Zero-Leverage Firms in the U.K. Market: Stock Trading and Firm Performance

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Abstract

In my thesis, I examine stock market reactions and liquidity effects following the first, subsequent and all bank loan announcements of zero-leverage firms. Using a sample of 96 zero-leverage firms listed on the FTSE 350 index over the time period of 2000-2015, I find evidence of a significant and permanent stock price increase as a result of the initial loan announcement. The loan announcement results in a sustained increase in trading volume and liquidity. This improvement continues to persist once I control for stock price and trading volume effects in both the short and long run. Furthermore, I examine the spread decomposition around the same period, and discover that the adverse selection of the bid-ask spread is significantly related to the initial bank loan announcement. Then I continue my research focus on the subsequent loan of zero-leverage firms, I discover a significant and permanent stock price increase as a result of the subsequent debt announcement, but not as pronounced as the initial loan announcement.

With the majority of existing research based on the block trading data, I am the first to examine the order flow ratio of zero-leverage firms. Based on 16 years examine period, I discover price continuations follow buys and reversals follow sales. I also observe that purchases have a greater impact on permanent price changes. Once price effects are estimated using quote returns to eliminate the bid-ask bias, the asymmetry in buyer-and seller-initiated trades is dramatically reduced. I find that there is a clear tendency that the order flow is imbalanced during the announcement period.

My results can be attributed to the information cost/liquidity hypothesis, suggesting that investors demand a lower premium for trading stocks with more available information. The bid-ask bounce can explain asymmetry in the trading direction of zero-leverage firms when they encounter debt for the first time. The announcement effect impact on the initial loan are significant different from any other bank loans, which confirms the unique role of the bank system and the significant effect of the levering up of debt free firms.

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Preface

Chapter three of this thesis will publish:

Zhang,S. , Gregoriou, A., and Jerome. H., (2018). “Initial Bank Loans, Zero-Leverage Firms and Stock Market Liquidity: New Empirical Evidence from the UK”, *Journal of Economic Studies*, Forthcoming.

Chapter four of this thesis will publish:

Zhang,S., and Gregoriou, A., (2019). “The price behavior around initial loan announcements: Evidence from zero-leverage firms in the UK”, *Research in International Business and Finance*, Vol. (50), 191-200.

Dedication

I dedicate this thesis to my parents, Yue Jing and Jin Zhang, my grandparents, Chunyuan Wang, Shusen Jing, Shuyuan Li and Huixiang Zhang, and my auntie, Yang Zhang. They are the most important people in my world.

谨以此文献给我挚爱的家人，我的爸爸妈妈，姥姥姥爷，爷爷奶奶和小姑。

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Declaration

I declare that the research contained in this thesis, unless otherwise formally indicated within the text, is the original work of the author. The thesis has not been previously submitted to this or any other university for a degree, and does not incorporate any material already submitted for a degree.

Chapter One

Introduction

1.1 Basic Capital Structure Theories

One of the fundamental questions in corporate finance is: How do company choose their capital structures? This question is at the center of the “capital structure puzzle” put forward by Myers (1984). Before and after Myers’s study, many discussions attempt to answer this question. More precisely, how much closer have previously existing empirical models and identified determinants moved us toward solving the corporate leverage puzzle? Given this progress, how can we move closer to ultimately providing a more complete understanding of capital structure decisions? My study investigates why a surprisingly large number of firms chose to follow a zero-leverage policy, which is defined as a company that does not possess any short or long-term debt and has become an international phenomenon.

Most of corporate finance studies begin with two fundamental theories: Trade-off theory and Pecking order theory. The Trade-off theory of financial leverage in corporate finance predicts that the optimal capital structure is achieved by balancing the costs and benefits of debt. The theory indicates that corporations can increase firm value by levering up to a certain point, and thus we should observe some use of debt by corporations. Myers and Majluf (1984), and Myers (1984), propose the “Pecking order theory” in which firms will not have an optimal capital structure, but will instead follow a pecking order of incremental financing choices, that places internally generated funds at the top of the order, followed by debt, and finally, when the firm reaches its debt capacity, equity. The defining prediction of the model is that there is a financing hierarchy of retained earnings, debt and then equity. The development of a pecking order based upon costs derived from asymmetric information between managers and the market, and the assumption that trade-off between costs and benefits of debt financing are second-order importance, when compared to the costs of issuing new securities in the presence of asymmetric information. Because there is an informational dilution cost to issuing equity in the presence of asymmetric information as mentioned in Myers and Majluf (1984).

Myers (1984) indicates a definition of debt capacity to measure the firms’ ability to issue debt, the debt capacity point is the point at which an increase in the use of debt decreases the total market value of the firm’s debt. A firm with higher debt capacity borrow from the public[1] whereas the firm with low level of capacity borrow from bank, or other financial intermediaries.

[1] The “Public debt” here is defined as the sum of the financial obligations incurred by all government bodies of a country. This debt can be accumulated by the government directly or a government agency at any level.

The combination of the Pecking order theory and debt capacity suggests that the Trade-off theory is a determination for high levels of leverage, and adverse selection cost is a primary motivator of conservative or zero-leverage policy. These firms are usually have fewer tangible assets, more volatile cash flows, smaller market capitalization, and are more opaque, and are likely to demand lower levels of debt financing compared to firms with high levels debt capacity.

1.2 New Trend: Zero-leverage Phenomenon

However, in reality firm financial behavior is not completely consistent with these two theories, a zero-leverage capital structure policy is becoming increasingly popular over time. A zero-leverage firm is defined as a company that does not possess any short or long-term debt. More broadly, Minton and Wruck (2001) define the financial conservatism policy as a persistent financial policy of low leverage. A firm is categorized as a conservative firm if its annual long-term debt ratio to total assets fall in the bottom 20% of all firms for five consecutive years. Strebulaev and Yang (2013) find for United States companies a large amount of firms are deliberately avoiding any short or long-term debt in their capital structure, on average, 10.2% of firms do not have any debts in a period from 1980 to 2007. Dang (2013) discovers more than 12.18% of public, nonfinancial United Kingdom companies operate a zero-leverage policy between 1980 and 2007. D'Mello and Gruskin (2014) find that 11.57% of firms have no debt in their sample from COMPUSTAT from 1977 to 2010. The percentage of zero-leverage firms increases from 6.68 percent in 1977 to 8.24 percent in 1990, to 13.67 percent in 2000, and in 2010 almost 20 percent of all firms have no debt. The conservative firms which leverage ratio less than 5% debt in their capital structure increase from 14.01% in 1977 to 34.42% in 2010. Consistent with D'Mello and Gruskin (2014)'s study, Lee and Moon (2011) find in their sample, about 9 percent of did not have any debt in their capital structure for at least three consecutive years during the period of 1989-2008. Also, the proportion of these firms has been steadily growing over time from 4.4 percent in 1991 to 12.6 percent in 2008.

A small existing body of the literature seeks the reason behind why firms choose an extremely conservative leverage policy. Devos et al. (2012) argue that zero-debt firms lack reputation in credit markets, that is, credit constraints, is a primary reason why they remain unlevered. Other hypothesizes are associated with the zero-leverage policy include the financial flexibility and managerial entrenchment. Financial flexibility hypothesis suggests that the debt-free firms hold significantly more cash and initiate debt when investment opportunities materialize. Managerial entrenchment hypothesis believes that the internal and external governance mechanisms are weaker for zero-debt firms compared to their levered control firms, however, recently, some of the studies which indicates that zero-debt policy is not induced by managerial entrenchment.

1.3 Financial intermediation and Zero-leverage Firm

When firms need external funds, they may choose between public debt or bank loan. Firms with a higher level of riskiness and a lower debt capacity to borrow from bank, which is believed usually more flexible. Campbell and Krasaw (1980) believe that one of the most important roles of financial intermediate is information transmission, the bank can provide the relatively lower monitoring costs, reduce the information asymmetry and improve the market efficiency by accessing firms' private information. Fama (1985) and Diamond (1991) indicates that bank lending activities certify firm quality and signal credit worthiness to outside investors. Bank relations allow firms to build-up reputation to counter adverse selection and moral hazard problems intrinsic to the external financing process. Berger and Udell (1995) and many other researches believes that banks have the competitive advantage over other lenders in reducing information asymmetry problems by producing and analyzing information, the transactions give banks the opportunity to gather a lot of information on their borrowers at minimum costs by setting loan contract terms, such as the interest rate charged or the collateral required. Other lenders who do not have this privilege have to pay more information costs.

Ferguson and Grosse (2014) investigate the relationship between zero-leverage firms and their initial bank loan announcements. This is a very interesting avenue of research as it looks at stock market reaction when zero leverage companies use debt for the first time in their capital structure. The results using data from the Australian Mining Industry show that bank loan announcements can signal important price sensitive information regarding the borrowing firm's inside information. Mining industry in Australian is believed to have a poor information environment and high information asymmetry. They go on to establish that the initial loan announcements relate to improvement of stock market liquidity (bid-ask spreads) and reduction of information asymmetry.

1.4 Contribution

In my research, I investigate the stock performance of zero-leverage firms over both the short- and long-term, from many different aspects. To the best of my knowledge, existing studies are primarily concerned with the motivation for financial conservatism and characteristics of the all-equity firms. Strebulaev and Yang (2013) address the long-term stock performance of zero-leverage firms, but they do not focus on the relationship between bank loan and these financial conservative firms. Ferguson and Grosse (2014) analysis the relation between initial loan announcement and the stock performance of zero-leverage firms, but they only look at the short term affect as they base their analysis on an 11-day event window. I provide more thorough econometric evidence as I look at short and long-term relationships between initial loan announcements and liquidity, by testing initial, subsequent and all other bank loan announcement respectively. More specially, I analyze a 181-day event window abnormal returns, spread decomposition, and also by capturing liquidity affects through price impacts rather than just via bid-ask spreads.

Secondly, Ferguson and Grosse (2014) focus only on a single industry. This potentially limits the findings of their research. According to Strebulaev and Yang (2013), the zero-leverage policy is not an industry-specific phenomenon, it can be found in most industries. It implying that I should look at a variety of industries in order to obtain robust results. This is achieved by analyzing the FTSE 350 index which is representative of the entire UK stock market, it is the aggregation of the FTSE 100 and 250 index and represents the largest 350 firms listed on the UK stock market with respect to market capitalization.

Furthermore, I am the only study to date to empirically examine the relationship between initial, subsequent and all other loan announcements and information asymmetry of zero-leverage firms. In Ferguson and Grosse (2014) studies, for example, they make the unrealistic assumption that changes in total bid-ask spreads are directly associated with movements in information asymmetry. This is unrealistic as there is ample evidence that the bid-ask spread is made up of three components, each of them contributing to various aspects of trading costs. The order processing component measures the cost of executing the trade on a stock exchange (see among others, De Jong et al., 1996). The inventory holding component captures the costs that market makers face due to the fact that they hold an undiversified portfolio (see among others, Huang and Stoll, 1997). The adverse selection component provides a proxy for information asymmetry as market makers could be dealing with investors that possess superior information to them (see among others, Glosten and Milgrom, 1985). I accomplish this by decomposing the asymmetric cost component from the total bid-ask spread.

My study also makes a contribution on the analysis of the position of trades within the spread. It could indicate that the order flow imbalance causes buying or selling pressure on the loan announcement event day of zero-leverage firms. Blume et al. (1989) and Lease et al. (1991) examines the relationship between order flow imbalance and stock return during the bad news announcement period. In contrast, in my research, the loan announcements can be regarded as a favourable event. Adopted debt for the first times causes a positive reaction in market value of the firms, decreasing the bid-ask spread and increasing the stock price, this is because bank lending activities certify firm quality and signal credit worthiness to outside investors.

My study is the first and only so far to examine the bid-ask bounce and price impact on zero-leverage firm around their loan announcement. To the best of my knowledge, the results of the previous theoretical predictions on asymmetric price impact and bid-ask bounce have not been tested empirically on zero-leverage firms. It is not clear whether similar results hold for zero-leverage firms or any other small or infrequently traded stocks. I fill this gap by empirically testing the previous theoretical model (Frino et al., 2003; Gregorious, 2008), which highlights the importance of bid-ask bounce effects on price impact and order flow imbalance. According to previous researches, zero-leverage firm are usually comparatively smaller than other leveraged firms with relatively high percentage spreads, suggesting that detection of a buy and sell order imbalance is more straightforward. This order flow imbalance should be larger for my sample than for a sample which includes all FTSE 100 or NYSDAQ firms that typically have larger market capitalization and lower stock price volatility. The previous literature (e.g.: Han and Lesmond, 2011) reveal that bid-ask bounce caused volatility is more important for the pricing of small and illiquid stocks than large stocks. Kaul and Nimalendran (1990) show that bid-ask errors can explain 50% of the daily return variances of small firms whereas for the largest firms in their research this proportion is just 23%. Rhee and Wang (1997) believe that the spread size is one of the sources of stock return errors. If the spread is minimal, the bid-ask error become unnoticeable. The volatility of spread during the announcement period create a favourable environment for detecting the bid-ask bias. Therefore, I would expect that the order flow imbalance should be larger for my sample than for a sample which includes levered firms listed in widely established financial markets such as the FTSE 100 or NASDAQ. My research is also the first to examine the asymmetric price impact of zero-leverage firms around their initial loan announcement.

One of the other contributions of my study is the size of my sample, my observations are significantly larger than previous studies. For example, in the examination of price impact effect on the zero-leverage firms, I examine 28,342,080 buy and 26,101,600 sell trades in my empirical framework, which is approximately six times bigger than Alzahrani et al. (2013) and 20 times grader than Gregoriou (2008). The FTSE 350 represents around 89% of the entire trading volume on the London Stock Exchange---the world's third largest equity market by market capitalization. Most previous research analyzes order imbalances around specific events concentrating on a short time period, for example, Blume et al. (1989) analyzes order imbalances during one month. Chan and Fong (2000) examine for six months. I investigate the price impact of zero-leverage firms traded on the London Stock Exchange over a 16-year time period. My data span is significantly longer than previous studies, for instance, Alzahrani et al. (2013) looks at 4 years and Gregoriou (2008) explores 8 years of time series data. Moreover, my sample firms are significantly larger than previous studies, 96 zero-leverage firms listed on the FTSE 350 cross many different industries. The prior studies, for example, Hasbrouck and Seppi (2001) and Brown et al. (1997) study order imbalances for thirty and twenty stocks, over one and two years, respectively.

Chapter Two

Literature Review

2.1. Capital Structure theories

The modern sense of corporate finance starts with the Modigliani and Miller (1958)'s capital structure irrelevance model (M-M model). In their model, a firms financial structure is irrelevant to investment because external funds provide a perfect substitute for internal capital. In general, with perfect capital markets, a firms investment decisions are independent of its financial condition. If all firms have equal access to capital markets, firms responses to changes in the cost of capital or tax-based investment incentives differ only because of differences in investment demand. Modigliani and Miller (1958) believe that all the criteria of rational decision-making should be based on two aspects, the maximization of firm profits and the maximization of market value. However, Fazzari et al. (1988) believes that outside of Miller-Modigliani world, finance tends to affect real investment decisions when there are missing or incomplete markets due to transaction costs or asymmetric information. In a world with incomplete markets, information asymmetry between shareholders, debt holders, and management cause agency problems, give rise to underinvestment or overinvestment incentives, investment may not be fully responsive, or may be over-responsive, to changes in economic fundamentals.

Furthermore, Stiglitz (1969) notes that there are some limitations of the M-M model: First, it depends on the existence of risk classes, which is based on analysts' forecasts. Some research believes that bankruptcy costs which including the transaction costs of liquidation or reorganization, probably discourage borrowing, then affected the validity of the theory. Robicheck and Myers (1966) argue that even if bankruptcy is ultimately avoided, costs of financial distress are incurred when the firm suffers the threat of bankruptcy.

Myers and Majluf (1984) develop the issue-invest decision under some assumptions. If the firm finally decides not to issue and therefore not to invest, the firm will pass up valuable investment opportunities, the real capital investment will be misallocated and firm value reduced. Nevertheless, the firm financed with risky debt will suffered more possibility of bankruptcy. Myers (1984) try to answer how do firms choose their capital structure by two theories: Trade-off theory and Pecking order theory. Static Trade off framework believe that firms are setting an optimal debt-to-value ratio then gradually moving towards it. In the Trade-off theory, a firm's target debt ratio is usually viewed as determined by balancing between the costs (e.g.: bankruptcy costs) and benefits (e.g.: tax benefits) of borrowing. The second one is Pecking order theory, firms always prefer internal (e.g.: remaining earnings) to external financing. Frank and Goyal (2009) believe that in the pure pecking order framework, the firm has no well-defined optimal debt-to-value ratio. Retained earnings are always a better source of funds than outside financing. If retained earnings are inadequate and external finance is required, firms issue the safest security first, start with debt, equity is used on as a last choice. In the perspective of outside investors, both debt and equity have an adverse selection risk premium, but equity is strictly riskier than debt, therefore the premium is larger on equity, an outside investor will demand a higher return on equity than on debt. Ravid and Spiegel (1997) believe that firms will use riskless debt first before turning to equity financing. Under the Pecking order theory, a firms' internal and external capital are not perfect substitutes, internal cash flow may affect investment spending because of a "financing hierarchy" in which internal funds have a cost advantage over new debt or equity finance. Thus firms investment may depend on financial factors, such as the availability of internal finance, the functioning of particular credit markets, and access to new debt or equity finance.

Helwege and Liang (1996) believe that one of the motivation of Pecking order theory is the degree of asymmetric information facing by firm. All else equal, a company which faces greater asymmetric information problems will have a stronger incentive to issue debt because external financing is more expensive for riskier securities, a change in risk will have a larger effect on the pricing of its stock performance. Fama and French (2002) and Frank and Goyal (2003) argue that the firms with the greatest potential for problems of asymmetric information will have the greatest incentive to follow the Pecking order theory. Frank and Goyal (2009) indicate that equity with more adverse selection problem will result in more negative market reactions. Among the three sources of funds, equity has serious adverse selection, debt has only minor adverse selection, and retained earnings avoid the problem. The insider often knows the true value of the firm's assets and growth opportunities better. Outside investors can only guess these values. If the manager decides to sell equity, then the outside investor must want to know the motivation of decision. In many cases, the overvalued firm's management will be happy to sell equity, while an undervalued firm's manager will not. Masulis (1988) shows that stock prices rise when a firm offers to exchange debt for equity, fall when they offer to exchange equity for debt. He also points out the firm's willingness to exchange debt for equity might signal the management of firm believe the firm's debt capacity increased, and an increase in firm value or a reduction in firm risk. Thus, a debt-for-equity exchange would be good news, and the opposite exchange is bad news.

Recently, many papers (e.g.: Shyam-Sunder and Myers, 1999; Agca and Mozumdar, 2007) conclude that comparing to a static Trade-off model (which predicts that more profitable firms should have more leverage), the Pecking order theory explains conservative firms' financing decisions better. The Trade-off theory argues that a firm adjusts leverage until it reaches its target debt-to-value ratio, while the pecking order yields debt issuance until the debt capacity is reached. Minton and Wruck (2001) also believe that financially conservative firms follow a pecking order style financial policy. Low leverage firms have a high flow of funds surplus and large cash balances relative to more leveraged firms, it increases the likelihood of adopting a more conservative financial policy; firms with sufficient internal funds will avoid using any type of external financing, including debt financing. Moreover, financial conservatism negatively associated with higher discretionary expenditures, which increase the likelihood that a firm will have to raise funds externally. Trade-off theory predicts that firms will choose conservative financial policies only if they face high expected financial distress costs and/or attach a low value to interest tax shields. Jong et al. (2011) tests the trade-off theory against the pecking order theory from two aspects, issue decisions and repurchase decisions. In their U.S. samples, the Pecking order theory perform as a better descriptor of firms' issue decisions. In contrast, for repurchase decisions they find that the static Trade-off theory is a stronger predictor.

However, Leary and Roberts (2010) find that the Pecking order theory is never able to accurately characterize the firms' capital structure decision, in their sample, less than 20% of firms follow the pecking order's predictions when they make debt and equity issuance decisions. Even after restricting attention to firm who most likely facing information asymmetry problem, the Pecking order is still only able to explain at most half of the observed external financing decisions. Fama and French (2005) find in their sample during 1973-2002, more than half of the firms violate the Pecking order theory when issuing equity. During 1973 to 1982, on average 67% of their sample firms issue some equity each year and the proportion rises to 74% for 1983 to 1992 and 86% for 1993 to 2002. Gomes and Phillips (2005) find that the pecking order theory just provides a better prediction of the public issues and has difficulty accounting for the private issues.

2.2 Zero-leverage Firms

2.2.1 Motivations for Zero-leverage Firms

Based on these theories, zero leverage is surprising in that companies should use debt financing when they build up their capital structure (Modigliani and Miller, 1958). Even though Lazzati and Menjchini (2015) believe that the existence of zero-debt can be explained by shareholder value maximization. It is an interesting point that whether a firm's zero-debt policy is just driven by strategic motives or is a consequence of financial constraints. Previous studies have primarily focused on finding the economic rationale behind the zero-leverage phenomenon. Devos et al. (2012) tests three main motivations for firms to remain debt free, namely, the need for financial flexibility (Graham and Harvey, 2001). Managerial entrenchment (Jensen and Mecking, 1976), and credit constraints (Diamonds,1989;1991). The Financial flexibility hypothesis suggests that firms remain zero leverage in order to avoid financial distress when they suffer negative exogenous shocks, save firms' borrowing capacity for future investment opportunities, avoid excessive costs of raising funds externally and also to increase their future growth opportunities (e.g., Myers, 1984; Myers and Majluf, 1984; and Gamba and Triantis, 2008). Aivazian et al. (2005) finds that leverage has a negative effect on investment. Dang (2011) believes that firms with greater growth opportunities and severe information asymmetries may choose to hold substantial cash reserves and/or have spare debt capacity as a buffer against possible future financial constraints. These studies suggest that it is financial flexibility that primarily drives the management's leverage choices. In contrast, Devos et al. (2012) finds that there is no marked relationship between investment opportunities and leverage, the profitable future projects opportunity for unlevered firms are not much different from their leveraged control firms.

The supporters of managerial entrenchment include Jensen and Meckling (1976), Fama (1980), and Berger et al. (1997). They all argue that the management of firms choose to remain debt free in order to reduce financial risk, protect the manager's personal capital or increase their control among the board. When there is a threat to their entrenchment and private benefits, these managers will choose to lever up. Strebulaev and Yang (2013) indicate that management's personal preferences differ from those of shareholders, and it could be one of a plausible explanation of the zero-leverage phenomenon. In their research, a 1% standard deviation increase in CEO ownership increases the likelihood that a firm adopts zero-leverage policy by 3.3%. Moreover, CEO ownership and tenure are significantly related to zero-leverage policy only in firms with smaller and less independent boards. Family firms are substantially more likely to be zero-levered. In contrast, consistent with Byoun and Xu (2013), Devos et al. (2012) reports that zero-leverage firms do not suffer from weak internal or external corporate governance mechanisms, the debt initiation decisions of these firms are not triggered by shocks to managerial entrenchment.

Graham (2000) believes that it is due to credit constraints, firms may not be able to issue additional debt. Diamond (1989; 1991) suggests that the small and young firms are more likely to face borrowing constraints in credit markets. In Devos (2012) 's opinions, firm do not remain unlevered by choice, credit constraints are main reason for they do not have access to public markets and limit their ability to borrow. Such firms have not yet developed a reputation or lack a credit history. At the same time, these firms can pay dividends to signal earnings quality (Sufi, 2009). Hadlock and Pierce (2010) highlight the firm age and company capitalization emerge as particularly useful predictors of constraints and appear to offer additional explanatory power for predicting constraints are cash flow and leverage. Thus, when estimating a firm's leverage, it is important to include not only the determinants of its target leverage but also the constraints on a firm's ability to increase its leverage and the source of funds.

Some previous literatures tried to using "leverage effect" to explain zero-leverage firm (Black, 1976; Christie, 1982; Cheung and Ng, 1992; Duffee,1995), leverage effect indicate that if the value of a stock declines then the corresponding value of equity falls relative to debt, this leads to an increase in leverage levels which in turn leads to higher stock return volatility. Therefore if firm keep debt free, it should can avoid the stock return volatility caused by leverage level. However, Hasanhodzic and Lo (2011) believe that the volatility changes cannot be explained by leverage effect, given that these all-equity firms in their samples have no debt on their balance sheet, the observed negative relationship between stock returns and the future stock return volatility still exist.

2.2.2 Zero-leverage Firms and Macroeconomics

Lazzati and Menichini (2015), consistent with Frank and Goyal (2009), show that according to Pecking order theory, firms borrow more during expansions. During expansions, stock prices go up, taxable income goes up, expected bankruptcy costs go down, and internal funds increase.

Dang (2013) relates the zero-leverage phenomenon with macroeconomic variables, he finds in the UK stock market, high-growth firms control underinvestment incentives by reducing leverage but not by shortening debt maturity. Choe et al. (1993) believes that the economic growth reduces adverse selection costs which caused by information asymmetry. In an economic slowdown, firms more likely to choose a conservative debt policy because the value of collateral, against which they borrow would declines (Kiyotaki and Moore, 1997).

In addition, Arslan-Ayaydin et al. (2014) examines zero-leverage firm in some extreme economic environment, then find that firms who survive financial crisis are more likely to hold conservative debt polices. Based on East Asian crisis of 1997-1998 and the worldwide credit crisis during 2007-2009, economic and financial crisis clearly represent exogenous shocks to firms' financial performance. They classify firms into several groups according to their cash holding and leverage positions prior to crisis and during crisis period, then they find that the greater a firm's financial flexibility at the onset of a crisis, the less severe the decline in its investment expenditures and performance during the crisis. Overall, economic recession has an important effect on firms' zero-leverage decisions, and the effect is expected to be more distinct for constrained firms. Gertler and Gilchrist (1994) document that the macroeconomic impact on firms' borrowing ability depends on the financial constraints levels of borrowing firms. Firms with less financial constraints can borrow more to smooth the impact of the economic shock, while the firm with more financial constraints cannot afford to do due to the credit constraint.

2.2.3 Characteristics of Zero-leverage Firms

Strebulaev and Yang (2013) find that in their U.S. sample, zero-leverage firms are more profitable, smaller than their proxies, have higher market-to-book ratios, pay higher income taxes, and hold substantially higher cash balances. Guo and Hodges (2015) support the findings of Strebuaev and Yang (2013), small firms are roughly twice likely to keep debt free than large firms. Byoun and Xu (2013) find that the profit level of zero-leverage firms associated with their size, small debt-free firms are less profitable whereas large debt-free firms are more profitable than their leveraged peers with similar size. Zero-leverage firms pay substantially larger dividends. Lee and Moon (2011) test the long-run stock performance of zero-leverage firms zero-leverage firms are more self-disciplined and prudent in making decisions, overall, they outperform than other levered peers. However, inconsistent with Strebulaev and Yang

(2013), Lee and Moon (2011) believe that there is no relationship between zero-debt firms' higher market-to-book ratios and their debt-free policy, it could be due to their relatively healthier financial condition coupled with growth options and financial flexibility. Minton and Wruck (2001) analyze the low leverage phenomenon and show that financial conservatism is not an industry-specific phenomenon, even though conservative firms are widespread in industries prone to high financial distress.

Lemmon and Roberts (2008) find that corporate capital structures of zero-leverage firms are remarkably stable over time: firms that have low leverage tend to remain as such for over 20 years, more profitable zero-leverage firms are less likely to change their debt policy. Minton and Wruck (2001) find out on average, small firms adopt a persistent policy of low leverage for five years in their sample. DeAngelo and Roll (2015) document that the capital structure varies significantly over time for most firms. However, when capital structure does appear to be stable, it is usually with low-leverage firms. It disagrees with Kaplan (1991)'s study who suggests that extreme capital structures are transitory. Graham (2000) finds that firms have the opportunity to increase their leverage but are still choosing to keep debt free, it results that firms appear to be missing the opportunity to create significant value by increasing their leverage and reducing their tax payments. Strebulav and Yang (2013) show that a significant number of firms persistently follow zero or low leverage policy, even though such firms could apparently increase their value by around 7% by levering up. They find the smaller, less tangible firms are more likely, dividend payers are less likely, to lever up. Zero-leverage firms are less likely to follow the zero-debt policy when they have lower tangibility, pay out larger dividends or have more counterparts that also follow the zero-leverage policy, they define entry (exit) event as a firm following a non-zero-leverage (zero-leverage) in the last financial year and a zero-leverage (non-zero-leverage) policy in the current financial year. Future abnormal capital expenditures are negatively related to entry and positively related to exit, consistent with that financial flexibility can be an important motivation for adopting the zero-leverage policy. Firms for whom the tax gain of debt are greater, the cost of financial distress lower, and the mispricing of debt relative to equity more favorable are expected to be more likely to lever up. Higher leverage confers a higher tax shield, but risk of financial distress will increase.

Previous study has classified the zero-leverage firms as financially constrained and unconstrained (Faulkender and Petersen, 2006; Lemmon and Zender, 2010; Hadlock and Pierce, 2010), based on these results, Bessler et al. (2013) defines the demand- and supply-side explanations for zero-leverage. Supply-side effect indicates that most zero-leverage firms are financially constrained and do not have the choice to obtain debt financing. These firms tend to be younger, smaller, less profitable and have a higher degree of risk, and have less flexible in their investment decisions. They follow a zero-leverage policy for longer periods of time since they do not hold sufficient debt capacity. In contrast, demand side effect shows a small group of zero-leverage firms that deliberately choose to adopt a zero-leverage policy. These firms are financially unconstrained, older as well as larger than their constrained zero-leverage peers, more profitable, and distribute higher dividends, most of them preserve their debt capacity for future profitable projects. So they maintain a zero-leverage policy only for a short period of time, after abandoning zero-leverage, these unconstrained firms usually make higher investments, reduce cash holdings by a larger amount and choose higher leverage ratios compared to their constrained zero-leverage peers.

2.3 Bank Loan

2.3.1 All Bank Loan

There is a large body of prior literature that bank loans differ significantly from other forms of finance. Chemmanur and Fulghieri (1994) define the role of banks as the information producers, the banks have an advantage over other lenders in producing borrower's information. Banks have a relative information advantage over external parties, so they are able to examine potential borrowers more effectively than the public as they have access to private information about the firm, giving them (Leland &Pyle, 1977; Lummer and McConnel, 1989). Aintablian and Roberts (2000) indicate that bank lending can provide unique monitoring services. Ongena and Roscovan (2013) believe that as the provider of private informative signals, bank loan announcement can make investors assess the value and the credit quality of the borrower better.

Fama (1985) suggests that the banks access private corporate information, signals creditworthiness of borrowing firms and lowers information costs for other agents. As the establishment of relation between bank and borrowing firm, bank information accrues over time, loan renewals also conveying positive information. Diamond (1984) and Ramakrishnan and Thakor (1984) document that loan initiations signal firm value, monitoring is a key intermediary service of financial intermediation. Inspired by Diamond's study, Datta et al. (1999) indicates that one of the most important of initial bank loan is the borrower can be monitored by financial intermediates and the bank debt significantly reduces the monitoring cost. On the other hand, given that banks are in a relatively safer position than other lenders, it is understandable that the banks may be more willing than other lenders to offer a bigger loan amount to a firm with information asymmetry problem, and the market will believe signals of the banks who have a sufficient stake in the market that they have no incentive to misrepresent their information (Campbell and Kracaw, 1980).

A large body of research has shown that bank loan announcements result in positive returns for borrowing firms. An announcement of an initial bank loan agreement or a renewal of an existing loan agreement causes a positive reaction in the market value of the borrowing firm. Moreover, Aintablian and Roberts (2000) find that positive announcement effects are stronger when a bank issuing a loan to a weaker credit borrower, or the lending bank is more reputable. James (1987), consistent with Maskara and Mullineaux (2011), reports an abnormal return of 1.93% during the two-day period around the announcement date. Other types of corporate financings, such as bond financings, is either significantly negative or no significant abnormal returns, so bank loans are unique or special. Mikkelson and Partch (1986) report a significant excess return of +0.89% than other financing resources around the announcement of bank loan agreements.

Morck and Nakamura (1999), Chemmanur and Fulghieri (1994) find information provided by lending bank is particularly material when there is a significant possibility that the borrower may be in financial distress. Firms with higher probability in financial distress preferred bank loan even though the firms will be charged a higher interest rate compare with the publicly trade debt, and firms with lower probability in financial distress preferred publicly traded debt, because they are able to borrow at a lower interest rate and could avoid competing with high risk firms in bank loans. Furthermore, Rajan (1992) indicates that for the zero-leverage firm which want to entry the credit market first time bank act as a monolithic, readily accessible creditor so the bank debt is easily renegotiated.

Moreover, Boscaljon and Ho (2005), consistent with Mikkelson and Partch (1986), James (1987), Best and Zhang (1993), focus on the information asymmetry problem in uncertainty macroeconomics, suggest that loan announcement effects are largest during the Asian financial crisis, banks play a unique role as a lender in reducing information asymmetries. During the greater economic uncertainty period, bank loan announcements are expected to convey more information than in normal times. D'Auria et al. (1999) finds that in some countries (e.g.: Japan and German), banks act as a risk sharer, willing to support borrowers in the expectation of future earnings. A long-term credit relationship provides the bank with better information about the firm's financial position and its prospects and makes it convenient to support creditworthy companies even in periods of financial distress.

In recent years, some studies (e.g.: Jams and Smith, 2000; Billet et al., 2006 and Fields et al., 2006) start to question whether the banks are still having a unique role and find the market response to bank loan announcements have diminished since the findings by James (1987). Billet et al. (2006) finds that the bank loan is not a better choice than other financing resources. After the announcement, bank loans do not decrease the information asymmetry problem, borrowers had operating performance below their non-borrowing firms' one year after their loan announcement, and it does not improve in the following three years, earnings announcement returns are even more volatile in post-loan period than pre-loan period. Fields et al. (2006) suggests the diminishing loan announcement effects is consistent with the rapid change in both information market and financial market. As the development of technology, market reaction to bank loan announcement have become insignificant in the years. Loan initial issuance and renewal loan agreements returns were significantly positive during the 1980s, however, the returns become statistically insignificant by the 2000s for both initial and subsequent loan, bank loan relationships matter less than previously, for smaller companies and for firms with poorer stock price performance prior to the announcements, renewal loan announcement returns are more likely to be positive.

These different results on the bank loan can be explained from several ways. First, Billet et al. (1995) and Ongena and Roscovan (2013) believe that informative signals from bank are in different qualities, high quality, competitive, foreign lenders seen to perform better in selecting and monitoring their clients, rather than local lenders that may have known bank's information before the loan been issued, higher quality bank lenders lead to higher abnormal returns for the borrowing firm. When a loan been issued by a foreign bank, the 2-days cumulative abnormal return (CARs) on the stock is about average 91 basis point. Comparing with U.S. countrywide loan announcements yield only 44 basis points and neighbour-state loans -20 basis points even larger when they control for loan and firm characteristics and macroeconomic conditions. In a related study, Thakor (1996) documents that loans from lending banks who face more capital constraints usually lead to greater announcement effects on borrowers' stock price. They tend to ration credit more severely, equity markets react more positively when such banks grant loans.

Secondly, Lummer and McConnel (1989) suggest that it is the action of the bank signals information, rather than the borrower's decision. They believe that the negative information related to the borrower is usually known before the loan announcement, bank loan announcements tend to reveal more positive information therefore market is more likely to reacting to the positive news. Boscaljon and Ho (2005) extend Lummer and McConnel (1989)'s explanation, find that for the mixed loan announcements, there is greater volatility related to the borrower's financial condition before the loan announcement. Positive loan renewals and revisions are accompanied by a stock price increase, shows that the bank desires to begin or continue to work with the borrower and sends an overall positive signal to the market. While the announcements of loan reductions and cancellations are accompanied by a stock price decrease. Moreover, if the loan is cancelled by the bank, the stock-price performance is even more negative than average.

2.3.2 Initial Bank Loan of Zero-leverage Firms

Denis and Mihov (2003) indicate that there are three debt financing resources can be chosen by the zero-leverage firm which has the ability, or want to lever up: bank loan, non-bank private debt and public debt. Previous studies find that larger and more profitable firms borrow from the public, they usually have a higher fixed asset to total asset ratio, higher credit ratings than borrowers from either banks or other private debt. Diamond (1989; 1991) is the widely cited example of how the firm build up their reputation in credit markets, he believes that firms borrow and repay from bank until they establish a good credit reputation. Reputation is a valuable asset, zero-leverage firms that entry debt market first time build reputation through bank loans can reduce their public debt cost. Consistent with Titman (2002), Faulkender and Petersen (2006) investigate that firms have lower leverage or zero-leverage is more likely need to borrow from banks, since they are more informationally opaque. Very little public information is available about such firms, and given their small size, the relative collecting information cost can be quite high. Denis and Mihov (2003) also suggest that this kind of firms can build their reputation in debt markets, by initially borrowing from a bank.

Arbel et al. (1983) and Slovin et al. (1992) discovers that client firm share price response to bank loan initiation have a negative relation with the firm size. Financial market analysts pay more attention to relatively large firms so that the large firms are well monitored and have established reputation in credit market, banks have less comparative advantage in the external financing process relative to financial performance. Whereas small firms which younger, lesser reputations and lesser public information face more severe adverse selection problem. Hadlock and Pierce (2010), consistent with Slovin et al. (1992), report that the small firm which has short history and low leverage companies suffer more from adverse selection and information asymmetry, thus they derive greater benefits from the screening and monitoring entailed in bank lending relations. For small firms, both initial and subsequent loans are significantly positive, subsequent agreement generate more favourable share price effects than initiations.

Based on previous results, Ferguson and Grosse (2014) find that initially bank loans can be seen as a signal of private information from a bank and can help to relieve the information asymmetry problems, an announcement of leveraging up reduces information asymmetry for market participants. Bank loan announcements were associated with a reduction in firm's information asymmetry. Moreover, share price and average abnormal trading turnover is significantly positive around the bank loan announcement day. In their multivariate tests, the cumulative average abnormal return was still positive for the next ten trading days, bid-ask spreads narrowed due to the reduction of information asymmetry.

2.3.3 Sequential Loans and Stock Market Returns

Beyond screening, keeping a long-term relationship with a reputable bank can be advantageous to the borrowing firm (Best and Zhang, 1993; Houston and James, 1996; DeGryse and Ongena, 1999). Lummer and McConnel (1989) show that during the first loan relationship, borrowers continue to disclose their private information to banks that assess loan quality. Some applicants are rejected whereas others are extended loan agreements with bank. Bank monitors consider subsequent loans to the same borrowing firm use private information collected during the initial loan monitoring process, to assess the quantity of borrower's future projects and the risk of subsequent loans, thus achieve an information advantage relative to competing banks that keep to face information asymmetry. Alternatively, if the firm is facing financial difficulties, the bank can increase the interest rate, tighten various protective covenants, or cancel the loan. These decisions signal negative information to the market. Chemmanur and Fulghieri (1994) believe that renewals of bank loans will convey more positive information compared to those of initial bank debt. Loan renewals from more reputable banks convey more favorable information, more reputable lenders devote more resources toward assessing firms and consequently obtain more accurate information.

Rapid changes in financial services prompt the banks focus more on building long-term relationships with borrowers (Boot and Thakor, 2000). Haubrich (1989) considers that repeated lending over time between the bank and borrower creates a relation contract that makes it easier for the bank to produce information. Some studies provide evidence that renewal loans often generate greater abnormal market returns than do announcements of initial loan (eg: Lummer and McConnel, 1989; Kwan, 1994; Billet et al., 1995). Cole (1998) finds that a bank lender is more likely to extend credit to a borrower with which it has a pre-existing relationship with them, such relationships generate valuable private information about the firm's financial prospects, regardless the length of this relationship.

At the same time, Consistent with Berger and Udell (1995), Blackwell and Winters (1997), D'Auria et al. (1999), Athavale, and Edmister (2004) find that the process of screening loan applicants and monitoring loan extensions results in resolution of information asymmetry. Blackwell and Winters (1997) show that the bank will extend subsequent loans at a lower cost due to the information advantage, and it is also lower than the rate that could be obtained at competing banks that continue to face unresolved information asymmetry.

However, Greenbaum et al. (1989), Sharpe (1990) and Wilson (1993) who all suggest that firms pay a higher interest rate on their renewal loans. Greenbaum et al. (1989) believes that the longer the relation between the lender and the borrower, the higher the loan rate that the bank will charge and the shorter the expected remaining duration of the relation. Incumbent bank charges a price higher than the average price offered by the competitors, as a consequence of monopoly power owing to its private information and to the client's information collection costs. On the other hand, the price of competitor banks better than incumbent banks in order to attract the client, establish a relationship, and reap the future monopoly profits. A bank will earn positive expected profits on subsequent loans, such profits as offset by the bank's expected losses in its initial loan offer made to attract the borrower.

Whereas Slovin et al. (1993) and Petersen and Rajan (1994) find little evidence to support there are any significant change in the subsequent loan rates. Degryse and Cayseele (2000) examine the bank-lender and firm-borrower relationship from two measures, duration and scope. Duration is the length of financial relationship between the bank and the borrowing company. Scope represents the number of services the bank provides to the firm. They document that the loan interest rate is increasing in the duration of the bank-firm relationship, and the rate of increases is lower when the scope of the bank service is broader.

2.3.4 Loan Maturity and Firm's Performance

Custódio et al. (2013) finds that there has been a reduction in debt maturity across the borrowing firms during the last three decades. The median percentage of debt with a maturity more than three years relative to total debt has fallen from a high of 63.5 percent in 1976 to 21.2 percent in 2000. James (1987), consistent with Rajan (1992), find that shorter maturity loans more likely to be related with positive announcement effects than longer maturity loans, since shorter maturities' bank loan can enhance the banks' monitoring and controlling over the borrower. Stohs and Mauer (1996) after taking into account the signalling effects of debt and liquidity risk, obtain that debt maturity has a negative impact on firm's financial performance, firms with larger potential information asymmetries issue more short-term debt to minimize adverse selection costs. Titman and Wessels (1988) believe that firms with a small market capitalization have a higher proportion of short-term debt to minimize flotation costs of long-term debt, this is consistent with Mitchell (1991), who indicate that a firm is more likely to issue shorter-term debt if the firm is not a large public firm which traded on the NYSE or in the S&P 500. Flannery (1986) indicates that under the signaling model, firms with larger earnings surprises are more likely to use shorter-term debt.

Several research papers also examine the relationship between the maturity of bank loan and corporate investment. Barclay and Smith (1995) discover that firms which are regulated or have a few investment options prefer long-term debt, because using too much short-term debt exposes them to the high cost of suboptimal liquidation, which may outweigh the benefits of reduced agency costs. Johnson (2003) believes that longer-term debt increases liquidity risk and has negative impact on growth opportunities. Shortening debt maturity so that borrowers can refinance before investment opportunities expire. However, Dang (2011) finds there is no significant relation between debt maturity and growth opportunities. For his U.K. sample form

1996-2003, the sample firms rely considerably on short term debt and tend to be constrained from shortening their debt maturity. This is consistent with Rajan and Zingales (1995), Antoniou et al. (2008) and Datta et al. (2005).

Diamond and He (2014) point out short-run debt is known to have several other drawbacks. Short-term debt is less sensitive to changes in firm value, it leads to more volatile future equity value, hence more volatile future overhang and influencing immediate investment incentives. It is consistent with Diamond (1991), short-term debt allows for a reduction in borrowing costs when a firm receives good news and the debt is refinanced. However, short-term debt exposes the firm to liquidity risk, loss of unassignable control rents if lenders will not allow refinancing and the firm is liquidated.

2.4. Liquidity

2.4.1 Definition of Liquidity

Harris (1990) defines a perfectly liquid market is the financial market where any amount of a given stock can be instantaneously transferred to cash and back to stocks at no extra cost. More recently, Balasemi et al. (2015) points out that liquidity means the ease of buying and selling a security with no considerable change in the price. Hence the level of liquidity shows the effects that order has on the price, including the discounts granted by sellers or premium receivables by buyers for meeting an order in the market. Higher liquidity has higher prices than the securities with lower liquidity (Johnson, 2008), and has more ability to absorb large volumes of trading without creating any severe volatility in security price. In an imperfect world, a liquid market can be defined as where the transaction costs related with the conversion are minimised. Amihud et al. (2005) believes that liquidity is one of the key elements upon which the investor decides trading a security or not. Selling an illiquid security quickly can be difficult or even impossible without accepting a lower price (Bogdan et al., 2012). Rouetbi and Mamoghli (2014), based the previous research such as Kyle (1985), conclude that the liquidity more accurate by introduced three aspects: tightness means low transaction costs, such as lower bid-ask spreads and implicit costs; depth, which refers to the ability of a market participants to buy or sell any amount of stock beyond the posted bid-ask spread; resiliency, which describes the time and the speed that prices need to return to their equilibrium and new order flow quickly to correct order flow imbalance. Based on these three factors, Black (1971) contribute the fourth characteristics, immediacy, means the efficiency of trading activity, which incorporates the speed with which orders can be executed, settled in the liquidity framework. Sarr and Lybek (2002) proposes an additional component, breadth, means that orders are both numerous and large in volume with minimal impact on prices.

Harvey (1988) investigates that liquidity changes is a better predictor than the changes of stock price, because the security price contains a more complex mix of information that noisy the signals from stock returns. Baker and Stein (2004) show a positive relationship between liquidity and stock return, whereas some other researchers such as Omri et al. (2004) reports a negative relationship between these two variables. Becker and Paul (2008) finds that the stock liquidity influenced investment decisions, increase in stock liquidity would result in higher capital investment. Following the previous investigations, Chordia et al. (2001) discovers that stocks with more volatile liquidity have lower expected returns. Moreover, Levine and Zervos (1998) find that significantly positive correlations between stock liquidity and growth rates.

Many studies show both empirical and theoretical reasons that the importance of liquidity will be different for positive and negative return days (e.g.: Brunnermeier and Pedersen, 2009; Brennan et al., 2012). Down days has a significantly lower average liquidity than up days regardless the firm size. Investors are more likely to be concerned about the liquidity in the event of a price decline than about liquidity in the event of a price increase, since the leverage constraints may compel levered investors to sell in negative return days. Investors may fear the risk of being trapped in an illiquid stock in a negative return day. This would reduce the demand for stocks whose liquidity dries up in down days. Overall, the level of liquidity in down markets is usually more important for asset pricing than illiquidity in up markets. Hameed et al. (2010) finds that illiquidity in individual stocks as measured by the bid-ask spread increases following negative returns on the stock and negative returns on the market.

Generally, firms' liquidity come from two sources: internal liquidity, such as cash holding and cash flow; external liquidity, come from credit lines. Chan et al. (2008) investigates the liquidity contains two dimensions: liquidity level, a predictable part of the stock's tradability which keep free from the adverse consequences of market impact. Liquidity risk, which arises from the unpredictable changes in liquidity over trading process. Liquidity risk varies over time both for individual securities and for the whole market (Hasbrouck and Seppi, 2001; Acharya and Pedersen, 2005). In the recent year, the importance of liquidity level component is partly substituted by the liquidity risk. Lou and Sadka (2011) believe that the liquidity risk explains the cross-section of stock returns better than liquidity level, especially during the financial crisis. If both liquidity level and risk play parts on asset returns, liquidity level tend to lower the stock returns whereas liquidity risk tends to lower or change direction of the liquidity on asset return. Since in the crisis, liquid stocks suffered as much as even more than the illiquid stock, and stocks with lower liquidity risk performed better than those with high liquidity risk, irrespective of the liquidity level.

Amihud and Mendelson (1986) define the liquidity premium as the proportional to the present value of transaction costs multiplied by trading frequency, it is the compensates for price impact or transaction cost. Amihud (2002) discovers that the expected stock returns are an increasing function of expected illiquidity. “Risk premium”, or stock excess return, reflects compensation for expected market illiquidity, unexpected market illiquidity lowers contemporaneous stock prices. Thus the liquidity premium should much larger than the trading costs. By contrast, Vayanos (1998) argues that the liquidity premium no longer the most weight proportion of cost, it should be “second order”, smaller than transaction cost and hard to detect empirically. Ben-Rephael et al. (2012) distinguishes between the transaction costs and liquidity premium, concludes them into two groups, the first one is characteristic liquidity premium, associated with the trading costs of security. And the second one is systematic liquidity premium, associated with the sensitivity of the stock returns to changes in market liquidity. They find that while the systematic liquidity premium was large and robust until the mid-1980s in accordance with Amihud and Mendelson (1986), it has become small and “second order” since 1990s to then.

2.4.2 Transaction Costs

The previous studies have examined that the transaction costs are difficult to obtain for market efficiency tests, since the period between the transaction costs happened and the cost be collected is too long, and differential financial market structure restrict the compare of transaction costs. According to Stoll (2000) and O’Hara (2003), the availability of detailed microstructure data in the developed markets, such as U.S., allows for the construction of sharper measures of liquidity, such as bid-ask spreads, quoted share and dollar depth. Unfortunately, Kato and Loewenstein (1995) find these the microstructure data are often unavailable for some countries' stock exchange markets.

Domowitz and Steil (1997), Aitken and Comerton-Forde (2003) believe that transaction costs fall into two groups, implicit costs and explicit costs. Implicit costs market impact costs, opportunity costs and bid-ask spreads, arise due to regulation, information dissemination inefficient and inadequate technology, participation and instrumentation. The explicit costs include government tax and brokerage commissions cost, they are easy to quantify but remain outside the direct control of the exchange. Keim and Madhavan (1995) believe that one of the most straightforward ways to estimate the transaction cost is transaction bid-ask spread plus commission (S+C), reflects the transaction costs impact directly on daily security returns. However, the commission often reflects more on payments of brokers than the costs of executing a trade. Johnson (1994) argues that some of execution costs are often pay for marketing research which may not be associated directly to every individual trade, and the amount of commission cost cannot compare across different market and currencies. In effect, the S+C estimate can overstate the effective trading costs, thus S+C cannot measure transaction cost accurately.

Lesmond et al. (1999) assumes that transaction costs include not only the S+C costs, but also the opportunity costs and expected price impact costs. For informed traders, there exists a public information signal that investors use to guide their private information and consequent decision to trade. If the value of both the public and the private information is insufficient to cover the transaction costs, then these investors will either decrease their trading frequency or not trade, thus there will be no price movement from the previous day. For most liquidity-motivated traders, if the requirement for liquidity is sufficiently low and the transaction costs sufficiently high, they will reduce their trading frequency or stop trading and observe a zero return day. A stock with higher transaction costs will have less frequent price movements and more zero returns than a security with lower transaction costs. If transaction costs inhibit more informed investors from trading, then more zero returns will be observed because no new information, therefore, frequency of the zero-return days can be a proxy for the length of information accumulation.

After examining the time series of daily security returns for firms listed on the NYSE and AMEX from 1963 to 1990, Lesmond et al. (1999) finds that zero return days are very frequent, and it can be regard as an attractive empirical alternative for liquidity measure. As much as 80%

of the smallest firm's returns are zero and even for some of the largest firms, 30% of the annual daily stock returns are zero. The frequency of zero returns is inversely related to firm size, and directly associated with bid-ask spreads. Kato and Loewenstein (1995) find that some of these equity markets across the world exhibit a very large number of zero daily returns, for example, Colombia has a 52% incidence of zero daily returns across domestically listed firms, and the smallest incidence of zero daily returns is 6.6% in Taiwan.

2.4.3 Measure of Liquidity

Liquidity has proved to be difficult to observe, the prior research offers a wide variety of measurement proxies for liquidity. Aitken and Winn (1997) concludes that there are more than 68 extant liquidity methods used in existing studies, and there is little agreement on the best measure to use. Most of these methods fall into two broad categories: trade-based measures and order-based measures (Aitken and Comerto-Forde, 2003). Trade-based measures commonly used in the previous literature include trading volume, total trading value, turnover ratio and trading frequency. These measures are simple to observe by readily available data and have widespread acceptance. Order-based measurement, or bid-ask spread, is more accurately capture the cost associated with trading immediately. Aitken and Comerto-Forde (2003) find that there is little correlation between the two liquidity measure categories, suggest that the choice of measure will lead to totally different results. After estimating market liquidity using two types of measures on the Jakarta Stock Exchange (JSX) surrounding the Asian economic crisis in 1998, Aitken and Comerton-Forde (2003) find that the trade-based measures appear to grossly underestimate and, in some cases, misrepresent the impact of the crisis on the financial market. Because trade-based measure is ex post so it examines the liquidity available in the past, it does not give an accurate indication of the ability of market participants to convert theirs stocks to cash immediately, particularly for the small securities. Therefore, the order-based measures are more indicative of what is presently available.

2.4.3.1 Bid-ask Spreads

The easiest way to observe the spread is absolute bid-ask spread, the difference between bid price and ask price. The relative spread is defined as the absolute spread divided by the average of the bid and ask prices (mid-points). Effective bid-ask spreads can be calculated as twice the absolute value of the actual execution price minus the mid-point of the quoted spread immediately before the transaction (Wu et al., 2011). Effective spreads are most commonly used in the measurement of market microstructure, it reflects the actual transaction cost for a trade and the true liquidity cost (Shah et al., 2012). The bid-ask spread represents difference between the lowest available quote to sell and the highest available quote to buy, and the cost that an investor must incur in order to trade immediately (Chordia et al., 2003). By calculating bid-ask spread as a percentage of the total stock price, liquidity could be compared across different securities even in stock market. And bid-ask spreads do not require a long time series of data and the spreads can be examined at any point of trading process.

To accommodate for the differences information groups which are all trading in the market, Copeland and Galai (1983), among others, conclude that there are three investor categories are proposed, liquidity investors who trade randomly, are assumed trading without private information and investing simply when they have excess money, disinvest when they need to withdrawal funds for other purposes (Bagehot, 1971; Copeland and Galai, 1983). Informed investors, who trade with private information. Single market makers, or other limit order investors, who have an information disadvantage relative to informed investors. Informed traders possess superior information as compared to the market maker, buy at low and sell when the price is high. Consequently, a market maker always loses when he trades with an informed trader, so they need to post bid-ask spreads wide larger than the loss of trading with informed investors. Copeland and Galai (1983) and Bagehot (1971) indicate market makers are able to remain profitable only by offsetting these losses with trading gains from liquidity-motivated traders by set the difference between the bid and ask price. In a market with asymmetrically informed traders, trading activity convey information and therefore have a persistent impact on the stock price. Easley and O'Hara (1987) believe that informed traders prefer to trade larger amounts at any given price. As a result, large trades being made at less favourable prices for the market makers.

As a benchmark of information asymmetry, bid and ask spreads has some limitations. Consistent with Peterson and Fialkowski (1994), Acharya and Pedersen (2005) note, larger bid-ask spreads are indicative of illiquidity but do not provide any information regarding the magnitude of price impact or the "depth" of the market. Moreover, closing price bid-ask spreads may be more easily manipulated by market makers. Compared with other liquidity measurement, Chalmers and Kadlec (1998) find that stocks with similar spreads exhibit vastly different turnovers, so the bid-ask spread alone cannot be a comprehensive proxy for liquidity. The other criticism is that spread as a measure of liquidity only captures the costs stocks with a small trading volume and cannot provide an overall indication of the extent of information asymmetry in whole trading market (O'Hara, 1995). And spreads data is not available in some markets such as Croatian stock market (Bogdan et al. 2012).

Moreover, both bid price and ask price are based on a daily frequency may be uninformative because they are noisy and usually refer to end-of-day transaction data. Moreover, Florackis et al. (2011) notes that in some databases, bid-ask spreads tend to be symmetric around the close price. Among these limitations, one of the most important is bid-ask bounce and the imbalance order flow ratio between buyer and seller-initiated trades. Previous studies emphasize that the bid-ask bounce is one of the source of price reversals and causes the measurement error on stock returns. Bid-ask means the price of a stocks bounces rapidly forth and back within the very limited range between the bid price and ask price. Blume and Stambaugh (1983) demonstrate that the reversals might simply be a shift from transactions at bid prices to transactions at ask prices that daily returns are biased due to the bid-ask bounce. Cox and Peterson (1994) find that it explains short-term price reversals following large one-day price declines. Roll (1984) indicates that the stock returns will be negatively correlated due to trading prices bouncing between bid and ask prices. Han and Lesmond (2011) argue that the bid-ask bounce inherent a liquidity bias, the price movement is not a "true" price movement, but that it nevertheless increases the volatility of stock returns and consequently price reversal.

Huang and Stoll (1996) discover the different bid-ask spreads for buyer and seller-initiated trades. Sell orders and purchase orders may have different transitory and permanent impacts on prices, buyer-initiated trades are usually found to be more informative than seller-initiated trades. With a few exceptions, the early literature (e.g., Kraus and Stoll, 1972; Keim and Madhavan, 1972; 1996; 1997; Chan and Lakonishok, 1993; 1995; Gemmill, 1996) on block trades and/or institutional trades finds that buy-side impacts exceed sell-side impact. Similarly, Lakonishok and Lee (2001) observe that insider's purchase activity contains the information while sell activity appears to have no predictive ability. Chiyachantana et al. (2004) finds that the asymmetry depends on particular market conditions: price effects of buyer-initiated trades are greater in bull markets (as in 1997-1998) whereas those of seller-initiated trades are larger in bear markets (as in 2001) (Bikker et al., 2007).

According to Kraus and Stoll (1972) and Chiyachantana et al. (2017), temporary price impact which relates to liquidity effects or changed bid-ask spread from a temporary imbalance in demand and supply, and permanent price impact, which relates to any new information permanently impounded into the stock price, leading to the price changes contribute to a new equilibrium level at the market. The total price impact is composed of temporary and permanent price impact. The size of bid-ask spread is the other source of the errors in the transaction price. Han and Lesmond (2011) reveal that the size of the bid-ask spread directly affects the estimated volatility through inflation in the daily return. In fact, the bid-ask bounce error can be unnoticeable if the size of the spread is minimal. I expect that after the announcement of the initial and subsequent bank loans, the change of the bid-ask spread and new information into prices through the new loan announcements may impact on the price impact asymmetry. Chen and Gau (2014) indicate that if one side of the market is better informed, the bid and ask can be asymmetric, given that when initial loan announcement, the asymmetric information between informed traders and all trades has eliminated so the imbalance of bid and ask orders are decrease.

Chiyachantana et al. (2017) indicates that for securities with a higher level of information asymmetry, price impact asymmetry is higher for shorter price run-ups. They also indicate that price impact asymmetry in stocks at earlier stages of rise run-ups is generally positive. After prolonged price run-ups, permanent price impact asymmetry reverses and ultimately becomes negative. Chordia et al. (2016) indicate that changes in order flow convey new information, a good understanding of the direction of order flow provides important insights into the factors that affect investors' trading decisions, time variation in trading volume, and expected price impacts of buy and sell trades, would help in efficiently understand the role in price discovery.

2.4.3.2 Amihud's Ratio

In 2002, Amihud develops a measure of stock illiquidity that is easily and cheaply calculated using daily or monthly price and volume data. Amihud's illiquidity ratio, or $RtoV$, is a measurement of illiquidity, defined as the illiquidity equals to stock's absolute daily return, divided by its daily monetary volume, averaged over some period. Illiquidity can arise from exogenous trading costs, adverse selection and information asymmetry, market makers' inventory risk, or any search or technology problems (Amihud et al., 2005). Amihud's ratio presents theoretical models implying that for more illiquid stocks, the same level of volume will cause higher distortions in price and thus higher absolute return. Illiquidity is priced as a stock characteristic and a risk factor, and the measure has a strong positive relation to expected stock return. It is one of the most widely used liquidity proxies in financial literature. From papers been published until 2013, over one hundred financial papers which used, analysis or compared Amihuds' ratio with other measures, published in some most important financial journals (Lou and Shu, 2017). *RtoV* ratio can be obtained from data on daily, weekly, monthly or quarterly securities' returns and volume that is readily available (Florackis et al. 2011). Thus the ratio available for most stock markets that no matter it has detailed microstructure data on transactions or not. Moreover, Chordia et al. (2009) indicates that the use of Amihud's ratio enables us to construct a time series of illiquidity over a long period, it enables to study the time series effect of illiquidity that would be impossible to do with bid-ask spread which rely on microstructure data.

On the other hand, Amihud's ratio also has some limitations. According to Florackis et al. (2011) and many other studies, *RtoV* ratio has been examined that remark negatively correlated with market capitalization, small stocks are expected to have a much higher *RtoV* ratio and necessarily illiquid. Florackis et al. (2011) indicates that trading volume variables are positively correlated with market capitalization by construction and by no means comparable across stocks with different market values, or in different currencies and countries due to the monetary terms. Cont et al. (2014) indicates that it cannot be calculated in the absence of trading volume. Tobek (2016) points out that Amihud ratio observes only price impact that survives until the end of the day, rather than a daily version of volatility over volume and it is only able to measure price impact that is of long-term nature. If there are some unexpected large orders that temporarily shift the price during the trading day, Amihud measure will not be able to pick it up. Tobek (2016) also believes that Amihud ratio is influenced by overnight returns that have no relation to price impact during the day.

2.4.3.3 RtoTR Ratio

To overcome these limitations, Florackis et al. (2011) proposes a new illiquidity ratio, the average ratio of daily absolute stock return divided by its turnover ratio, replacing the trading volume of a security with its turnover ratio (*RtoTR* ratio). Turnover ratios are as easily accessible from the public information as the trading volume which has been used in Amihud's ratio, and *RtoTR* ratio is able to comparable across firm sizes since it does not necessarily exhibit an inherent size-related pattern.

Florackis et al. (2011) demonstrates that *RtoTR* is not only inherits the advantage of Amihud's ratio, but also highlighting the importance of holding periods variables and trading frequency. *RoTR* ratio helps to explain the relationship between turnover ratios and stock returns. For example, Datar et al. (1998) and Brown et al. (2009) documents that stocks with greater trading frequency means it has a higher turnover ratio, higher turnover ratios exhibit higher returns, and are thought to be more liquid, otherwise stocks with lower turnover ratios are expected a lower expected return. Amihud and Mendelsen (1986) model believes that in equilibrium, illiquid assets would be held by investors with longer investment periods. When investors make a portfolio investment decision, they do care about both holding period and holding costs, less liquid assets must be paid more premiums as a kind of compensation of liquidity risk. The *RtoTR* ratio support the argument that it is a compound effect of trading frequencies and transaction costs that effects on asset pricing, not each feature in isolation.

2.5. Information Asymmetry

2.5.1 Information Asymmetry and Measurements

The information asymmetry problem was first indicated by Akerlof (1970) and has received considerable attention in the corporate finance literature. Numerous markets are characterized by informational differences between buyers and sellers. Bessembinder et al. (1996) characterizes information into two types: firm-specific information and market-wide information. Stock trading information must be related at least to one of these variables. The firm-specific information is more likely to cause the asymmetry information. In competitive markets with asymmetric information, the trading volume is directly associated with the accuracy of information possessed by informed traders. Bessembinder et al. (1996) shows that trading volume of small stocks is more strongly related to firm specific information whereas trading volume of large stocks is primarily determined by market-wide information.

According to Clarke and Shastri (2000), information asymmetry proxies fall into three categories: measures based on analysts' forecasts (Moyer et al., 1989; Barth and Hutton, 2004), measure based on investment opportunity set (McLaughlin et al., 1998; Smith and Watts, 1992), and market microstructure measures (O'Hara, 1995; Naes and Skjeltorp, 2006). Easterwood and Nutt (1999) find that analysts' forecast-based measure may tend to misstate the degree of information asymmetry, analysts over-react to positive information and under-react to negative information. Moreover, forecast-based measurement might be correlated with the riskiness level of the firm. Some firms may have higher forecast errors not because of higher level of information asymmetry, simply because they have more volatile earnings.

A firm's investment opportunity set as measures of information asymmetry, including market-to-book asset ratio, book value of equity and the earnings-price ratio. Smith and Watts (1992) and Kothari et al. (2006) argues that due to the unbalance information between inside manager and outside investor, financial decisions of high growth firms can reflect the manager better knowledge about firm's investment set and cash flow. However, Gaver and Gaver (1993) note that the market-to-book of assets as a measure of growth potential usually been impact by leverage level, these proxies just cannot be treated as the direct measure of information asymmetry. For example, the market-to-book asset ratio is used frequently as a corporate performance proxy, or an indication of monopoly. Another problem is that the accounting data related to these measurements is available only on a quarterly basis, therefore they cannot report the information asymmetry level on a daily or weekly basis. And it cannot compare across different countries due to the different accounting standards. For high-risk company where the investment opportunity set can change dramatically across quarter or the firms with any overseas investment projects, these problems could be particularly severe. Therefore, in my research, I focus on microstructure measurement, decompose the spread and try to explain the information asymmetry problem of zero-leverage firm.

2.5.2 Spreads Decomposition

Bid-ask spread in most previous studies been regarded as two kinds of costs, the first approach treats the bid-ask spread as a holding cost to the dealer, in Garman (1976) and Stoll and (1978)'s model, a seller may arrive to the market at a time when potential buyers are not present. The market makers who continuous presence in the market can bridge this timing gap, buy from the seller then resell to the buyer, thus enable continuous trading by any market participants who want to trade immediately. However, the risk which the market maker faced is the price changes during the process and this risk must be compensated. The second approach to the determination of bid-ask spreads bases on the existence of asymmetric information. Glosten and Milgrom (1985) believe that the bid-ask spread can be seen as a purely informational phenomenon. In a perfect market, information is made available to all market participants simultaneously and prices immediately adjust back to the equilibrium level. However, in the real world information is likely to be unequally distributed, the availability and attitude to information may be different among investors. Based on these extant market microstructure literatures, the bid-ask spread is a function of three cost components incurred by the market-maker: adverse selection costs, inventory holding costs and order processing costs. Order processing costs represent the market-maker's fixed costs for standing ready to match buy and sell orders, such as clearing and settlement costs. Adverse selection component is a cost to market makers of taking the risk of dealing with informed traders who may possess superior information, it is directly related to the perceived level of information asymmetry in the capital market as an uninformed market-maker will increase the spread to compensate for expected losses to privately informed traders (Glosten and Harris, 1988). Inventory holding component is the compensation for a dealer holding a non-diversified portfolio during an uncertain time period. The inventory holding cost represents the market-maker's cost of holding suboptimal levels of inventories. Demsetz (1968) indicates that bid-ask spreads are directly related to investor's inventory costs due to the investors cannot fully diversify their portfolio risk. In the inventory cost models, the bid-ask spread increases with the price level and the asset price volatility and decreases with trading volume. In the asymmetric information models, the bid-ask spread is related to the degree of the adverse selection problem (Chaudhury, 2015).

Some studies estimating spread decomposition rely on firm specific attributes such as market capitalization, trade size and trading volume. Other literatures focus on the market type, such as auction market versus dealer market, specialist market versus multi-dealer market (Affleck-Graves et al., 1994; Brockman and Chung, 1999). Brockman and Chung (1999) focus on the bid-ask spread decomposition in order-driven environment and they believe that investigating the components of spreads is important in several ways. For management of firms, they can gain further knowledge about the variables underlying cost of capital, liquidity level and risk, and the value of the firm. Then, the spread decomposition is also useful to a wide range of investors. In my thesis, I chose three of measurements from the large amount of spread decomposition models, Madhavan, Richardson and Roomans (MRR) model, PIN model and Huang and Stoll model[2].

[2] See also VanNess et al. (2009). Recent papers have been attempted to use various of other spread decomposition models, Glosten and Harris (1988),George, Kaul and Nimalendran (1991), Affleck-Graves, Hedge and Miller (1994), Lin, Sanger and Booth (1995), Neal and Wheatley (1998), Bleen et al. (2004). These researches presented the different methods on the decomposition of spread, the result of every single component do not have significant different. These three measures which my chosen in the research are most high concentrated and the most common

Madhavan, Richardson and Roomans (1997) develop a structural model (MRR model) of intra-day stock price that conveys public information shocks and microstructure effects. Compared with previous studies, MRR model focus on explaining the effect of information flows on stock prices over the trading day. MMR model shows that stock prices change because of new public information and through information revealed in the trading process. Based on previous researches (e.g.: Handa and Schwartz, 1991 and Madhavan, 1992), MMR model provides a unified framework of the variance of transaction price changes, information asymmetry reduces steadily through the day since market markers learn from order flow, however, dealer costs increase over the day due to the overnight inventory holding cost, so that spreads and transaction price exhibit the U-shaped pattern.

The PIN model assumes that in competitive market, market makers, informed traders, and uninformed liquidity trader all exist. The idea behind PIN is that informed traders have the ability to value the content of the information signal while uninformed traders have no rights to know, or do not care about the signal, so informed traders buy following high-value signals and sell following low-value signals while uninformed traders are assumed to be equally likely to buy or sell stocks and are uncorrelated with information signals. Duarte and Young (2009) show that PIN is designed to measure the different responses to the information signal create a buy and sell order imbalance. Boehmer et al. (2007) believes that one of the most attractive feature of PIN model is that the model allow the public to estimate the probability of informed trading from easily available data. All data that involved the model is to count the number of buyer-and seller-initiated orders for each transaction in any single trading day.

However, Duarte and Young (2009) report that PIN is biased by the trading in clusters of less-liquid stocks, PIN component only priced when it related to illiquidity, the component which related to asymmetric information is not price. Akay et al. (2012) reports that the bias of PIN related to liquidity effects while unrelated to information asymmetry. Thus, the estimation of PIN based which are on stock transaction data face these same difficulties with trade clustering because liquidity traders and informed traders trade concurrently.

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used.

Based on previous studies (Glosten and Harris, 1988; Stoll, 1989 and George et al,1991), Huang and Stoll (1997) construct a trade indicator model of spread components. They are the first study to distinguish the spread into three components, by measuring the behaviour of quotes and trade prices after a trade to infer that both inventory holding cost and order processing components are distinct from adverse information effects. Inventory effect induces negative serial correlation in orders and in quotes, in addition to the serial correlation from the bid-ask bounce of prices. The three-way decomposition results are 9.6%, 28.7% and 62.7%, for the adverse selection costs, inventory holding costs and order processing costs respectively. An alternative three-way model provides a similar estimate for order processing 68.9%, but a change in the relative magnitudes of inventory holding 9.6% and adverse selection components 21.5%.

2.6. Characteristics of UK and London Stock Market

My research is based on the data from the London Stock exchange which is a competitive dealership system. Comparing with the other main stock market New York Stock Exchange (NYSE), they are difference in three important aspects. First, the NYSE is an order driven exchange while LSE is a quote driven market. Trading in LSE takes place by telephone through a small number of certificated market makers. They announce stock prices at which they are willing to trade on SEAQ screens (Snell and Tonks, 1995). Second, on the LSE all trades must pass through the market makers' inventory, unlike the NYSE where public limit orders can be matched with outside trades. Thirdly, the trading size is different between NYSE and LSE. In London, a minimum quantity which known as the normal market size (NMS) which is set for each stock at 2.5% of the average daily customer turnover in the preceding quarter. The relatively high mandatory trading size on the LSE provides incentives to market makers to post wide spreads to cover the finance inventory carrying cost as well as those induced by temporary imbalances during trading may affect inventory and asymmetric information risks. On the other hand, the liquidity of high NMS stocks encourages a narrower spread because positions can be unwound quickly to reduce inventory risks.

In October 1997, the LSE implemented an electronic order-matching system, Stock exchange Electronic Trading System (SETS) for FTSE 100 index stocks. Under the new SETS trading system, the LSE replaced obligated market makers with voluntary dealers, and give the permission to the public to compete directly with dealers in the stocks through the submission of limit orders. Furthermore, the market makers could trade with one another directly by the inter-dealer broker system. In September 1999, the LSE expanded the realm of SETS into FTSE 250 index. In December 2005, the LSE developed the SETmm platform where in order to motivate the low liquidity stock trading and reduce the trading cost. The 50 largest securities listed on the FTSE AIM which is widely regarded as the most illiquid index in the LSE stared trading on the SETSmm system (Gregoriou, 2015).

The first UK study to attempt a decomposition is by Neuberger (1992), but his research was based on the Glosten and Harris (1988) model which ignored the inventory cost of bid-ask spread. Snell and Tonks (1995) find very weak evidence of the impact of asymmetric information on the trading activity of (LSE) investors. Hansch et al. (1999) finds that dealers make profits on small trades, break even on large trades but lose on medium trades. Reiss and Werner (1998) investigate that the significance of either inventory control or asymmetric information plus inventory control in dealer quote behaviour, none of them attempt to split spread into the three components. Menyah and Paudyal (2000) is the first paper in UK to used Stoll (1989)'s model to decompose the spread into its three components. In Menyar and Paudyal's model, 47 percent is the adverse selection cost, 23 percent is inventory cost and 30 percent of the spread is the order processing cost. This finding is consistent with the results of Hansch et.al (1999) that the adverse selection cost dominates the bid-ask spread to produce profits. The inventory cost is usually smaller than the order processing component, probably due to the avenues open to market makers in the management of their inventory risks as documented by Reiss and Werner (1998). The adverse selection component varies inversely with the size of the realised spread.

Different country and banking environment is also evidenced to influence the market response to bank loan announcements. Armitage (1995) studies on the U.K. stock market show less responsive to loan announcement compared to the U.S. studies. Study on Canada capital market which provided by Aintablian and Roberts (2000) show a similar result as the U.S. cases, and studies on China market from Bailey et al. (2011) reports opposite results to previous studies due to its special government regulation and politically controlled banking industry.

Fan et al. (2012) shows that a country's legal system explains a large proportion of the variation in leverage. La Porta et al. (1998; 2002) argues that the different law environment provides the different protection for investors, common law system provides better external investor protection than the civil law system, resulting in better access to external equity and higher stock values. Weak legal systems and public enforcement of laws are associated with less eternal financing, and all else being equal, firms from common law countries will use more outside equity. Furthermore, civil law countries are usually characterized by relationship lending, thus the asymmetric information problem should be less pronounced. Harris and Raviv (1993) argue that the principles of a countrys bankruptcy law play an important role in determining the leverage ratio that creditors are willing to accept. Djankov et al. (2007) reports that there are large variations in the insolvency procedures across countries. In equity-friendly countries there is an explicit bankruptcy code that specifies and limits the rights and claims of creditors and facilitates the reorganization of an ongoing business. In contrast, in debt-friendly countries without bankruptcy codes or weakly enforced codes, creditors hastily claim the collateral by liquidating distressed firms without seeking reorganization (Davydenko and Franks, 2008). Fan et al. (2012), and Bessler et al. (2013) supports the result of Djankov et al. (2007) that firms are more likely to carry higher leverage ratios in countries with heathier economic conditions. Acharya et al. (2011) shows that managers choose to reduce leverage in countries with strong creditor rights. On average, being based in a common law country rather than a civil law country is associated with an increase in the propensity to become debt-free by more than 8%. Booth et al., (2001) finds a negative relationship between the likelihood of a firm being classified as zero-leverage and the relative size of the deposits in a country, indicates that financial intermediation encourages the use of corporate debt.

Chapter Three

The Initial Bank Loan of Zero-leverage Firms

3.1 Background

Previous studies have primarily focused on establishing the economic rationale behind the zero-leverage phenomenon. Minton and Wruck (2001) show that zero-leverage firms will move towards their preferred capital structure by levering up when they discover the net benefit of debt is positive. Hadlock and James (2002) indicate that zero-leverage firms are more likely to borrow from banks, because they suffer more from adverse selection and information asymmetry problem than the levered firms, they derive greater benefits from the screening and monitoring entailed in bank lending relations. Especially, for firms like zero-leverage firm which are younger, less reputable with scarce public information, the market reaction of initial loan announcements is significantly positive (Aintablian and Roberts, 2000).

Ferguson and Grosse (2014) investigate the relationship between zero-leverage firms and their initial bank loan announcements. This is a very interesting avenue of research as it looks at stock market reaction when zero-leverage companies use debt for the first time in their capital structure. The results using data from the Australian Mining Industry show that bank loan announcements can signal important price sensitive information regarding the borrowing firm's inside information. They go on to establish that the initial loan announcements relate with decreasing bid-ask spreads and information asymmetry.

I study to inspect the impact of initial loan announcements on liquidity in both the short and long run. By analyzing a 181 days event window and also by capturing liquidity affects through illiquidity ratio rather than just via bid-ask spreads. The illiquidity ratio indicated by Amihud (2002) and Florackis et al. (2011) encapsulate the long term financial stability of a company as permanent changes in prices reflect alterations in the information environment of a firm. I also estimate the three components of bid-ask spread. The order processing component measures the cost of executing the trade on a stock exchange (see among others, De Jong et al., 1996). The inventory holding component captures the costs that market makers face due to the fact that they hold an undiversified portfolio (see among others, Huang and Stoll, 1997). The adverse selection component provides a proxy for information asymmetry as market makers could be dealing with investors that possess superior information to them (see among others, Glosten and Milgrom, 1985). Each of them contribute to various aspects of trading costs then I can conclude whether the initial loan announcement can improve the financial performance of zero-leverage firms.

3.2 Data

I collect my data from the universe of all FTSE 350 firms actively traded from the start of January 2000 to the end of December 2005[3]. I focus on the FTSE 350 index for three reasons. First, membership of FTSE index (including FTSE 100, FTSE 250 and FTSE 350) depends exclusively on firm's market capitalization. This is contrast to membership in the S&P 500 index, which not only elect membership rely on market capitalization, but also consider about a stock's future performance given by financial analysts (Jain, 1987). Secondly, FTSE 350 is the combination of FTSE 100 and FTSE 250, constituents are essentially very large UK-based firms, accounting for approximately 85% of market capitalization in the London Stock Exchange. Only premium listed equity shares that trade on the London Stock Exchange are eligible for inclusion in the FTSE index. As a result, it is can directly reflect the whole economy in UK and the main develop trends of main companies. Moreover, Denis and Mihov (2003) believe that the FTSE index is not very associate to abnormal performance which may lead volatility on measure financial performance, or with changes in investor awareness. I estimate the model on a sample of more than 20,000 firm-months for 137 firms which have completed both market and company information from FTSE 350, between year 2000 and 2015.

I collect all FTSE 350 data from Thomas Reuter Eikon, a worldscope fundamental financial database, for each company we obtain the company's daily trade and closing price, bid price and ask price, trading volume (number of stocks traded), stock turnover (the average of shares outstanding during the period divided by total number of shares traded), D/E ratio (firm's debt divided by firm's equity) and market valuation (number of shares traded multiple by the share price). I also collect information concerning the initial loan undertaken by the firm including the issue date, loan amount, and loan maturity.[4] The loan information is from the corporate event announcement. I calculate the L/A ratio is defined as loan amount to total assets ratio. In total, there are 96 zero-leverage firms within the FTSE 350 that have sufficient data for my study. I define the stock of zero-leverage firm which are undertook the initial loan during my sample period as stock *i* in this chapter, then in the next chapter I will define the zero-leverage firms which undertook the subsequent loan as stock *j,* for stocks which are undertook more

[3] I require that firms are not a financial company, utilities company or closed-end mutal fund. The stock has enough data from 2000 to 2015, including trade volume, average daily price, daily closing price, bid-ask spread and trade turnover.

[4] In my dataset the announcement and the issue date of the loan are identical.

than two loans during my sample period as stock *h*. [5]

3.3 Methodology

3.3.1 Absolute Spread, Relative Spread and Effective Spread

Previous literatures provide a menu of proxies to estimate liquidity and information asymmetry. A common finding in asymmetric information models (see among others Glosten and Milgrom, 1985 and Copeland and Galai, 1983) predicts that a reduction in information asymmetry will motivate the market maker to decrease the bid-ask spread. A rational market maker will set the bid-ask spread wide enough to recoup expected losses as a result of trading with informed traders by gains to trading with uninformed investors. The simplest way to measure the spread is the absolute bid-ask spread (*AS*), which is defined in equation (3.1).

$$AS_{i,t}=A_{i,t}-B_{i,t} \tag{3.1}$$

Where $AS_{i,t}$ is the absolute bid-ask spread of stock *i* at the time *t*. $A_{i,t}$ is the closing ask price of stock *i* at time *t* and $B_{i,t}$ is the closing bid price of stock *i* at time period *t*. However, some researches such as Madhavan, Richardson and Roomans (hereafter, MRR) (1997) indicate that the absolute bid-ask spread is not reliable for measuring investors' trading costs. Many trades are executed within the bid-ask spread, resulting in absolute bid-ask spreads overstating the trade execution cost. Therefore the relative bid-ask spread, which is calculated by dividing the absolute bid-ask spread by the average of the bid and ask prices, may be a more accurate measure of stock market liquidity.

$$RS_{i,t} = \frac{A_{i,t}-B_{i,t}}{(A_{i,t}+B_{i,t})/2} \tag{3.2}$$

Where $RS_{i,t}$ is the relative spread of stock *i* at time period *t*, $A_{i,t}$ and $B_{i,t}$ are defined in the same way as in equation (3.1). The relative bid-ask spread also has a problem, which is that any changes in the midpoint (*Mid*, defined as ask prince minus bid price then divided by 2) of the stock price will automatically impact on the bid-ask spread (see among others, Florackis et al., 2011, for more information). In addition, the relative bid-ask spread fails to account for the

[5] I provide a loan announcement news example in the appendix.

tendency of stock prices to increase following a buy and decrease following a sale, and overestimates the liquidity cost of a stock. Due to these shortcomings, the existing market microstructure literatures also estimate the effective bid-ask spread *(ES).*

The effective spread is often considered more reliable than the other spread measures because it does not depend on quotes prices, reflects the actual transaction cost for an average sized trade and the true liquidity cost (see among others, MRR (1997)). The greater the difference between absolute and effective spreads, the larger the number of trades that were executed from prices within the prevailing bid-ask quotes. Effective bid-ask spreads are calculated as twice the absolute value of the actual execution price minus the mid-point of the quoted bid-ask spread immediately before the transaction.

$$ES_{i,t}=2\left|P_{i,t} - Mid_{i,t}\right| \tag{3.3}$$

Where $ES_{i,t}$ refers to the effective bid-ask spread of stock *i* at time period *t*, $P_{i,t}$ is the stock price of stock *i* at time period *t* and $Mid_{i,t}$ is the midpoint between the bid and the ask price of stock *i* at time period *t*. The effective spread measure assumes that, if a trade takes place above (below) the bid-ask midpoint, it is a customer buy (sell) order. While the effective spread is a better measure for customer trader costs than the quoted spread, it still fails to account for the fact that trades may be executed between customers and may not involve the participation of the market maker at all. Therefore, in order to provide robust empirical evidence, I estimate all three bid-ask spread measures in my study.

3.3.2 Illiquidity Ratio Test

Bid-ask spreads measure information asymmetry problem and liquidity only for a small number of shares in a short-run period. Also closing prices which are widely used to measure the spreads have a tendency to occur at the ask price which leads to inaccurate results (Florackis et al., 2011). In 2002, Amihud develops a measure of stock illiquidity that is calculated using daily or monthly price and trading volume data. Amihud's illiquidity ratio, or *RtoV* ratio is defined as absolute daily return on stock *i,* divided by the firm's daily monetary volume, average over a trading period.

$$RtoV_i=\frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{i,d}|}{V_{i,d}} \tag{3.4}$$

Where $|R_{i,d}|$ and $V_{i,d}$ refers to the absolute return and monetary volume of stock *i* on day *d* respectively, D_i is the number of trading days for stock *i*. Amihud's ratio computes the average daily price movement associated with a unit of trading volume, it is straightforward and easy to calculate for long-run time periods and data is generally available from financial databases. However, according to Florackis et al. (2011) and many other researches, *RtoV* ratios carry a significant size bias, since trading volume variables in monetary terms and is positively correlated with market capitalization. Thus it cannot comparable across stocks with different market values. Given these shortcomings, Florackis et al. (2011) constructs a new price impact ratio, defined as the average ratio of daily absolute stock return to its turnover ratio (*RtoTR* ratio):

$$\mathrm{RtoTR}_i = \frac{1}{D_i} \sum_{d=1}^{D_i} \frac{|R_{i,d}|}{TR_{i,d}} \tag{3.5}$$

Where $TR_{i,d}$ refers to the turnover ratio of stock *i* at day *d*, D_i and $R_{i,d}$ is same as previously defined in equation (3.4). The *RtoTR* ratio is free of any size bias (Florackis et al., 2011). Therefore, it can be compared across the firms with different market capitalizations. Given these analysis, in my study I compute both the *RtoV* ratio and *RtoTR* ratios for completeness.

3.3.3 Multivariate Analysis

The primary objective of this chapter is to study the relation between the information asymmetry costs and the initial loan announcement of zero-leverage firms. Following Hedge and McDermott (2003) and other previous studies, I test the relation between liquidity changes and other determinants by a pooled time series cross-sectional multivariate analysis. Controlling for various firm-level characteristics, the coefficients can be shown in the following formula:

$$LogLiq_{i,t} = \beta_0 + \beta_1 Initial_{i,t} + \beta_2 LogVol_{i,t} + \beta_3 LogSize_{i,t} + \beta_4 StdDev_{i,t} + \beta_5 LogPrice_{i,t} + \beta_6 LogL/A_{i,t} + \varepsilon_{i,t}. \tag{3.6}$$

Where *t=1* corresponds to the pre-announcement period and *t=2* corresponds to the post-announcement period. The subscript *i* means 96 initial loan announcement of zero-leverage sample firms' stock in my study. The dependent variable, $logLiq_{i,t}$ is defined as the natural logarithm of the average daily five liquidity benchmarks, absolute spreads, relative spreads, effective spreads, *RtoV* and *RtoTR* ratios, for stock i at time t. Independent variables include the dummy variables $Initial_{i,t}$, which is equals to 1 in the post-announcement period and 0 otherwise. $logVol_{i,t}$, corresponds to the natural logarithm of the daily trading volume in stock i at time t. $LogSize_{i,t}$ captures the natural logarithm of the market capitalization of firm i at time t. $LogStdDev_{i,t}$ is the daily return standard deviation which captures the volatility of stock i at the time t. $LogPrice_{i,t}$ is the natural logarithm daily closing price of stock i at time t. $LogL/A_{i,t}$ is the natural logarithm loan amount to total asset ratio. I am primarily interested in the significant and the magnificent of the dummy variable *Initial*, β_1. Since my five benchmarks measure the illiquidity of stocks, if β_1 is negative, then I can conclude that increase in the liquidity of stocks comes as a result of the initial loan announcement of a zero-leverage firm.

3.3.4 Spread Decomposition

Several different approaches to estimating the bid-ask spread components exist in the literature. One of the most predominately used is the Probability of information–based trade (PIN) model established by Easley et al. (1996). Numerous studies (see among others, Copeland and Galai, 1983 and Glosten and Milgrom, 1985) have found evidence of adverse selection costs due to information-based trading, and the bid-ask spread inducing by the information-based trading. The PIN model assumes that in a competitive market, liquidity traders are likely to buy or sell stocks randomly. The motivation of their placement of an order or not is based on two independent processes with identical intensity parameter ϖ. The probability that an information occur in the event day is a, good news events occur with a probability δ, informed traders buy. Bad news occurs take place with a probability $1-\delta$, informed traders sell (Zagaglia, 2013). The arrival of informed orders is modelled as a poisson process with intensity parameter u, assumed to be identical for informed buy and sell orders. Easley et al., (1996) estimates the unconditional probability of informed trading. I estimate the PIN model by measuring the maximum likelihood for each zero-leverage firm during the examination period. The maximum likelihood function of PIN model is:

$$L[M|\theta]=\sum_{t=1}^{T}[-2\omega+M_t \mathrm{Ln}\chi+(B_t+S_t)\ln(u+\omega)]+\sum_{T=1}^{T} ln[a(1-a)e^{-mu}\chi S_t\text{-}M_t + a\delta e^{-u}\chi B_t\text{-}M_t+(1-a)\chi B_t+S_t\text{-}M_t]. \quad (3.7a)$$

With M_t equals to min (B_t, S_t) +max (B_t,S_t)/2, and $\chi_t = \varpi/(u+\varpi)$.

Where I define the *B* and *S* are the number of buys and sells for a given date and parameter space $\theta = a, \delta, \varpi, u$. Buy arrival rate as ϖ_b, sell arrival rate as $\varpi_b + u$, the likelihood demonstrate that the buy orders and sell orders arrive the market according to independent poisson distributions (Duarte and Young, 2009).

$$\mathrm{PIN} = \frac{\mathrm{au}}{\mathrm{au}+2\varpi} \tag{3.7b}$$

Boehmer et al. (2007) believes one of the most attractive feature of PIN model is its simplicity, because it requires data on the number of buyer-initiated and seller-initiated trades. However, this requirement is not as easy as it appears, the bias caused by trade misclassification is substantial. Furthermore, for many security markets which do not exclusively rely on an electronic limit order book (e.g. the Nasdaq), this information is not publicly available and trading classification is difficult.

The second model I consider is the MRR model which decomposes the bid-ask spread into adverse selection costs and order processing costs. This provides a unified framework which explains the effect of information flows on stock prices over the day. In the classical model of efficient security market, transaction price movements simultaneously reflect new public information shocks and order flow as a noisy signal. Both of two aspects may cause revisions in beliefs and transaction price without any trading volumes changes. Information asymmetry problems and uncertainty over fundamentals decrease over the day, and transaction costs increase. Therefore, the variance of transaction price changes is U-shaped while the variance of ask price changes is declining over the day.

P_t denotes the transaction price of the security at time *t* and *Q* be the trade indicator variable, equaling 1 if the trade is buy-oriented, and -1 if it is sell-oriented. The MRR model can be computed as:

$$P_t - P_{t-1} = \alpha(Q_t - \rho Q_{t-1}) + \varphi(Q_t - Q_{t-1}) + \varepsilon_t \tag{3.8}$$

Where α captures possible adverse selection costs revealed by the trade at time t. The parameter ρ captures the serial correlation in the trade indicator variable Q_t. The second term, $\varphi(Q_t-Q_{t-1})$ captures the effect of the bid-ask bounce, where $\varphi \geq 0$ denotes the liquidity suppliers' cost per share for supplying liquidity. And ε_t is a random error term. Following the MRR model, the parameter vector, α, ρ and φ can be estimated using the GMM estimator proposed by Hansen (1982).

The PIN and MRR models fail in categorizing the adverse-selection and inventory holding costs, which leads to a revision after a trade which occurs concurrently. Thus, one of the most significant theoretical contributions of the Huang and Stoll (1997) model is that they allow for separate estimation of the adverse selection and inventory holding costs. It is a method which uses a transaction approach that examines the serial correlation in trade flows to identifying the three components of the spread (Van Ness et al., 2001).

Defining the trader indicator as Q, $Q=1$ if a transaction is buyer initiated, $Q=-1$ if it is seller initiated and $Q=0$ if the transaction occurs at the midpoint. Therefore, the three-way decomposition model for any time point of a day is:

$$E(Q_{t-1}|Q_{t-2})=(1-2\pi)Q_{t-2} \quad (3.9)$$

$$\Delta Mid_t=(\alpha+\beta)\frac{S_{t-1}}{2}Q_{t-1}-\alpha\frac{S_{t-2}}{2}Q_{t-2}(1-2\pi)+\varepsilon_t \quad (3.10)$$

Where S is the spread of stock i at time t, π is the probability of a trade flow reversal. Mid_t is the midpoint of the bid-ask spread of stock i at time t. α and β are the percentages of the half-spread attributable to adverse selection and inventory holding costs respectively. Since α and β are stated as proportions, the order processing component is equal to $1-(\alpha+\beta)$. $\frac{S_{t-1}}{2}$ is the posted half spread at time $t-1$. The public information component is captured by ε_t.

If I consider that the inventory holding costs β is equal to 0, I can rewrite equation (3.10) as follows:

$$\Delta P_t = \frac{S}{2}\Delta Q_t + \alpha\frac{S}{2}Q_{t-1} + \varepsilon_t \qquad (3.11)$$

The order processing costs is then equal to 1-α. De Jong et al. (1996) examines that the spread decompostion estimation results might be sensitive to the specifications used by different market microstructure models. I use the Huang and Stoll (1997) model for reporting my main results because it separates the bid-ask spread into three rather than two components. The PIN and MRR models are estimated to provide robustness to my spread decomposition estimations.

3.3.5 Event Study

Price pressure hypothesis suggest that investors who provide liquidity to the market without any motivation should be compensated by a premium that reflects their extra costs and risks (Launois, 2009). I use the standard market model method for both short-term and long-term abnormal returns. The announcement date (day *0*) is the day of the first bank loan announcement where the zero-leverage firm starts to lever up. In terms of the short-term event period, I examine abnormal returns (ARs) for the announcement day [day 0], three-day period around the announcement day [-1, +1], five-day period around the announcement day [−2, +2] and eleven-day period [-5, +5] around the announcement days. For the long-term event period I calculate the event periods as long as 180 days [-90, +90] around the announcement dates. More specifically, I estimate the abnormal returns by using an economically market-adjusted model:

$$AR_{i,t} = R_{i,t} - R_{m,t} \qquad (3.12)$$

Where $AR_{i,t}$ is the abnormal return earned by stock *i* at time *t*. $R_{i,t}$ is the return on stock *i* at time *t,* and $R_{m,t}$ is the value-weighted market index return at time *t*. As a proxy for the market's return, I use the FTSE index returns for the examining period. Cumulative abnormal return (CAR) of event window surrounding the event day can be calculated using the following formula:

$$CAR_{i,t(-q,+q)} = \sum_{t=q}^{S} AR_{i,t} \qquad (3.13)$$

Where q is equals to 1, 2, 5, 10, 20,.......90 respectively, represents the different time period during the event window. The standard *t-test* is used to test whether the $AR_{i,t}$and $CAR_{i,t}$ differ significantly from zero.

3.4. Empirical Results

3.4.1 Descriptive Statistics

The descriptive statistics are presented in Table 3.1. Panel A compare zero-leverage firms and all FTSE 350 firms. As the findings of most previous studies (e.g.: Faulkender & Petersen, 2006) state, zero-leverage firms are smaller than their levered counterpart firms, with an average market capitalization of approximately ₤3995 million as compared to ₤4231 million for all FTSE 350 firms. This result is in direct contrast to Strebulaev and Yang (2013), who believe that the existence of zero-debt policy is independent of firm size. I believe the reason for the difference in results is because they compare zero-leverage to almost zero leverage firms, which are similar in both debt capacity and market capitalization.

Table 3.1 Descriptive statistics

Table 3.1 provides the descriptive statistics for my data sample. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial loan during the time period of 2000-2015. Panel A provides the descriptive statistics on borrowing zero-leverage firms. Market capitalization is calculated as the share price multiplied by the number of shares traded. Absolute spread is defined as ask price minus bid price. Relative spread is defined as ask price minus bid price, then divided by quote midpoint. Effective spread is defined as two times trade price minus quote midpoint. The midpoint is ask price minus bid price divided by two. Panel B provides the disclosed amount to be borrowed by the zero-leverage firm measured in pounds.

Panel A: Borrower Descriptive Statistics

	Zero-leverage firm (No.=96)	**All firm (No.=254)**
Market Capitalization (₤million)	3995	4231
Stock Price (₤)	507.633	523.435
Standard deviation of return (%)	1.250	1.231
Trading Volume (million)	6325	6520
Absolute Spread	2.537	2.031
Relative Spread (%)	0.015	0.011
Effective Spread (%)	0.412	0.369

Panel B: Descriptive Statistics

	Mean (Million)	Median (Million)	Std.Dev (%)	Min (Million)	Max (Million)	Skewness
Initial Loan	1537.29	248.92	7916.28	44.88	69049	7.94

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Furthermore, all three spreads of zero-leverage firms are larger than all firms, it shows zero-leverage firms are less liquid then all FTSE 350 firms regardless of the measure of liquidity. It consistent with the previous studies which believe that zero-leverage firms lack of information due to their non exposure to debt financing.

Turning to the standard deviation of returns, for the two groups there is no significant difference (1.250 for zero-debt firms and 1.231 for all firms). Panel B reports the descriptive statistics on loan amounts. The amount of the initial loan is on average around £1537.29 million whereas the median is £248.92 million. The loan amounts are extremely variable reflected by the excess skewness of the data, with a range of approximately £69004 million.

3.4.2 Univariate Changes in Share Prices

I start my empirical research with an event study that examines the share price and stock return changes. Table 3.2 exhibits the abnormal return associated with the announcement of initial bank loans. Standard event study methodology is used to examine the share price behaviour surrounding initial loan announcement of zero-leverage firms. My analysis is based on an event window starting 90 days before the effective day and ending 90 days after the effective day. According to Chae (2005), the information asymmetry in the period prior to important corporate announcements is likely to be large, because some informed traders are likely to have superior information about the issued loans. A long prior announcement window is used to examine if there is any information leakage before the news. Thus, the abnormal return of each trading day covers a 181 event day period. The null hypothesis is that the price is unchanged or reverts to the pre-announcement level. Panel A provides the abnormal return on the initial loan and Panel B provides the abnormal return of all kinds of loans (including the subsequent loan, third loan and any subsequent loans after that) during my sample period. For the pre-announcement period, both of the groups are significantly positive from the 60 days prior to the announcement day, and insignificantly different between the two groups. My findings are consistent with Chae (2005), there is some information leakage before both the initial and all loan announcements, and all loan announcements lead to a positive market reaction.

For initial loans, the significant positive return persists from day 0 to day 90, with the two largest average abnormal return of 2.394% (t-statistic of 12.20), 1.645% (t-statistic of 7.44) occurring on the effective date of announcement (day 0) and the first trading day after the announcement (day 1) respectively. Cumulative average abnormal returns (CARs) over various event windows are also presented in Table 2. The average cumulative abnormal return of 9.005% is observed over the 11-event day interval [-5, +5], with a highly significant t-value. Event windows [-2, +2] and [-1, +1] have CARs of 6.400 and 4.556 percent respectively which are both highly significant. In terms of all loans, on the announcement day the abnormal return is 2.125% with a t-statistic of 10.25, which is significantly lower than the abnormal return of the initial loan. The positive abnormal return lasts for 90 days after the initial loan announcements, suggests that positive excess returns are gained by zero-leverage firms over a long-term period.

Table 3.2 Price effects associated with initial bank loans of zero-leverage firms

Table 3.2 provides the price and return changes from the pre-announcement to the post-announcement period. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015. Panel A presents the daily average abnormal returns (AAR) and cumulative abnormal returns (CARs) surrounding the initial bank loan announcements whereas Panel B shows the AARs and CARs of all kinds of loans. T-statistics are presented to show if sample loans' AAR are significantly different from zero. Event day (day zero) presents the day of the bank loan announcement. Two tailed tests of significance are reported as follows, ***significance at 1%, **significance at 5% and * significance at 10%.

Event Day	**Panel A: Initial Loan (N=96)**		**Panel B: All Loans (N=365)**	
	AAR (%)	T-stat	AAR (%)	T-stat
(-90,0)	0.167	2.32**	0.142	1.91*
(-80,0)	0.212	2.60**	-0.017	-0.98
(-70,0)	-0.327	-2.57**	0.006	1.43*
(-60,0)	0.519	3.46***	0.251	2.25***
(-50,0)	0.392	2.48**	0.194	1.98*
(-40,0)	0.273	2.46**	0.207	1.46*
(-30,0)	0.256	2.97**	0.223	2.03**
(-20,0)	0.135	2.03*	0.224	2.55**
(-10,0)	0.167	2.56**	0.339	2.87**
-5	0.268	3.18***	0.199	3.01**
-4	0.196	2.08*	0.284	2.86**
-3	0.103	2.44**	0.197	3.11**
-2	0.449	3.27***	0.198	3.48***
-1	0.517	2.29*	0.205	2.77**
0	2.394	12.20***	2.125	10.25***
1	1.645	7.44***	1.378	4.99***
2	1.395	7.73***	1.198	4.38***
3	0.816	2.49**	0.709	2.51**
4	0.657	2.72***	0.544	1.57*
5	0.565	1.69*	0.599	2.54**
(-1, +1)	4.556	6.06***	3.708	5.17***
(-2, +2)	6.400	4.55***	5.104	3.34***
(-5,+5)	9.005	4.37***	7.636	5.95***
(0,10)	0.258	2.25*	0.201	1.97*
(0,20)	0.428	2.91***	0.299	2.21**
(0,30)	0.152	2.58**	0.105	1.99*
(0.40)	0.161	2.14*	0.118	2.48**
(0,50)	0.170	1.76*	0.160	1.83*
(0,60)	0.151	0.82	0.100	1.56*
(0,70)	0.319	1.62*	0.023	1.44*
(0,80)	0.167	2.43**	0.089	1.08
(0,90)	0.155	2.82**	0.197	2.01*

My results are strongly consistent with the information hypothesis. The bank lending decisions provide positive signals to equity market participants, and the positive information causes increases in stock prices immediately and the effects could be permanent (Denis and Mihov, 2003). Moreover, the gains obtained by zero-leverage firms from the initial loan are more pronounced than any other loans.

3.4.3 Trading Volume Effects of Zero-leverage Firms' Initial Bank Loan

In this section I examine if the abnormal returns lead to significant enhancements of trading volume. To isolate the short-run abnormal trading volume in the days around the announcement, I employ the following dummy variable panel fixed effects regression model.

$$Vol_{i,t}=\eta_{i,t}+\gamma_{i,t}+\sum_{-5}^{+5} D_{i,t}\, AVol_{i,t} + \varepsilon_{i,t} \qquad (3.14)$$

Where $Vol_{i,t}$ refers to the logarithm of trading volume for stock i at time t, *i is a 96*96* identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. $\eta_{i,t}$ captures the variation in trading volume across all the companies in my sample. $\gamma_{i,t}$ captures the change in trading volume per day that is common across all the companies in my sample. $D_{i,t}$ is dummy variables for each trading day t in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_{i,t}$ captures the abnormal trading volume during the event interval [-5, +5], $\varepsilon_{i,t}$ is a random disturbance term with a mean of zero and a variance of σ^2, $\eta_{i,t}$ $\gamma_{i,t}$, and $AVol_{i,t}$ are the parameters to be estimated. Equation (3.14) is estimated by a fixed effects panel estimator using the White (1980) heteroscedastic consistent covariance matrix. The results are presented in panel A of Table 3.3. The positive and significant sign of all 11 dummy variables confirm that there is a dramatic increase in trading volume around initial bank loan announcements. From 5 days prior to the announcement day, the coefficient is positive (e.g.: day -5 is 0.094) with a corresponding t-statistics of 2.40. On the event day (day 0), $AVol_0$ achieved its peak value of 1.970, which is highly significant with a t-statistic of 11.48. Following the loan announcement, the abnormal trading volume subsides from its peak but remains significant. During my short-run event period, all coefficients are positive and statistically significant.

Table 3.3 Short and long-run trading volume affects around the initial loan announcement

Panel A: Short-run trading volume

Panel A of table 3.3 provides the short-run trading volume ratio between the pre-announced and post-announced period. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015. A pooled time series regression is estimated with the White (1980) covariance matrix to investigate the volume patterns around the bank debt announcements as follows:

$$Vol_{i,t} = \eta_{i,t} + \gamma_{i,t} + \sum_{-5}^{+5} D_{i,t}\, AVol_{i,t} + \varepsilon_{i,t}$$

Where $Vol_{i,t}$ refers to the logarithm of trading volume for stock *i* at day *t*, *i is a 96*96* identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. $\eta_{i,t}$ captures the variation in trading volume across all the companies in my sample. $\gamma_{i,t}$ captures the change in trading volume per day that is common across all the companies in my sample. $D_{i,t}$ is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_{i,t}$ captures the abnormal trading volume during the event interval [-5, +5], ε_i is a random disturbance term with a mean of zero and a variance of σ^2, $\eta_{i,t}, \gamma$, and β are the parameters to be estimated. Two tailed tests of significance are reported as follows, ***significance at 1%, **significance at 5% and * significance at 10%.

Parameter	Estimate	T-stat
$\eta_{I,T}$	0.014	16.57**
$\gamma_{I,T}$	0.000587	11.21**
AVOL-5	0.094	2.40**
AVOL-4	0.091	1.57*
AVOL-3	0.002	1.43*
AVOL-2	0.009	1.94**
AVOL-1	0.084	3.71**
AVOL0	1.970	11.48***
AVOL1	1.152	6.34**
AVOL2	0.272	2.98**
AVOL3	0.361	2.71**
AVOL4	0.198	1.98*
AVOL5	0.204	1.87*

Panel B: Long-run trading volume

Panel B of table 3.3 provides the long-run trading volume ratio between pre-announced period and post-announced period. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015. Standardized trading volume is defined as daily trading volume in shares divided by the total FTSE 350 trading volume for the same day. Standardized trading volumes are computed for the pre-announcement [-90, 0] and the post-announcement period [0, +90]. The t-statistic is constructed to test the null hypothesis that the standardized trading volume is unchanged in the pre-announcement period as compared with the post-announcement period. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Variable	Standardized Trading Volume
Mean (pre-announced)	0.0347%
Mean (post-announced)	0.0643%
Median (pre-announced)	0.0227%
Median (post-announced)	0.0374%
Mean (post/pre ratio)	1.853
Median (post/pre ratio)	1.648
t-test	2.56**

In order to analyze the trading volume changes in the long-run, I construct a post/pre-ratio of standardized trading volume in the post announcement period [0, +90] to the standardized volume in the pre-announcement period [-90, 0]. Standardized trading volume is defined as daily trading volume of the zero-leverage firm listed on the FTSE 350 index, divided by the total FTSE 350 index trading volume for the same day. The results of the long-term changes in trading volume are reported in Panel B of Table 3.3. The mean (median) Post/Pre-ratio of standardized trading volume is 1.853 (1.648), the standard t-test statistic indicates that the increase in standardized trading volume is statistically significant at the 5% significance level. This result is consistent with the information effect hypothesis, suggesting that the initial bank loan announcement of zero-leverage firms leads to a permanent rise in trading volume. Hedge and McDermott (2003) and many other studies states that based on the liquidity-motivated hypothesis, trading volume is negatively related with information asymmetry. Therefore, a permanent increase in trading volume will result in a decrease in the bid-ask spread. In the next section I will analyze the impact of initial loan announcements on the bid-ask spread.

3.4.4 Univariate Changes in Overall Bid-ask Spreads

I construct ratios of the daily average absolute, relative and effective bid-ask spreads over various event windows during the pre and post initial bank loan announcements. The null hypothesis is that the spread ratio is equal to unity (indicating no change in the daily average time-weighted spreads) is tested by a standard t-test. There is clear evidence from Table 3.4 that spreads are significantly reduced after the announcement of the initial bank loan. For example, in the [-1, +1] event window, the mean of absolute spreads ratio is 0.842 with a highly significant t-statistic of – 3.25. It indicates that absolute spreads are significantly lower over the 3-trading day period centered on the announcement day. On the announcement day, the absolute bid-ask spread ratio is 0.867 (relative spread ratio is 0.803 and effective spread ratio is 0.877), which is smaller than 1 and significantly different from 0. In all event windows, all absolute spreads ratios are less than 1 and highly significantly. The decline is also pronounced for the relative and effective spread.

Table 3.4 Bid-Ask spread ratios for initial loans

Table 3.4 provides the spread ratio between pre-announced period and post-announced period. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015. Liquidity is measured by the absolute, relative and effective spread. The spread ratio for each bank debt in the sample is defined as the ratio of average spreads measured over the indicated event time interval to average measured over the post-bank loan announcement period. Absolute spread is defined as ask price minus bid price. Relative spread is defined as ask price minus bid price, then divided by quote midpoint. Effective spread is defined as two times trade price minus quote midpoint. The midpoint is the average between the ask and bid prices. The null hypothesis that that the mean of the reported ratio is equal to unity is tested using a standard t-test. *** significance at 1%, ** significance at 5% and * significance at 10%.

Event Day	Absolute Spread	T-test	Relative Spread	T-test	Effective Spread	T-test
0	0.867	-3.33***	0.803	-3.00**	0.877	-2.08**
(-1,+1)	0.842	-3.25***	0.874	-2.05*	0.869	-3.01**
(-2,+2)	0.839	-2.04*	0.882	-1.54*	0.842	-2.03*
(-3,+3)	0.938	-1.24	0.900	-1.97*	0.836	-0.71
(-4,+4)	0.901	-1.25	0.892	-2.38**	0.910	-3.04**
(-5,+5)	0.896	-2.11**	0.902	-3.67***	0.905	-2.44**
(0,+10)	0.917	-1.37*	0.896	-2.10**	0.894	-1.01
(0,+30)	0.903	-0.41	0.919	-1.05	0.983	-2.10**
(0,+60)	0.908	-1.57*	0.878	-1.49*	0.933	-3.28***
(0,+90)	0.914	-0.98	0.925	-2.26**	0.954	-2.44**

Furthermore, bank loan announcements result in a decrease in spread that persists over 90 trading days after the loan is announced, the average absolute bid-ask spread ratio for the long-term period, [0, 90] period is 0.914 although not at a statistically significant level (t-statistics=-0.98). However, the ratio of relative and effective measures of the bid-ask spread are significantly (0.925 with a t-statistics=-2.26 and 0.954 with a t-statistics=-2.44 respectively). There is some evidence of the reversal of bid-ask spread improvement in the 90-day post-announcement period, but not enough to eliminate the gains accrued during the event period. Given the advantages of the effective over the absolute bid-ask spread discussed earlier in the paper, I can say with some confidence that loan announcements enhance liquidity in the 3-month period. My result is consistent with liquidity effect and many other studies (e.g., Ferguson and Grosse, 2014) indicate that holding other things constant, a permanent decrease in bid-ask spreads must be associated with a permanent increase in trading volume, the improvement in liquidity and reduce in transaction costs of zero-leverage firm stocks as a result of lever up is permanent.

3.4.5 Robustness Test: Illiquidity Ratios

I undertake robustness tests for liquidity by constructing ratios of daily return to volume (*RtoV* ratio) and daily return to turnover (*RtoTR* ratio), over various intervals to their counterparts in the event window of [-90 + 90]. The null hypothesis that the *RtoV*, *RtoTR* ratio is equal to unity. From table 3.5, I see that both the *RtoV* and *RtoTR* ratios show a clear decrease over the event window. For example, in the [-5, +5] interval the *RtoV* and *RtoTR* ratio is 0.941 and 0.958 respectively. Since both *RtoV*, *RtoTR* ratios are illiquidity ratios, the decrease of them indicates increases of liquidity in the post-announcement period. In the [-1, +1] interval, the decrease is more pronounced, 0.899 and 0.849 for the *RtoV*, *RtoTR* ratios respectively, with both ratios being highly significant. The most pronounced ratio is on the event day, 0.804 for *RtoV* and 0.848 for *RtoTR* respectively with high significance. My results are consistent the liquidity wealth effect hypothesis discovered by Amihud and Mendelson (1986), the abnormal returns related with the initial loan announcement of stocks are positively related to the enhancement in the liquidity of stocks, by increasing in the degree of bank monitoring and eliminating information asymmetries across markets. Similar with changes in bid-ask spreads, I observe a reduction in the degree of increases through time, but the ratio still smaller than 1, indicating the reduction of transaction costs and the markets become more liquid due to the initial loan announcements.

Table 3.5 Illiquidity ratios for initial loans

Table 3.5 provides the robustness test for liquidity between the pre-announced period and post-announced period. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015.Illiquidity is measured by the *RtoV* (Amihud, 2002) and *RtoTR* ratio (Florackis et al., 2011). *RtoV* ratio is defined as the average daily absolute stock return to its trading volume. *RtoTR* ratio is defined as the average daily absolute stock return to its turnover. The null hypothesis that that the mean of the reported ratio is equal to unity and is tested using a standard t-test. *** significance at 1%, ** significance at 5% and * significance at 10%.

$$\text{RtoV}_i = \frac{1}{D_i} \sum_{d=1}^{D_i} \frac{|R_{i,d}|}{\text{Vold}_{i,d}}$$

$$\text{RtoTR}_i = \frac{1}{D_i} \sum_{d=1}^{D_i} \frac{|R_{i,d}|}{\text{TR}_{i,d}}$$

Event Day	RtoV ratio	T-test	RtoTR ratio	T-test
0	0.804	-2.08**	0.848	-3.56***
(-1,+1)	0.899	-2.65**	0.849	-2.39**
(-2,+2)	0.862	-2.16**	0.870	-1.43
(-3,+3)	0.834	-1.98**	0.945	-1.65*
(-4,+4)	0.902	-1.45*	0.923	-0.97
(-5,+5)	0.941	-1.99*	0.958	-1.74*
(0,+10)	0.897	-1.73*	0.899	-1.69*
(0,+30)	0.963	-1.56*	0.908	-1.03
(0,+60)	0.954	-1.99*	0.927	-1.07
(0,+90)	0.912	-0.93	0.934	-0.86

3.4.6 Multivariate Analysis of Market Liquidity Changes

Table 3.6 provides the results for the log-linear pooled cross-sectional multivariate regression analysis for initial bank loan announcements. I estimate a model for each of the five liquidity measures: absolute spreads, relative spreads, effective spreads, and the two illiquidity ratios, *RtoV* and *RtoTR*. Under the log-linear specification of equation (3.6), the coefficients of the initial loan announcement appears negative and highly significant in the event period. This result suggests that the event news has enhanced liquidity regardless of the measure of liquidity that is used. For example, the absolute bid-ask spread decreases on average by 9.3% in the post announcement period, the relative and effective spread decline by 3.7% and 2.4% respectively, after controlling for the impact of trading volume, firm size, volatility and share price. For two illiquidity ratio, the coefficient between *RtoV* and initial loan announcement is -0.018 and -0.026 for *RtoTR* ratio, although the coefficient of *RtoV* ratio is statistically insignificant.

Table 3.6 Multivariate analysis of changes in stock liquidity for initial loans

Table 3.6 provides the multivariate analysis of the long-term liquidity impact on initial loan announcement. The sample consists of 96 zero-leverage firms listed on the FTSE 350 that undertook an initial bank loan during the time period of 2000-2015. A log-linear pooled time series cross-sectional multivariate analysis of quoted spread and price impact ratio is estimated as follows:

$$LogLiq_{i,t}=\beta_0+\beta_1 Initial_{i,t}+\beta_2 LogVol_{i,t}+\beta_3 LogSize_{i,t}+\beta_4 StdDev_{i,t}+\beta_5 LogPrice_{i,t}+\beta_6 LogL/A_{i,t}+\varepsilon_t.$$

Regression variables are defined as: $logLiq_{i,t}$ represents the natural logarithm of the average daily five liquidity benchmarks, absolute spreads, relative spreads, effective spreads, *RtoV* ratio and *RtoTR* ratios for stock *i* in time period *t*. independent variables include the dummy variables $Initial_{i,t}$, which equals 1 in the post-announcement period and 0 otherwise. $logVol_{i,t}$, is the daily trading volume of the stock *i* in the time *t*, $LogSize_{i,t}$ captures the natural logarithm of the market capitalization of the firm *i* at time *t*. $LogStdDev_{i,t}$ represents daily return volatility in the time period t. $LogPrice_{i,t}$, is the natural logarithm of the stock *i*'s daily closing price. $logL/A_{i,t}$ is the logarithm of loan amount to total asset of zero-leverage firms. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

	Dependent Variables									
Independent Variables	**Absolute Spread**	**T-stat**	**Relative Spread**	**T-stat**	**Effective Spread**	**T-stat**	**RtoV**	**T-stat**	**RtoTR**	**T-stat**
C	-3.268	-3.08***	-5.465	-6.78***	-3.669	-2.07*	0.037	2.08**	0.0056	0.44
Initial	-0.093	-6.29***	-0.037	-3.56***	-0.024	-1.24	-0.018	-1.64	-0.026	-3.23***
Vol	-0.028	-5.83***	-0.041	-3.17***	-0.011	-1.99*	-0.669	-8.28***	-0.0005	-0.75
Size	-0.007	-1.12	-0.003	-0.81	-0.003	-0.83	-0.376	-6.43***	0.009	0.98
StdDev	0.068	3.49***	0.027	2.13*	0.027	2.18*	0.0001	0.74	-0.004	-1.73*
Price	-0.003	-1.27	-0.009	-1.00	0.002	1.29	0.014	1.47	0.026	2.18**
L/A	0.004	1.07	0.001	0.93	0.0002	0.78	0.000	0.63	0.000	0.77

In table 3.6 most of the control variables are consistent with findings documented in prior research, trading volume is negative whereas volatility is positive related with illiquidity. Interestingly, the coefficient estimate for the firm size is negative but statistical insignificant, suggesting that there is no statistical relationship between firm size and liquidity. Furthermore, there are a clear evidence that Amihud (2002)'s *RtoV* ratio are relate with firm size, the coefficient of firm size and *RtoV* is -0.376 and statistical significant at 1%. It confirms the previous studies which indicated the *RtoV* ratio contains firm size bias. On the other hand, there are no statistic relations between *RtoTR* ratio and firm size. As expected, the interpretation of coefficient on price suggests that the price is lower for stocks with higher spreads and *RtoV*, *RtoTR* ratios.

3.4.7 Spread Components of Zero-leverage Firms around the Announcement Days

In the last section I established the improvement in market performance results primarily from a drop in the bid-ask spread. Now I use the spread decomposition model indicated by Huang and Stoll (1997) to measure the decrease of spreads in the event window are attributable to improvement in the asymmetric information components. Table 3.7 reports the spread components for both zero-leverage firms and all firms around the announcement day. The Huang and Stoll (1997) two-way spread decomposition model decomposes the spreads into two components, adverse selection plus inventory holding costs (λ_i) and order processing cost ($1-\lambda_i$). I estimate the data 90 trading days before the initial loan announcements and 90 trading days after the announcement day. I present the results of all sample in Panel A, then divide my study sample according to the trade size in Panel B. Portfolio 1 includes stocks with the smallest trade size, portfolio 2 and 3 incorporates stocks with the median and largest trade size respectively. When I look across the percentage of adverse selection plus inventory holding costs (λ_i) in Panel A, the estimates of λ_i in the post-announcement period are significantly smaller than the pre- announcement period for zero-leverage firms. For example, λ_i before the initial loan announcement is 0.632 for all samples then drops to 0.547 after the announcement, and there are no significant changes for all FTSE 350 firms during the same period (0.448 and 0.452).

Turning to the results depend on the trade size, the overall pattern is that before the announcement period, λ_i increase with the trade size (0.589, 0.590 and 0.663 for small, median and large trades respectively). It is consistent with Lin et al. (1995), informed traders prefer to trade a larger size at any given price to maximize their trading profits, so the adverse information component of the spread should increase with trade size. Similar with the results in Panel A, the adverse selection plus inventory holding costs are significant decline after the initial loan announcement, for example, λ_i before the initial loan announcement is 0.589 for small trading size then drops to 0.500, 0.590 for median trades then decline to 0.527 after the initial loan announcement. The results in Table 3.7 support my hypothesis that the initial loan announcement leads to increasing liquidity, since the order processing costs is a fixed cost, I can conclude the adverse selection plus inventory holding costs decrease in monetary terms as a result of the news announcement. For more details about whether adverse selection or inventory cost components are driving the decrease of spread or both of them, I continue my study by applying Huang and Stoll (1997) three-way spread decomposition model.

Table 3.7 Spread components for zero-leverage firms and all FTSE 350 firms using two-way Huang and Stoll model

Table 3.7 reports a comparison of bid-ask spread components of zero-leverage firm before and after the announcement of initial bank loans. The adverse selection plus inventory costs components (λ_i) is estimated by the Huang and Stoll (1997) two-way decomposition model. They also estimate the order processing costs by computing ($1-\lambda_i$). I estimate the data 90 trading days before the initial loan announcement day and 90 trading days after the announcement day. For all firms, I calculate the average bid-ask spread components on the same days corresponds to the zero-leverage firms. The results for the whole sample are reported in Panel A and the results by trade size are presented in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel A: Spread components using two-way model

Zero-leverage Firms				
Initial loans	**Before**	**T-stat**	**After**	**T-stat**
λ_i (%)	0.632	18.67***	0.547	19.67***
All FTSE 350 Firms				
	Before	**T-stat**	**After**	**T-stat**
λ_i (%)	0.448	5.44***	0.452	6.73***

Panel B: Spread components by trade size using two-way model

Small Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
λ_i (%)	0.589	21.11***	0.500	19.96***
Median Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
λ_i (%)	0.590	18.39***	0.527	15.36***
Large Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
$\alpha\lambda_i$ (%)	0.663	10.42***	0.617	6.40***

Table 3.8 reveals the spread components for both zero-leverage firms and all firms using the three-way Huang and Stoll (1997) model. Like the previous study I divide my sample into three groups according to different trading sizes. For all samples, the estimates of the adverse selection are decreasing from 0.326 before the announcements to 0.299 after the announcements, the estimates of inventory holding cost components drop from 0.348 to 0.307 after the initial loan announcements.

Table 3.8 Spread components for zero-leverage firms and all FTSE 350 firms using three-way Huang and Stoll model

Table 3.8 reports a comparison of the components of the bid-ask spread of zero-leverage firm before and after the announcement of initial bank loans. The adverse selection (α_i), inventory costs components (β_i) and order processing costs ($1-\alpha_i-\beta_i$) are estimated by the Huang and Stoll (1997) three-way model. I compute the data 90 trading days before the initial loan announcement day and 90 trading days after announcement days. For all firms, I calculate the average bid-ask spread components on the same days corresponds to the zero-leverage firms. I report the whole sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel A: Spread components using three-way method

Zero-leverage Firms				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α_i (%)	0.326	23.13***	0.299	21.26***
β_i (%)	0.348	25.28***	0.307	19.00***
All FTSE 350 Firms				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α_i (%)	0.213	11.76***	0.224	10.05***
β_i (%)	0.327	9.25**	0.330	11.14***

Panel B: Spread components by trade size using three-way method

Small Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α_i (%)	0.293	21.04***	0.274	18.92***
β_i (%)	0.445	18.76***	0.428	22.66***
Median Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α_i (%)	0.311	16.32***	0.298	13.50***
β_i (%)	0.396	14.14***	0.390	19.19***
Large Trades				
Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α_i (%)	0.315	14.11***	0.301	18.40***
β_i (%)	0.447	16.83***	0.436	16.12***

Panel B presents the results by trade size. Same as before, the adverse selection component rises monotonically as trade size increases. The average percentage of adverse selection costs vary from 0.293 for small trades to 0.315 for large trades. For the inventory costs, the coefficients are 0.445, 0.396 and 0.447 (with t-test 18.76, 14.14 and 16.83 respectively). After the announcement of the initial loan, both α_i and β_i decrease for all three groups. Since I have concluded that the initial loan announcements will lead to the decrease of spreads, and the order processing costs is the fixed costs, the decline in spreads are attributed to changes in both the adverse selection and inventory costs. Looking into the changes of every component after the loan announcement, for small trades, adverse selection costs drop from 0.293 to 0.274, for medium and large trades are 0.311 to 0.298, and 0.315 to 0.301 respectively, with the corresponding change levels of 1.9%, 1.3% and 1.4%. The difference in medium and large trades is not as significant as the small trades with medium trades. For inventory holding costs, the change level is 1.7%, 0.6% and 1.1%. According to previous studies, even though the adverse selection costs are increasing with the trade size, the information asymmetry problem is more influenced on the small trade size. Overall, the findings in table 3.7 and 3.8 document that the amount change of the bid-ask spread that can be attributed to adverse selection components and inventory holding costs fell dramatically for all trades as well as for all trade size groups with the announcements of the initial loan. And the adverse selection costs and inventory holding costs increase with trade size while order-processing costs decrease with the trade size due to the scale of economic. The next step in my econometric analysis is to examine the cross-sectional relationship between the firm determinants and the initial loan announcements.

3.4.8 Regression Results between Spread Components and Firm Characteristics

In this section, I use the ordinary least squares method to obtain some preliminary insights on the cross-sectional determinants of spread components for zero-leverage firms around the initial loan announcement period. Table 3.9 (3.10) presents the two (three) way Huang and Stoll (1997) model. For the two-way Huang and Stoll (1997) model, the dependent variables are adverse selection plus inventory holding costs (λ), and order processing costs (1-λ). Like the previous section, the regressions are run for small, medium and large trades separately. Specifically, the regression takes the following forms:

$$Ln\lambda_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i \quad (3.15)$$

$$Ln(1-\lambda_i)=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i \quad (3.16)$$

Where λ_i and $1-\lambda_i$ is the adverse selection plus inventory holding costs and order processing costs for stock *i*, represents the firms which undertook the initial loan during my sample period. Independent variables include $Initial_i$, which is a dummy variable equal to one if the trading occurs after the initial loan announcements and zero otherwise. Vol_i is the average daily volume of trading, $Size_i$ is the market capitalization of zero-leverage firms, $StdDev_i$ is the standard deviation of the stock prices, which approximates stock price volatility. $Price_i$ is the daily average share price and L/A_i is the Loan amounts to total assets ratio. I mainly focus on the magnitude and significance of $Initial_i$ in order to observe the impact of debt announcements of zero-leverage firms on their stock market liquidity.

Table 3.9 shows that for all of λ_i there is a strong negative correlation with the $Initial_i$ dummy variable. For all samples in Panel A, the coefficient is -0.056 with a t-statistic of -3.43. Similar quantitative results are obtained in Panel B, for all three trade-size groups, the initial loan announcement dummy is highly significant, where the estimated significant coefficient for λ_i is -0.097, -0.019 and -0.004 for small, medium and large trades respectively. These results indicate that the initial loan announcements appear to have an overwhelming negative effect on λ_i. Furthermore, the correlation between λ_i and the initial dummy are fairly large in the small trades, then decreasing with trading size. It indicates that the initial loan announcement has more influence on the small trades rather than medium and large trades.

For my second model where order processing costs ($1-\lambda_i$) act as a dependent variable, all coefficients of the initial variable are not significant. This is consistent with the results which I have mentioned previously, that there are no statistical relationships between the initial loan announcement and order processing costs. The reduction of spreads after the initial loan announcements are mainly due to the decrease of λ_i. Moreover, the coefficients for trading volume are negative and significant in all order processing cost models regardless of trade size. This confirms the results of Lin et al. (1995), which state that higher trading volume is connected with changes in order processing costs, due to the order costs representing fixed clerical expenses of carrying out a transaction. Standard deviation of stock prices, which proxy volatility are positively related with λ_i but negative and insignificantly associated with the order processing cost. Firm size is positive and significant with order processing costs but insignificant with adverse selection plus inventory costs in all four models. It means the firm size has no relation with any components which are driven by the information model but are only related with the order processing model. For share price, the estimates of small trading size are highly significant and confirm an inverse relation between λ_i and share price. One possible explanation is that the lowest priced stocks have a significantly smaller market value than higher priced stocks, and they tend to be less widely followed by the market and are subject to a greater degree of asymmetric information.

Table 3.9 Regression of spread components using two-way Huang and Stoll model for initial loans

Table 3.9 presents the OLS regression results for the determinants of the adverse selection plus inventory cost, and order processing costs from 2000 to 2015, for the zero-leverage firms (stock *i*) which announce their initial bank loans. The dependent variable is the adverse selection plus inventory cost (λ_i), and order processing costs ($1-\lambda_i$), estimated using the Huang and Stoll (1997) two ways spread decomposition model. The independent variables include the dummy variable $Initial_i$ which denotes the initial loan of zero-leverage firms, the logarithm of trading volume (Vol_i), the logarithm of daily average market capitalization ($Size_i$), the logarithm of daily return standard deviation ($StdDev_i$), the logarithm of daily average share price ($Price_i$), and the loan amount to total asset ratio (L/A_i). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%,** significance at 5% and * significance at 10%.

$$Ln\lambda_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$
$$Ln(1-\lambda_i)=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$

Dependent Variables		Independent Variables													
		C		***Initial*$_i$**		***Volume*$_i$**		***Size*$_i$**		***StdDev*$_i$**		***Price*$_i$**		***L/A*$_i$**	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: Regression of Spread Components															
All	λ_i	2.760	7.55***	-0.056	-3.43***	-0.005	-3.06***	-0.001	-1.88*	0.013	2.09*	-0.004	-1.98*	0.015	1.24
	$1-\lambda_i$	3.205	6.04***	0.004	0.98	-0.058	-5.47***	0.056	4.25***	-0.003	-1.36	-0.002	-1.08	0.002	0.98
Panel B: Regression of Spread Components by Trade Size															
Small	λ_i	3.024	8.68***	-0.097	-3.09**	-0.004	-2.44**	-0.000	-1.38	0.030	2.50*	-0.005	-2.61**	0.023	1.85*
	$1-\lambda_i$	4.331	9.49***	0.001	1.31	-0.025	-4.24***	0.037	2.73**	-0.001	-1.65*	-0.000	-1.58	0.001	0.46
Median	λ_i	6.320	12.45***	-0.019	-2.83**	-0.003	-1.69*	-0.001	-1.93*	0.009	3.04**	-0.001	-2.19*	0.006	0.97
	$1-\lambda_i$	5.124	6.27***	0.000	0.45	-0.055	-2.20**	0.068	2.05*	-0.004	-0.25	-0.005	-0.45	0.000	1.45
Large	λ_i	3.088	9.33***	-0.004	-1.96**	-0.007	-1.05	-0.000	-1.51	0.004	1.83*	-0.013	-1.08	0.001	0.73
	$1-\lambda_i$	3.740	1.11	0.000	0.84	-0.073	-2.33**	0.059	2.16**	-0.000	-0.71	-0.001	-1.43	0.000	0.48

Table 3.10 summarizes the results of the firm determinants and the three spread components, adverse selection (α_i), inventory holding costs (β_i) and order processing costs ($1-\alpha_i-\beta_i$). The spread components are computed by the three-way Huang and Stoll (1997) model. Similar with two-way decomposition model, order processing costs are negligible in every subsample with an initial loan announcement. This suggests that the large decline in spreads cannot be attributed to changes in the order processing costs. For all samples in Panel A, the coefficient between adverse selection and the initial loan announcements dummy is -0.024 with t-statistic of -4.33. The coefficient between inventory holding costs and *Initial* is -0.006 and significant at the 10% level. Comparing with previous results, this implies that although both λ_i and α_i are negatively related with the initial loan announcements, the adverse selection components account for a larger portion of the spread decrease.

Panel B reports the regression results for the panel data regressions with three spread components as dependent variables sorted by trade size. The correlations between adverse selection components and initial loan announcements are fairly significant in the first two subsamples (-0.029 for small and -0.015 for medium trades) and are negligible in the third group. It reveals that the decrease of information asymmetry is more pronounced in the small and medium trades when a zero-leverage firm has been issued an initial bank loan. It also suggests that the level of decrease falls when the trade size increases.

Van Ness et al. (2001) finds that the adverse selection and stock return volatility are positively and significantly related. My results reaffirm their findings. For all samples, the coefficient between them is 0.012 with a t-statistic of 3.03. The reduction is also seen in the level of the changes between the standard deviation and the inventory holding costs. The estimated coefficient for inventory holding costs is 0.040 for all samples, 0.076 for the small trades group, 0.041 and 0.019 for medium and large trade groups respectively. The positive correlation between the standard deviation and inventory holding components indicates that the more volatile the stock, the greater the inventory holding problem faced by the market maker.

In my zero-leverage samples divided by trade size, the coefficient between market capitalization and α_i is -0.003, -0.000 and -0.001 with the t-statistics of -2.77, -1.06 and-1.65 respectively, it only significant in the small trade size. Moreover, the correlation between the adverse selection and trading volume is -0.010, -0.005 and -0.003 for small, median and large trading sizes. This supports the evidence of the liquidity effects and my result in section 3.4.3, that more highly traded stocks have fewer information problems, a significant source of abnormal returns associated with the initial loan announcement is the decline in the asymmetrical information costs of bid-ask spread. All coefficients on the trading volume have a strong negative correlation with the order processing costs and are highly significant, advocating that fixed costs are diminishing when market makers trade more shares.

Table 3.10 Regression of spread components using three-way Huang and Stoll model for initial loans

Table 3.10 presents the OLS regression results for the determinants of the adverse selection, inventory cost, and order processing costs for a period from 2000 to 2015 for zero-leverage firms (stock *i*) which announced their initial bank loans. The dependent variable is the adverse selection (α_i), inventory cost (β_i), and order processing costs ($1-\alpha_i-\beta_i$), estimated using Huang and Stoll (1997) three-way spread decomposition model. The independent variables include the dummy variable $Initial_i$, which denotes the initial loan of zero-leverage firms, the logarithm of trading volume (Vol_i), the logarithm of daily average market capitalization ($Size_i$), the logarithm of daily return standard deviation ($StdDev_i$), the logarithm of daily average share price ($Price_i$), and the loan amount to total assetratio (L/A_i). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$Ln\alpha_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$
$$Ln\beta_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$
$$Ln(1-\alpha_i-\beta_i)=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$

Dependent Variables		Independent Variables													
		C		***Initial*** $_i$		***Vol*** $_i$		***Size*** $_i$		***StdDev*** $_i$		***Price*** $_i$		***L/A*** $_i$	
		Coef	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: Regression of Spread Components															
All	α_i	1.306	11.58***	-0.024	-4.33**	-0.003	-1.32	-0.000	-1.08	0.012	3.03**	-0.003	-1.32	0.008	1.33
	β_i	3.888	12.04***	-0.006	-2.14*	-0.020	-4.83***	-0.004	-2.46**	0.040	3.14***	-0.007	-0.56	-0.006	-0.47
	$1-\alpha_i-\beta_i$	3.729	9.03***	0.001	1.64*	-0.066	-2.98**	0.037	1.04	-0.002	-1.63*	-0.001	-1.56	0.000	0.83
Panel B: Regression of Spread Components by Trade Size															
Small	α_i	2.400	17.58***	-0.029	-4.03***	-0.010	-1.44	-0.003	-2.77**	0.023	4.29***	-0.004	-2.82**	0.011	1.54
	β_i	4.253	9.08***	-0.012	-2.25**	-0.024	-2.03*	-0.001	-2.24**	0.076	1.07	-0.009	-1.66	-0.013	-1.03
	$1-\alpha_i-\beta_i$	2.368	11.63***	0.003	0.58	-0.093	-3.18***	0.020	2.25**	-0.002	-1.09	-0.001	-1.48	0.000	0.87
Median	α_i	2.403	8.09***	-0.015	-3.98***	-0.005	-1.24	-0.000	-1.06	0.010	3.54***	-0.000	-2.13*	0.003	1.24
	β_i	3.050	9.40***	-0.003	-3.92***	-0.018	-1.68*	-0.002	-2.10*	0.041	1.99*	-0.004	-1.02	-0.009	-0.98
	$1-\alpha_i-\beta_i$	4.584	11.00***	0.000	1.03	-0.054	-3.66***	0.041	2.73**	-0.001	-1.58	-0.002	-0.77	0.000	0.45
Large	α_i	2.809	6.41***	-0.007	-1.34	-0.003	-0.83	-0.001	-1.65	0.008	2.44**	-0.003	-1.77*	0.001	0.47
	β_i	1.054	4.55***	-0.001	-2.67**	-0.015	-2.78**	-0.004	-0.96	0.019	1.48	-0.004	-0.66	-0.003	-0.87
	$1-\alpha_i-\beta_i$	6.038	7.67***	0.001	0.37	-0.076	-3.25***	0.044	3.96***	-0.001	-1.05	-0.001	-0.98	0.000	0.85

3.4.9 Robustness Test: Regression of Spread Components by MRR Model and PIN Model

In this section I replicate the single equation in section 4.8 using two alternative proxies, the MRR model (1997) and *PIN* model developed by Easley et al. (1996), to test whether my findings are driven by methodological differences. Given that both the *MRR* and *PIN* models are two-way spread decomposition models, I compare the results with the two-way Huang and Stoll model. The results are displayed on Table 3.11 (*MRR* model) and 3.12 (*PIN* model).

The spread component estimation is sensitive to model specifications, because the estimates of the adverse selection component from the *MRR* model are generally higher than my estimate from the Huang and Stoll model, whereas the estimation from the *PIN* model is lower. The first column in Table 3.11 presents the relationship between adverse selection estimated by the *MRR* model and firm determinants. For all samples in Panel A, similar with the regression model of the two-way Huang and Stoll, order processing costs are negligible. The coefficient between λ and the initial loan announcement dummy is -0.045 with a t-statistic of -3.58. Even though, λ is significant, the costs are very small given the small magnitude of the coefficient. In Panel B, for small trade sizes, the estimated coefficients of the adverse selection component are -0.093 with a t-statistic of-3.13, -0.034 and -0.037 for medium and large trades respectively. Order processing cost coefficients are insignificant with initial loan announcements across the three groups. Comparing with the result of the Huang and Stoll model in Table 3.9, I observe that the adverse selection components are negatively related with the initial loan announcements of zero-leverage companies.

For all samples in the *PIN* model, the coefficient of the dummy variables is insignificant and negative, with a *PIN* value of -0.004 with t-statistics of -0.95. For *1-PIN*, the coefficient between the initial loan announcements is -0.007 with t-statistic -1.88, which is significant only at the10% level. The correlations between α and the initial loan dummy variable are fairly small in all three subsamples (-0.008, -0.002 and -0.001 for small, medium and large trades). So, I cannot conclude that the adverse selection component (as measured by the *PIN* model) of the spread decreases with the announcement of the initial bank loan. I think it is due to the misclassification of *PIN* model. As Boehmer et al. (2007) predicts, the measurement error from misclassification will negatively relate to the stock's liquidity.

Table 3.11 Regression of spread components using MRR model for initial loans

Table 3.11 presents the OLS regression results for the determinants of the adverse selection and order processing costs, which are estimated using Madhavan et al. (1997) spread decomposition model (MRR model). Over the period of 2000 to 2015, for zero-leverage firms (stock *i*) which announced their initial bank loans. The independent variables include the dummy variable ($Initial_i$), the initial loan of zero-leverage firms, the logarithm of trading volume (Vol_i), the logarithm of daily average market capitalization ($Size_i$), the logarithm of daily return standard deviation ($StdDev_i$), the logarithm of daily average share price ($Price_i$), and the loan amount to total asset ratio (L/A_i). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$Ln\lambda_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$
$$Ln(1-\lambda_i)=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$

Dependent Variables		Independent Variables													
		C		***$Initial_i$***		***Vol_i***		***$Size_i$***		***$StdDev_i$***		***$Price_i$***		***L/A_i***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: Regression of Spread Components															
All	λ_i	2.607	7.18***	-0.045	-3.58***	-0.010	-5.84***	-0.005	-2.94**	0.037	3.96***	-0.008	-1.85*	0.000	0.96
	$1-\lambda_i$	6.551	6.35***	0.000	0.96	-0.059	-8.93***	0.033	3.07**	-0.000	-1.14	-0.003	-0.97	0.000	1.89*
Panel B: Regression of Spread Components by Trade Size															
Small	λ_i	2.064	6.88***	-0.093	-3.13***	-0.006	-2.65**	-0.005	-1.18	0.049	4.65***	-0.004	-1.02	0.010	0.78
	$1-\lambda_i$	3.448	3.41***	0.004	1.16	-0.063	-7.45***	0.012	1.90*	-0.000	-1.26	0.016	0.83	0.024	1.00
Median	λ_i	4.001	6.86***	-0.034	-3.59***	-0.005	-3.37***	-0.009	-1.18	0.014	5.09***	-0.010	-1.99*	0.003	1.24
	$1-\lambda_i$	3.298	1.71*	0.002	1.16	-0.041	-3.11***	0.061	1.00	-0.000	-1.27	0.009	0.79	0.001	0.90
Large	λ_i	1.008	7.65***	-0.037	-2.88**	-0.013	-1.68*	-0.038	-2.54**	0.016	3.34***	-0.013	-1.65	0.000	0.73
	$1-\lambda_i$	3.068	0.52	0.000	0.75	-0.048	-6.33***	0.035	2.48**	-0.003	-1.60	0.000	1.03	0.000	0.24

Table 3.12 Regression of spread components using PIN model for initial loans

Table 3.12 presents the OLS regression results for the determinants of the informed trading costs and non-informed trading costs of share spread, which are estimated using the probability of information-based trading (PIN model) by Easley et al. (1997). Over the time period of 2000 to 2015, for zero-leverage firms (stock *i*) which announced their initial bank loans. The independent variables include the dummy variable *Initial*, which denotes the initial loan of zero-leverage firm, the logarithm of trading volume (Vol_i), the logarithm of daily average market capitalization ($Size_i$), the logarithm of daily return standard deviation ($StdDev_i$), the logarithm of daily average share price ($Price_i$), and the loan amount to total asset ratio (L/A_i). I report the entire sample results in Panel A and the results by trade size in Panel B.Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$\text{Ln}PIN_i=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$
$$\text{Ln}(1-PIN_i)=\mu_0+\mu_1 Initial_i+\mu_2 Vol_i+\mu_3 Size_i+\mu_4 StdDev_i+\mu_5 Price_i+\mu_6 L/A_i+\varepsilon_i$$

Dependent Variables		**Independent Variables**													
		C		***Initial***		***Vol_i***		***$Size_i$***		***$StdDev_i$***		***$Price_i$***		***L/A_i***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: Regression of Spread Components															
All	PIN_i	11.88	9.65***	-0.004	-0.95	-0.003	-1.24	-0.031	-3.25***	0.017	3.96***	-0.000	-0.74	0.018	1.05
	$1\text{-}PIN_i$	7.52	5.33***	-0.007	-1.88*	-0.000	-0.97	0.045	3.23***	-0.056	-2.89**	0.003	1.28	0.006	1.30
Panel B: Regression of Spread Components by Trade Size															
Small	PIN_i	-1.357	-3.05**	-0.008	-1.66*	-0.005	-1.38	-0.030	-3.58***	0.004	1.63*	-0.001	-1.88*	0.022	1.78*
	$1\text{-}PIN_i$	-2.007	-3.41***	-0.006	-1.86*	-0.000	-0.29	0.010	2.03*	-0.071	-0.99	0.000	1.00	0.030	2.55**
Median	PIN_i	-2.055	-2.27*	-0.002	-1.92*	-0.008	-1.32	-0.012	-4.87***	0.030	0.73	-0.010	-1.03	0.009	1.04
	$1\text{-}PIN_i$	-2.113	-1.04	-0.001	-1.55*	-0.004	-1.03	0.017	2.46**	-0.004	-1.64*	0.006	1.75*	0.000	1.22
Large	PIN_i	-2.819	-3.12**	-0.001	-0.75	-0.002	-1.46	-0.045	-1.07	0.001	2.15**	-0.001	-1.33	0.000	1.07
	$1\text{-}PIN_i$	-3.007	-3.69***	-0.000	-0.43	-0.011	-0.89	0.037	2.08*	-0.011	-1.21	0.004	1.86*	0.002	0.64

3.5 Summary

In this chapter, I examine stock market reactions and liquidity effects following the initial bank loan announcement of zero-leverage firms. Using a sample of 96 zero-leverage firms listed on the FTSE 350 index over the time period of 2000-2015, I find evidence of a significant and permanent stock price increase as a result of the initial debt announcement. The announcement of an initial bank loan causes a positive reaction in the stock price of borrowing firms, which is consistent with the financial intermediation hypothesis. This suggests that bank relations allow zero-leverage firms to build-up reputation to encounter credit constraints and that financial intermediaries play a unique role in monitoring and signal effects to the market.

I also find that the announcement of the news results in a sustained increase in trading volume and liquidity. The improvement in liquidity continues to persist once we control for stock price and trading volume effects in both the short and long run. My results are robust across five alternative measures of liquidity. When I decompose the bid-ask spread into its three components I find that information asymmetry is driving the enhancement in liquidity rather than changes in order processing and inventory holding costs. Using the Huang and Stoll two -and three-way spread decomposition, I discover that both the adverse selection and inventory holding are decreasing after the initial and subsequent loan announcement. The decline in spreads are attributed to changes in both the adverse selection and inventory costs. The regression results between spread components and firm characteristics, show that the initial loan announcement has more influence on small trades rather than medium and large transactions. There is no statistical relationship between the loan announcement and order processing costs.

Chapter Four

Subsequent and All Loans for Zero-Leverage Firms in UK

4.1 Background

My research has shown that there is a sustained increase in liquidity for stocks announced an initial bank loan, the improvement in trading costs and liquidity persist even after controlling for the effects of changes in trading volume, stock price, and variance of returns. In this chapter, I aim to examine if the results are similar for subsequent and all other loans for my data sample. Some prior research has focus on the difference between the signal effect and the initial and subsequent loans. Billett et al. (1995) believes that the renewals of bank loan contracts will convey more favorable information compared to the initial bank loan issuance. Athavale and Edmister (2004) believes that over the duration of the loan extension, the banks assess the borrowers' projects and obtains additional private information. Loan contract renewals from more reputable banks convey more favorable information compared to those from less reputable ones, since the bank devote more resources toward reviewing firms so that more reputable banks obtain more accurate evaluations stock. On the other hand, rapid develops in financial institutions are threatening traditional bank industry, there are increasing among of financial intermediations focus more on building a long-term relation with borrowers, therefore the subsequent and more loans become more possible than before (Boot and Thakor, 2000). These research, however, all based on the all firms rather than zero-leverage firms, therefore the different signal effects of initial loan and subsequent loan for zero-leverage firms are remain a question.

4.2 Data

Following my research in Chapter three, I collect data from all the FTSE 350 firms actively traded from the start of January 2000 to the end of December 2015[6]. The FTSE 350 aggregating the FTSE 100 and FTSE 250 index, consists of the 350 largest firms listed on the London Stock Exchange with respect to market capitalization. During my dataset, there are 96 zero-leverage firms during the examining period be issued the initial loan, 71 of them be issued the subsequent loan following their initial loans, and 69 sample firms continue to be issued more loans during the period. In this chapter, I mainly focus on the subsequent and third loan and any subsequent loans after that. For distinguishing the zero-leverage firms which be issued both the initial and subsequent loans from all the zero-leverage firms, I define the stock of firms

[6] Same with my research on initial loan announcement, my sample excludes financial and utility companies or closed-end funds.

with subsequent loans as stock *j*, and the firms with more than two loans as stock *h*. In total, there are 365 loans undertook by 96 zero-leverage firms during the period, 96 initial loans, followed by 71 subsequent loans and 198 third and more loans.

In this chapter, I obtain the firms variables same as chapter four for every stock *j* and stock *h*. I collect data from Thomas Reuter Eikon, on company's daily and monthly trade and closing price, bid price and ask price, trading volume (number of stocks traded), stock turnover (the average of shares outstanding during the period divided by total number of shares traded), L/A ratio (firm's loan amount divided by firm's market capitalization) and market valuation (total share outstanding multiple by share price). Similar with the initial loan's study, I obtain information concerning the subsequent and all other loan undertaken by the firm including the issue date, loan amount, and loan maturity. Details on the construction of the bid-ask spread data is given in the following section.

4.3 Methodology

4.3.1 Absolute Spreads, Relative Spreads and Effective Spreads

For examining the liquidity level around the loan announcements for zero-leverage firms, I measure the absolute spread around the announcement date for stock *j* and stock *h*, the difference between ask price and bid price:

$$AS_t = A_t - B_t \tag{4.1}$$

Where AS_t equals to $AS_{j,t}$ or $AS_{h,t}$, represent the absolute bid-ask spread of stock *j (h)* at time period *t*. $A_{j,t}$ $(A_{h,t})$is the closing ask price of stock *j (h)* at time period *t* and $B_{j,t}$ $(B_{h,t})$is the closing bid price of stock *j* (*h*) at time period *t*. However. Macey and O'Hara (1997) report that many trades are executed within the bid-ask spread, resulting in absolute bid-ask spreads overstating the trade execution cost. Therefore absolute bid-ask spread is not reliable for measuring the trading costs (Petersen and Fialkowski, 1994; Madhavan et al., 1997). In this case, the relative bid-ask spread, which is calculated by dividing the absolute bid-ask spread by the average of the bid and ask prices, may be a more accurate measure of transaction costs. The relative bid-ask spread is defined in equation (4.2).

$$RS_t = \frac{A_t - B_t}{(A_t + B_t)/2} \quad (4.2)$$

Where RS_t equals to $RS_{j,t}$ for the relative spread of stock j at time period t, or $RS_{h,t}$ for the relative spread of stock h. A_t equals to $A_{j,t}$ ($A_{h,t}$) , and B_t equals to $B_{j,t}$ ($B_{h,t}$)are defined in the same way as equation (4.1). Due to the presence of mid-point of in the relative spread ((A_t – B_t)/2), any changes in the mid-point will automatically impact on the bid-ask spread (see among others, Florackis et al., 2011). Furthermore, relative bid-ask spreads fail to account for the tendency of stock prices to increase following a buy and decrease following a sale, overestimates the liquidity cost of a stock (Hedge and McDermott, 2003). Madhavan et al. (1997), consistent with Shah et al.(2012), consider that the effective spread is more reliable than the other spread measures because it does not depend on quotes prices, and it reflects the actual transaction cost for an average sized trade and true liquidity cost. The effective spread (*ES*) are calculated as twice the absolute value of the actual execution price minus the mid-point of the quoted bid-ask spread immediately before the transaction around the subsequent and all bank loans (see among others, Wu et al., 2011; Shah et al., 2012).

$$ES_t = 2|P_t - Mid_t| \quad (4.3)$$

Where ES_t refers to $ES_{j,t}$ ($ES_{h,t}$)the effective bid-ask spread of stock *j (h)* at time period *t*, P_t equals to $P_{j,t}$ or $P_{h,t}$ is the stock price of stock *j* or stock *h,* at time period *t* respectively. M_t is the mid-point between the bid-price and the ask price of stock *j* ($M_{j,t}$) or stock *h* ($M_{h,t}$)at time period *t*.

4.3.2 Illiquidity Ratio Test

O'hara (1995) suggests that all bid-ask spread proxies measure only the cost of trading a small number of shares. Another deficiency is that closing prices which are commonly used to capture the daily bid-ask spread, have a tendency to occur at the ask price[7], or often deviate from the quote as trades are often completed at different prices or even outside the bid-ask

[7] See next chapter for more information.

spread (Gregoriou, 2008). Given the shortcomings of using the spread to approximate liquidity for robustness I also calculate the price impact ratio liquidity measures developed by Amihud (2002) and Florackis et al. (2011).

For the *RtoV* analysis, according to Amihud (2002), Return to Volume ratios can be calculated as:

$$\mathrm{RtoV} = \frac{1}{D}\sum_{d=1}^{\mathrm{D}} \frac{|\mathrm{R}_d|}{\mathrm{V}_d} \qquad (4.4)$$

Where R_d and V_d refers to $R_{j,d}$ or $R_{h,d}$, the return and monetary volume of stock *j* or stock *h* on day *d* respectively, *D* is the number of valid observation days during the event periods for stock. Amihud's ratio respects the average daily price response associated with a unit of trading volume, it is enables to construct a time series of illiquidity over a long period, and data can be collected very easily from financial databases (Gregoriou et al., 2015). However, according to Florackis et al. (2011) and Gregoriou et al. (2015), *RtoV* ratios carry a significant size bias, is expected to be much higher for smaller firms' stocks. Trading volume variables is positively correlated with market capitalization, and due to its monetary terms, it cannot comparable across stocks with different market values, or in different currencies and countries. Given these problems with the Amihud Ratio, same as Chapter three I imply a new price impact ratio constructed by Florackis et al. (2011), defined as the average ratio of daily absolute stock return to its turnover ratio:

$$\mathrm{RtoTR}=\frac{1}{D}\sum_{d=1}^{D} \frac{|\mathrm{R}_d|}{\mathrm{TR}_d} \qquad (4.5)$$

Where TR_d refers $TR_{j,d}$ or $TR_{h,d}$ to the turnover ratio of stock *j* or stock *h* at day *d* respectively, *D* and R_d are same as previously defined in equation (4.4). The turnover of stock shows how much stock price responds to one unit of turnover rate, *RtoTR* ratio is influenced neither by price levels nor exchange rate adjustments, and more importantly it is free of any size bias (Florackis et al., 2011). For robustness in my study I compute both the *RtoV* and the *RtoTR* price impact ratios.

4.3.3 Multivariate Analysis

For testing the relation between liquidity changes and other determinants, following Hedge and McDermott (2003) and Azevedo et al. (2014), I imply a pooled time series cross-sectional multivariate analysis of both bid-ask spreads and two illiquidity ratios. Controlling for subsequent and all other loan announced events, and firm-level variables, through the following log-liner specification where the regression coefficients provide estimates of the elasticity:

$$LogLiq_{j,t}=\beta_0+\beta_1 Sub_{j,t}+\beta_2 LogVol_{j,t}+\beta_3 LogSize_{j,t}+\beta_4 StdDev_{j,t}+\beta_5 LogPrice_{j,t}+\beta_6 LogL/A_{j,t}+\varepsilon_{j,t} \quad (4.6a)$$

$$LogLiq_{h,t}=\beta_0+\beta_1 All_{h,t}+\beta_2 LogVol_{h,t}+\beta_3 LogSize_{h,t}+\beta_4 StdDev_{h,t}+\beta_5 LogPrice_{h,t}+\beta_6 LogL/A_{h,t}+\varepsilon_{h,t} \quad (4.6b)$$

Where $t=1$ corresponds to the pre-announcement period and $t=2$ corresponds to the post-announcement period. The subscript j denotes the 71 subsequent loan announcement in my study and h denotes all more than two loans. The dependent variable, *logLiq* represented by either the natural logarithm of average daily five liquidity benchmarks, absolute spreads, relative spreads, effective spreads, *RtoV* ratios and *RtoTR* ratios. The calculation of these benchmarks has shown above. Then, independent variables included the dummy variables, $Sub_{j,t}$, equals to 1 corresponds to the post-announcement period otherwise equals to 0 for subsequent loan annoucnement. $All_{h,t}$ equals to 0 corresponds to the post-announcement period otherwise equals to 0 for third and any subsequent loans. *logVol,* corresponds to the natural logarithm of the daily trading volume. *LogSize* captures the natural logarithm of the market capitalization of sample firm. *LogStdDev* captures the natural logarithm of daily return volatility of stock. *LogPrice* is the natural logarithm of daily closing price. I am primarily interested in the change in the intercept of dummy variable *Sub* and *All*, if they are negative, then I can conclude the increase in the liquidity of stocks as a result of the subsequent loan and more loan's announcement of a zero-leverage firm.

4.3.4 Spread Decomposition

Following Easley et al. (1996), I assume that during my sample period around the subsequent and all other loans of zero-leverage firms, liquidity traders are likely to buy or sell stocks randomly. The motivation of their placement of an order or not is based on two independent processes with identical intensity parameter ϖ. The probability that an information occur in the loan announcement day (event day) is a, good news events occur with a probability δ, informed traders buy. Bad news occur take place with a probability $(1-\delta)$, informed traders sell (Zagaglia, 2013). The arrival of informed orders is modelled as a poisson process with intensity parameter u assumed to be identical for informed buy and sell orders. Following Easley et al. (1996), I estimate the PIN model by measuring the maximum likelihood for each zero-leverage firm during the examination period. The likelihood function of PIN model is:

$$L[M|\theta]=\sum_{t=1}^{T}[-2\omega+M_t Ln\chi+(Buy_t+Sell_t)\ln(u+\omega)]+\sum_{T=1}^{T} ln\, [a(1-a)e^{-mu}\chi\, Sell_t - M_t +a\delta e^{-u}\chi Buy_t-M_t+(1-a)\chi Buy_t+Sell_t-M_t]. \quad (4.7a)$$

With M_t equals to min (Buy_t, $Sell_t$) +max (Buy_t,$Sell_t$)/2, and $\chi_t =\varpi/(u+\varpi)$. Where I define the Buy and Sell are the number of buy orders and sell orders for a given data and parameter space $\theta= a, \delta, \varpi, u$. Buy arrival rate as ϖ_b, sell arrival rate as $\varpi_b +u$. The likelihood demonstrates that the buy orders and sell orders arrive the market according to independent poisson distributions (Duarte and Young, 2009). Therefore the unconditional probability of informed trading can be estimated as:

$$PIN=\frac{au}{au+2\omega} \quad (4.7b)$$

The data requirement of PIN model is simply the number of buyer-initiated and seller-initiated trades. However, this requirement is not as easy as it appears, trading classification is difficult in some markets and the bias caused by trade misclassification is substantial. For many security markets which do not exclusively rely on an electronic limit order book (e.g. Nasdaq), this information is not publicly available.

The second model I consider is the MRR model which decomposes the bid-ask spread into adverse selection and order processing costs. This provides a unified framework which explains the effect of information flows on stock prices over the day.

P_t denotes the transaction price of the security at time t and Q be the trade indicator variable, equaling 1 if the trade is buy-oriented, and -1 if it is sell-oriented. The MRR model can be computed as:

$$P_t - P_{t-1} = \alpha(Q_t - \rho Q_{t-1}) + \varphi(Q_t - Q_{t-1}) + \varepsilon_t \tag{4.8}$$

Where α captures possible adverse selection costs revealed by the trade at time t. The parameter ρ captures the serial correlation in the trade indicator variable Q_t. The second term, $\varphi(Q_t - Q_{t-1})$ captures the effect of the bid-ask bounce, where $\varphi \geq 0$ denotes the liquidity suppliers' cost per share for supplying liquidity. And ε_t is a random error term. Following the MRR model, the parameter vector, α, ρ and φ can be estimated using the GMM estimator proposed by Hansen (1982).

The PIN and MRR models fail in categorizing the adverse-selection and inventory holding costs, which leads to a revision after a trade which occurs concurrently. Thus, one of the most significant theoretical contributions of the Huang and Stoll (1997) model is that they allow for separate estimation of the adverse selection and inventory holding costs.

Defining the trader indicator as Q, $Q=1$ if a transaction is buyer initiated, $Q=-1$ if it is seller initiated and $Q=0$ if the transaction occurs at the midpoint. Therefore, the three-way decomposition model for any time point of a day is:

$$E(Q_{t-1} | Q_{t-2}) = (1-2\pi) Q_{t-2} \tag{4.9}$$

$$\Delta Mid_t = (\alpha+\beta)\frac{S_{t-1}}{2} Q_{t-1} - \alpha \frac{S_{t-2}}{2} Q_{t-2}(1-2\pi) + \varepsilon_t \tag{4.10}$$

Where S is the spread of sample stock at time t, π is the probability of a trade flow reversal. Mid_t is the midpoint of the bid-ask spread of sample stock at time t. α and β are the percentages of the half-spread attributable to adverse selection and inventory holding costs respectively. Since α and β are stated as proportions, the order processing component is equal to $1-(\alpha+\beta)$. $\frac{S_{t-1}}{2}$ is the posted half spread at time $t-1$. The public information component is captured by ε_t. If I consider that the inventory holding costs β is equal to 0, the equation (4.10) can be rewritten as follows:

$$\Delta P_t=\frac{S}{2}\Delta Q_t+\alpha\frac{S}{2}Q_{t-1}+\varepsilon_t \tag{4. 11}$$

The order processing costs is then equal to 1-α. I use the Huang and Stoll (1997) model for reporting my main results because it separates the bid-ask spread into three rather than two components. The PIN and MRR models are estimated to provide robustness to the spread decomposition estimations.

4.3.5 Event Study

The announcement date (day *0*) is the day of the subsequent and all bank loan announcement. In terms of the short-term event period, I examine the average abnormal returns (ARs) for the announcement day [day 0], three-day period around the announcement day [-1, +1], five-day period around the announcement day [−2, +2] and eleven-day period around the announcement day [-5, +5]. For the long-term event period I calculate the event periods as long as 181 days [-90, +90] around the announcement dates. More specifically, I estimate the abnormal returns by using an economically market-adjusted model:

$$AR_t=R_t-R_{m,t} \tag{4.12}$$

Where AR_t equals to $AR_{j,t}$ or $AR_{h,t}$, is the abnormal return earned by stock *j (h)* at time *t*. R_t, equals to $R_{j,t}$ or $R_{h,t}$ is the return on stock *j* or stock *h* at time *t*, and R_{mt} is the value-weighted market index return at time *t*. As proxy for the market's return, I use the FTSE index returns for the examining period. Cumulative abnormal returns (CARs) of event window surrounding the event day can be calculated:

$$CAR_{t(-q,+q)}=\sum_{t=q}^{S} AR_t \tag{4.13}$$

Where q equals to 1, 2, 5, 10, 20,.......90 respectively, represents the different time period during the event window. S means the summation of abnormal returns. The standard *t-test* is used to test whether the $AR_{j,t}$, $AR_{h,t}$, $CAR_{j,t}$ and $CAR_{h,t}$ differ significantly from zero.

4.4 Empirical Results

4.4.1 Descriptive Statistics

The descriptive statistics for the final sample of zero-leverage firms met data requirements in FTSE 350 Index firms is presented in Table 4.1. Panel A compares the zero-leverage firm which be issued only one loan, two loans and more than two loans. Zero-leverage firm which be issued initial loan but do not have subsequent loans are smaller than their subsequent loan peers, with an average market capitalization approximately 3408 million pounds whereas 3884 million pounds for the firm undertake subsequent loans. And the firms be issued more than two loans are significantly larger than the other two groups, the average market capitalization is 4963 million pounds. Furthermore, zero-leverage firms with single loans are shown suffer higher information asymmetry problem, all of three information asymmetry proxies (absolute spreads, relative spreads and effective spreads) are higher than other two groups. Fama (1985) believes that smaller firms are expected to have higher levels of infomration asymmetry, so they could benefit more from bank financing signals. For the standard deviation of return, all three groups are insignificant difference (1.245 for zero-debt firms with single loan, 1.338 for firms undertook two loans and 1.277 for the firms be issued more than two loans). Panel B indicates that the descriptive statistics on subsequent loan and all loan amounts respectively. The amount of subsequent loan on average around 763.8 million whereas the median is 273.8, it shows the amount of loan is extremely variation, the minimum amount (49.85 million) and the maximum amount (17997.73 million) points out the significant various as well. For all loans, the mean of amounts is much larger than the subsequent loan (1150.55million) as well as the standard deviation (4038.24 million), it means for all bank loans for zero-leverage, the amount is still variation.

Table 4.1 Descriptive statistics

Table 4.1 provides the descriptive statistics for my data sample. The sample consists of all zero-leverage firms listed on the FTSE 350 that undertook an initial loan then follow by second or more loans during the time period of 2000-2015. Panel A provides the descriptive statistics on borrowing firms. One Loans means the zero-leverage firm which are just issued the initial loans. Two loans means the zero leverage firms been issued the subsequent loans during the event period. More than two loans means the zero leverage firms been issued more than two loans. Market capitalization is calculated as the natural logarithm of the firm's market capitalization measured by pounds. Absolute spread is defined as ask price minus bid price. Relative spread is defined as ask price minus bid price, then divided by quote midpoint. Effective spread is defined as two times trade price minus quote midpoint. The midpoint is ask price minus bid price divided by two.
Panel B provides the disclosed amount to be borrowed by the zero-leverage firm measured in pounds.

Panel A: Borrower's descriptive statistics

	One Loans	**Two Loans**	**More Than Two**	**All Zero Leverage firms**	**All Firms**
Market Capitalizaiton (£000,000)	3408	3884	4693	3995	4231
Stock Price(£)	466.73	525.08	519.33	507.633	523.435
Standard deviation of return (%)	1.245	1.338	1.277	1.250	1.231
Trading Volume (000,000)	4098	5665	6740	6325	6520
Absolute Spread	3.634	2.507	2.649	2.537	2.031
Relative Spread (%)	0.027	0.018	0.009	0.015	0.011
Effective Spread (%)	0.588	0.346	0.482	0.412	0.369

Panel B: Loans descriptive statistics

	Mean (£000,000)	Median (£000,000)	Std.Dev	Min (£000,000)	Max (£000,000)	Skewness
Subsequent Loans	763.8	273.8	2129.22	49.85	17997.73	6.95
All loans	1150.55	266.33	4038.24	46.89	3350.77	7.03

4.4.2 Univariate Changes in Share Price

Panel A of table 4.2 reports the abnormal return associated with the announcement of subsequent bank loans whereas Panel B represents the abnormal return earns by the borrowing firms around the third and any subsequent loans during my sample period. Standard event study methodology is used to examine the share price behavior surrounding the announcement date, my analysis is based on an event window starting 90 days before the effective day and ending 90 days after the effective day. Same with Chapter 3, for capturing any possibility of information leakage or inside trading activity before the loan announcement, I examine a large prior announcement window. To determine if the announcement effects on share price is permanent, the abnormal return of each trading day is calculated until 90 days following the announcement (day 90). The null hypothesis is that price unchanged or reverts to pre-announcement level. For pre-announcement period, most of both of two groups are significant positive from the 40 days prior to the announcement day, and abnormal return of subsequent loan is slightly higher than all loans. The abnormal return appears before the loan announcement associated with the information leakage.

From the subsequent loans announcement, the significant positive return persists from day 0 to day 90, with the two largest average abnormal return of 2.139% (t-statistic of 12.45), 1.467% (t-statistic of 5.91) occurring on the effective date of announcement (day 0) and the first trading day after announcement (day 1) respectively. Cumulative average abnormal returns (CARs) over various event windows are also presented in Table 4.2. The average cumulative abnormal return of 8.349% is observed over the 11-event day interval [-5, +5], with a highly significant statistics t-value, and event window [-2, +2], [-1, +1] is 5.222 and 4.054 respectively, both of them are highly significant. It is consistent with information hypothesis, in efficient markets, the positive information (e.g. issued a loan by a reputable bank) that cause increased stock price immediately and the effects should be permanent (Jain, 1987; Lynch and Mendenhall, 1997; Denis and Mihov, 2003; Azevedo et al., 2014).

In terms of the third or more loans, on announcement day, the abnormal return is 2.033% with a t-statistics of 11.84, it is clearly lower then abnormal return of subsequent loan announcement. On the other hand, the abnormal return of all other loans approaching to zero during the ending period of event window (e.g.: 0.017 in period [0, 80] and 0.023 in period [0, 90]). There is some evidence of the reversal of positive abnormal returns in the post-announcement period, but not enough to eliminate the gains accrued during the whole event period. This result indicates the subsequent loan still attract a significant market response than other normal loans for the zero-leverage firms.

Table 4.2 The price effect associated with subsequent and all bank loan of zero-leverage firm

Table 4.2 provides the price and return changes from the pre-announcement to the post-announcement period. The sample consists of 71 FTSE 350 listed firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015. Panel A presents the daily average returns (AR) and cumulative average return (CAR) surrounding the subsequent bank loan announcements whereas Panel B shows the results of all other loans. T-statistics are presented to show if AR or CAR of sample loans are significantly different from zero. Event day (day zero) presents the day of the bank loan announcement. Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Event day	**Panel A: Subsequent bank loan (N=71)**		**Panel B: Three or more loans (n=198)**	
	AAR (%)	T-stat	AAR (%)	T-stat
(-90,0)	0.043	1.75*	-0.051	-1.09
(-80,0)	-0.028	-0.92	0.003	1.68*
(-70,0)	-0.395	1.40*	-0.017	-1.34
(-60,0)	0.001	1.45*	-0.045	-1.01
(-50,0)	-0.003	-0.56	0.306	2.55**
(-40,0)	0.244	2.38**	0.255	1.96**
(-30,0)	0.189	2.96**	0.134	1.57*
(-20,0)	0.268	2.43**	0.283	1.88*
(-10,0)	0.151	2.64**	0.315	2.17*
-5	0.260	2.07*	0.006	1.08
-4	0.137	2.11*	0.113	1.96*
-3	0.156	2.93**	0.014	1.03
-2	0.163	1.75*	0.000	1.55*
-1	0.448	2.88**	0.138	2.97**
0	2.139	12.45***	2.033	11.84***
1	1.467	5.91***	1.098	4.66***
2	1.005	7.57***	1.114	5.98***
3	0.938	2.75**	1.000	6.05***
4	1.006	2.56**	0.462	3.14**
5	0.663	2.07*	0.434	3.23***
(-1, +1)	4.054	7.37***	3.269	6.66***
(-2, +2)	5.222	6.68***	4.383	5.09***
(-5, +5)	8.349	6.07***	6.412	4.98***
(0,10)	0.580	2.58**	0.004	1.73*
(0,20)	0.740	1.74*	0.015	1.61*
(0,30)	0.582	1.58*	0.296	2.55**
(0.40)	0.533	1.53*	0.003	1.38
(0,50)	0.520	0.52	0.245	2.54**
(0,60)	0.469	1.47*	0.681	2.69**
(0,70)	0.233	0.44	0.054	1.32
(0,80)	0.102	0.64	0.017	1.18
(0,90)	0.243	1.00	0.023	1.01

The univariate evidence provided in table 4.2 indicates that permanent price effects runs consistent with previous studies, bank lending decisions do provide positive signals to equity market participants. Comparing with the results from last chapter, in the event day of initial loan announcement, the abnormal return is 2.394% in day 0 and 2.125% in day 1, the CARs of event window [-1, +1], [-2, +2] and [-5, +5] is 4.556%, 6.400% and 9.005% respectively. They are significantly higher than the abnormal return achieved during the subsequent loan announcement period. Therefore, my study is inconsistent with the previous studies (e.g.: Lummer and McConnel, 1989) which believe that the subsequent loans often generate greater abnormal market reactions than do announcements of initial loan. I think the reason is that

Lummer and McConnel (1989) and Chemmanur and Fulghieri (1994) all focus on the levered companies, they define the subsequent loan announcement means after the bank assess borrowing firms' future projects and current financial performance, the same lending bank decide to continue the relation with the borrower. However, in my study, when the sample firms be issued their initial loan they are no debt, therefore the signal effect of initial loan announcement in my research is more significant than the subsequent loan, the announcement effect of entry credit market are more significant than the announcement of continuing working with the lending bank.

4.4.3 Trading Volume Effects of Zero-leverage Firms' Initial Bank Loan

Another important results of liquidity in previous work is the improvement of liquidity and decrease of information asymmetry problem can be reflected by increasing in trading volume. Chae (2005) believes that the information asymmetry is likely to be greatest before the important corporate announcement, trading volume should decrease before scheduled announcements. On the other hand, there are some researches (eg : Conrad and Niden, 1992) report that no relation between trading volume and the announcement event of firms. To isolate abnormal trading volume in the day around the announcement, I employ the following dummy variable panel fixed effects regression model :

$$Vol_t = \eta_t + \gamma_t + \sum_{-5}^{+5} D_t \, AVol_t + \varepsilon_t \qquad (4.14)$$

Where Vol_t refers to $Vol_{j,t}$ or $Vol_{h,t}$, the logarithm of trading volume for stock j or stock h at time t, j,h *is a 71*71* identity matrix or 198*198 identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. η_t captures the variation in trading volume across all the companies in our sample. γ_t captures the change in trading volume per day that is common across all the companies in our sample. D_t is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_t$ equals to $AVol_{j,t}$ or $AVol_{h,t}$, captures the abnormal trading volume during the event interval [-5, +5], ε_t is a random disturbance term with a mean of zero and a variance of σ^2, η, γ, and $AVol$ are the parameters to be estimated. Equation (4.14) is estimated by a fixed effects panel estimator using the White (1980) heteroscedastic consistent covariance matrix. The results of equation (4.14) are presented in table 4.3. The positive of 11 dummy variables for both subsequent loans and all other loans confirm that there is a dramatic increase in trading volume as a result of subsequent and more bank loan announcements, and most of variables are significant. From 5 days prior to announcement day, the coefficient is positive (e.g.: day -5 is 0.073 for subsequent loans and 0.086 for all loans) with a significant at 5% level. On event day (day 0), β_0 achieve the peak of 1.587 and highly significant with a t-statistic of 15.99. For all other loans, β_0 equals to 1.388 with a t-statistic of 12.96. Following the loan announcement, the abnormal trading volume subsides from its peak but remains significant, such as day 1 is 0.989 with a significant t-statistic of 7.13 for subsequent loan, and day 5 is 0.054 with a t-statistic of 3.84 for all other loans. Similar with the result of initial loan announcement, my results are consistent with George et al. (1994) who proposes an argument that high trading volume immediately after corporate announcements is a result of increased liquidity trading.

For the long-term period, I construct a post/pre-ratio of standardized trading volume in the post announcement period [0, +90] to the standardized volume in the pre-announcement period [-90, 0], in order to analyse changes over the longer horizon. Standardized trading volume is defined as daily trading volume of the zero-leverage firm of FTSE 350 index, divided by the total FTSE 350 index trading for the same day. The results of the long-term changes in trading volume are reported in the Panel B of Table 4.3. The mean (median) Post/Pre-ratio of standardized trading volume is 1.772 (1.601) for subsequent loans, for all loans the mean ratio is 1.367 and median ratio is 1.154, the standard t-test indicate that the increase in standardized trading volume is statistically significant at the 5% level. This result indicates that consistent with information effect hypothesis, the subsequent bank loan announcement of zero-leverage firm leads to in a permanent rise in trading volume.

Table 4.3 Short-run and long-run volume effect around the subsequent and all loan announcement

Panel A of table 4.3 provides the short-run trading volume ratio between the pre-announced and post-announced period. The sample consists of 71 FTSE 350 listed firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015. A pooled time series regression is estimated with the White (1980) covariance matrix to investigate the volume patterns around the bank debt announcements as follows:

$$Vol_t=\eta_t+\gamma_{,t}+\sum_{-5}^{+5} D_t\, AVol_t + \varepsilon_t$$

Where Vol_t refers to $Vol_{j,t}$ or $Vol_{h,t}$ the logarithm of trading volume for stock j or stock h at time t, j,h *is a* $71*71$ identity matrix or 198*198 identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. η_t captures the variation in trading volume across all the companies in our sample. γ_t captures the change in trading volume per day that is common across all the companies in our sample. D_t is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_t$ equals to $AVol_{j,t}$ or $AVol_{h,t}$, captures the abnormal trading volume during the event interval [-5, +5], ε_t is a random disturbance term with a mean of zero and a variance of σ^2, η, γ, and $AVol$ are the parameters to be estimated. Panel B of Table 4.3 provides the long-run trading volume ratio between pre-announced period and post-announced period. Standardized trading volume is defined as daily trading volume in shares divided by the total FTSE 350 trading for the same day. Standardized trading volumes are computed for the pre-announcement [-90, 0] and the post-announcement period [0, +90]. The t-statistic is constructed to test the null hypothesis that the standardized trading volume is unchanged in the pre-announcement period as compared with the post-announcement period. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel A: Short-run volume effect around the subsequent and all loan announcement		
Subsequent Loans		
Parameter	Estimate	T-stat
η_j	0.001	15.99**
γ_j	0.000017	12.39**
$AVol_{j,-5}$	0.073	3.04**
$AVol_{j,-4}$	0.005	1.11
$AVol_{j,-3}$	0.007	2.56**
$AVol_{j,-2}$	0.008	1.05
$AVol_{j,-1}$	0.099	1.58
$AVol_{j,0}$	1.587	15.99***
$AVol_{j,1}$	0.989	7.13***
$AVol_{j,2}$	0.136	4.68**
$AVol_{j,3}$	0.165	5.01**
$AVol_{j,4}$	0.153	4.37**
$AVol_{j,5}$	0.137	2.58*

All other loans		
Parameter	Estimate	T-stat
η	0.007	11.28**
γ	0.000065	11.95**
$AVol_{h,-5}$	0.086	3.39**
$AVol_{h,-4}$	0.013	2.04*
$AVol_{h,-3}$	0.057	1.57*
$AVol_{h,-2}$	0.094	1.52
$AVol_{h,-1}$	0.344	2.35**
$AVol_{h,0}$	1.388	12.96***
$AVol_{h,1}$	0.975	6.39***
$AVol_{h,2}$	0.170	3.97**
$AVol_{h,3}$	0.106	2.05
$AVol_{h,4}$	0.188	2.68**
$AVol_{h,5}$	0.054	3.84**

Table 4.3 Short-run and long-run volume effect around the subsequent and all loan announcement (Continued)

Panel A of table 4.3 provides the short-run trading volume ratio between the pre-announced and post-announced period. The sample consists of 71 FTSE 350 listed firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015. A pooled time series regression is estimated with the White (1980) covariance matrix to investigate the volume patterns around the bank debt announcements as follows:

$$Vol_t = \eta_t + \gamma_{,t} + \sum_{-5}^{+5} D_t \, AVol_t + \varepsilon_t$$

Where Vol_t refers to $Vol_{j,t}$ or $Vol_{h,t}$ the logarithm of trading volume for stock j or stock h at time t, j,h *is a 71*71* identity matrix or 198*198 identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. η_t captures the variation in trading volume across all the companies in our sample. γ_t captures the change in trading volume per day that is common across all the companies in our sample. D_t is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_t$ equals to $AVol_{j,t}$ or $AVol_{h,t}$, captures the abnormal trading volume during the event interval [-5, +5], ε_t is a random disturbance term with a mean of zero and a variance of σ^2, η, γ, and $AVol$ are the parameters to be estimated. Panel B of Table 4.3 provides the long-run trading volume ratio between pre-announced period and post-announced period. Standardized trading volume is defined as daily trading volume in shares divided by the total FTSE 350 trading for the same day. Standardized trading volumes are computed for the pre-announcement [-90, 0] and the post-announcement period [0, +90]. The t-statistic is constructed to test the null hypothesis that the standardized trading volume is unchanged in the pre-announcement period as compared with the post-announcement period. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel B: Long-run volume effect around the subsequent and all other loan announcement

Subsequent loans	
Variable	Standardized Trading Volume
Mean (pre-announced)	0.0394%
Mean (post-announced)	0.0698%
Median (pre-announced)	0.0303%
Median (post-announced)	0.0486%
Mean (post/pre ratio)	1.772
Median (post/pre ratio)	1.601
t-test	1.73*
All other loans	
Variable	Standardized Trading Volume
Mean (pre-announced)	0.0398%
Mean (post-announced)	0.0544%
Median (pre-announced)	0.0287%
Median (post-announced)	0.0532%
Mean (post/pre ratio)	1.367
Median (post/pre ratio)	1.154
t-test	2.33**

4.4.4 Univariate Changes in Bid-ask Spreads

Stoll (1978), Hedge and McDermott (2003) state that based on liquidity-motivated hypothesis, a permanent increase in trading volume will related to a decrease in the bid-ask spread. Bid-ask spreads is expected to have a positive relation with information asymmetry problem, and a negative relation with liquidity level and abnormal returns. Since I have examined both price and volume are experience a permanent increase as a zero-leverage firm be issued a subsequent loan and more than two loans, I would expect a permanent drop in the spreads. Same with the estimation I used for the initial loan announcement, I construct ratios of the daily average absolute, relative and effective bid-ask spreads during the pre- and post- bank loan announcements. The null hypothesis that the spread ratio is equal to unity (indicating no change in the daily average time-weighted spreads) is tested by a standard t-test. There is clear evidence from Table 4.4 that spreads are decreased after the announcement of subsequent and all other bank loans. For subsequent loans, the greatest observed decrease in all spreads occurs in the event day, the ratio is 0.839, 0.800 and 0.888 for absolute, relative and effective spreads respectively, smaller than 1 and significantly different from 0. For third and any subsequent loans, in the announcement date, the three spreads are 0.867, 0.823 and 0.864 respectively. In other event windows surrounding the event day, all absolute spreads ratio is smaller than 1 and highly significantly. For example, in the [-1, +1] subsequent loan event window, the mean of absolute spreads ratio is 0.897 with a highly significant t-statistic of – 2.90, for all other loans, the absolute spread ratio is 0.844 for 3-trading days surrounding the announcement day with a t-statistics -2.57, significantly at 5% level. This indicates that absolute spreads are significantly reduced over the 3-trading day period centered on the day of the announcement. In the [-5, +5] interval of subsequent loans, the daily mean ratio is 0.890,0.958 and 0.927 for absolute, relative and effective spread, for all other loans are 0.901, 0.897 and 0.923 respectively, showing that spreads are lower over the eleven-trading day period centered on the announcement day. It is consistent with previous studies which indicate the long-term relationship between bank and borrowing firm can continue to reduce the information asymmetry problem. My results also consistent with Berger and Udell (1995), Blackwell and Winters (1997), D'Auria et al. (1999), Athavale and Edmister (2004) which all find that the process of screening loan applicants and monitoring loan extensions results in resolution of information asymmetry. Blackwell and Winters (1997) show that the bank will extend subsequent loans at a lower cost due to the information advantage, and it is also lower than the rate that could be obtained at competing banks that continue to face unresolved information asymmetry.

Furthermore, the level of spread reductions decrease over the longer sample period, for example, the average absolute bid-ask spread of subsequent loans for the long-term period, [0, 90] period, the spreads ratio is 0.938 (0.989 and 0.977 for relative and effective spreads respectively) although not at a statistically significant level. For all loans, during the [0, +60] period, the absolute spread ratio is 1.025 larger than 1, in the [0, +90] event window the ratio is 0.973, 1.007 and 0.997 respectively. The result of relative spread ratio of all other loans larger than 1 means in the long-term of post-announcement period, the relative spread is reversal. Similarly, Beneish and Whaley (1996) find a long-run improvement in trading volume but only a short-term decrease in the quoted spread. Their findings seem inconsistent because the liquidity effect predicts that a permanent increase in trading volume should be associated with a permanent decrease in the bid-ask spread. Petersen and Fialkowski (1994) discover that the temporary decrease on the bid-ask spread is perhaps due to the fact that the relative spread is not quite reliable in measuring actual trading costs, it overstates the true cost of trading because many trades are executed inside the quotes, as I have mentioned in above.

Table 4.4 Bid-ask spreads ratio for subsequent and all other loans

Table 4.4 provides the spread ratio between pre-announced period and post-announced period. The sample consists of 71 FTSE 350 listed zero-leverage firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015. Liquidity is measured by the absolute, relative and effective spread. The spread ratio for each bank debt in the sample is defined as the ratio of average spreads measured over the indicated event time interval to average measured over the post-bank loan announcement period. Absolute spread is defined as ask price minus bid price. Relative spread is defined as ask price minus bid price, then divided by quote midpoint. Effective spread is defined as two times trade price minus quote midpoint. The null hypothesis that that the mean of the reported ratio is equal to unity is tested using a standard t-test. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel A: Subsequent loans						
Event Day	**Absolute spread**	**T-test**	**Relative spread**	**T-test**	**Effective spread**	**T-test**
0	0.839	-2.56**	0.800	-3.57***	0.888	-3.96***
(-1,+1)	0.897	-2.90**	0.806	-2.92**	0.842	-2.90**
(-2,+2)	0.856	-1.58*	0.894	-2.31*	0.838	-2.57**
(-3,+3)	0.937	-2.05*	0.933	-1.93*	0.827	-1.45*
(-4,+4)	0.996	-1.97*	0.914	-1.84*	0.906	-1.33
(-5,+5)	0.890	-2.96**	0.958	-1.33	0.927	-1.01
(0,+10)	0.895	-1.39	0.936	-1.97*	0.944	-1.58*
(0,+30)	0.930	-1.06	0.927	-1.24	0.923	-1.03
(0,+60)	0.996	-0.88	1.003	-0.99	0.918	-1.17
(0,+90)	0.938	-1.01	0.989	-0.96	0.977	-0.76
Panel B: More than two loans						
Event Day	**Absolute spread**	**T-test**	**Relative spread**	**T-test**	**Effective spread**	**T-test**
0	0.867	-2.45*	0.823	-2.54**	0.864	-1.05
(-1,+1)	0.844	-2.57**	0.825	-1.96*	0.863	-1.25
(-2,+2)	0.893	-1.59*	0.974	-1.03	0.894	-1.99*
(-3,+3)	0.867	-1.97*	0.903	-1.34	0.900	-1.23
(-4,+4)	0.945	-1.09	0.828	-1.97*	0.894	-2.28*
(-5,+5)	0.901	-1.21	0.897	-1.96*	0.923	-1.25
(0,+10)	0.933	-1.40*	0.956	-1.45	0.907	-2.99**
(0,+30)	0.984	-1.58*	0.933	-1.27	0.916	-1.93*
(0,+60)	1.025	0.52	1.004	0.97	1.002	0.63
(0,+90)	0.973	-0.43	1.007	0.63	0.997	-0.58

Moreover, related with results in the abnormal return and trading volume in the above, the post-announcement behavior of the bid-ask spreads and share prices are consistent with Amihud and Mendelson (1986,1989) who predict that a decrease in the bid/ask spread will lead to a reduction in the investor's required return and a consequent increase in share price. The result in time interval [0, 90] indicates in the post-announcement period, liquidity levels reverse to some extent. The results of subsequent loans in the 90 trading days after the announcement are still smaller than one but insignificant in statistics, it cannot conclude that the liquidity improvement is permanent for subsequent loan announcements. Moreover, comparing the ratio between initial loan in Chapter 4, subsequent loan and all bank loan announcements, the degree of liquidity improvement are significant in initial loans, for subsequent loan and all loans, the spreads are decrease but not as pronounced as the initial loan.

4.4.5 Robustness Test: Illiquidity Ratio

In order to completeness my study, I perform a robustness test by constructing ratios of daily return to volume ratio, *RtoV* ratio and daily return to turnover ratio, *RtoTR* ratio over various event intervals to their counterparts in the period over announcement days from 90 days before announcement until 90 days after announcement. Similar with univariate change tests in bid-ask spreads, the null hypothesis that the *RtoV*, *RtoTR* ratio is equal to unity. From Table 4.5, *RtoV* and *RtoTR* ratios show a clear decrease over the event window for both subsequent loans and more than two loans announcement period. For example, in the event day, the *RtoV* and *RtoTR* ratio is 0.823 and 0.834 for subsequent loan respectively with highly statistic significantly. In Panel B for all other loans, the event day ratio of *RtoV* equals to 0.849 and 0.826 of *RtoTR* ratio, both are smaller than 1. In the [-2, +2] event period for subsequent loans, the *RtoV* and *RtoTR* ratio is 0.877 and 0.873 respectively and both high significantly, and 0.862, 0.892 for all other loans. Since both *RtoV*, *RtoTR* ratios are illiquidity ratio, the decrease of them indicates the increase of liquidity in post-announcement period. The decrease is still pronounced in the long-term period, the [0, +90] interval, for subsequent loan announcement, the *RtoV* ratio is 0.971 and *RtoTR* is 0.993, both smaller than 1. One of the interesting point is in the [0, +90] period of all other loans, the *RtoV* ratio is larger than 1 and statistic insignificant, it indicates that in the long-run of post-announcement period, the illiquidity degree is reversal to the pre-announcement period. Comparing with the initial loan announcement in Chapter three, the improvement of liquidity level of subsequent loan and all other loans are not as significant as the initial loan announcement. Moreover, for all loans, the announcement effect disappears when examining the absolute spreads, for relative and effective spread, the effect eliminates but the ratio still smaller than one.

Table 4.5 Illiquidity ratios for subsequent and all other loans

Table 4.5 provides the robustness test for liquidity ratio between pre-announced period and post-announced period. The sample consists of 71 FTSE 350 listed firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015.Liquidity is measured by the *RtoV* ratio (Amihud, 2002) and *RtoTR* ratio (Florackis et al., 2011). *RtoV* ratio defined as the average daily absolute stock return to its trading volume. *RtoTR* ratio defined as the average daily absolute stock return to it turnover. The null hypothesis that that the mean of the reported ratio is equal to unity is tested using a standard t-test.

$$\text{RtoV}=\frac{1}{D}\sum_{d=1}^{D}\frac{|\text{R}_d|}{V}$$
$$\text{RtoTR}=\frac{1}{D}\sum_{d=1}^{D}\frac{|\text{R}_d|}{\text{TR}_d}$$

Panel A: Subsequent loans

Event Day	RtoV Ratio	T-test	RtoTR Ratio	T-test
0	0.823	-2.56**	0.834	-2.83**
(-1,+1)	0.856	--2.98**	0.862	-2.44**
(-2,+2)	0.877	-3.03**	0.873	-2.95**
(-3,+3)	0.900	-1.64*	0.890	-1.93*
(-4,+4)	0.874	-2.07*	0.903	-1.33
(-5,+5)	0.932	-1.45	0.915	-0.99
(0,+10)	0.899	-1.75*	0.900	-1.56*
(0,+30)	0.901	-1.63*	0.897	-2.03*
(0,+60)	0.906	-1.97*	0.917	-1.01
(0,+90)	0.971	-1.43	0.993	-1.93*

Panel B: All other loans

Event Day	RtoV ratio	T-test	RtoTR ratio	T-test
0	0.849	-2.82**	0.826	-2.95**
(-1,+1)	0.841	-2.94**	0.898	-2.13**
(-2,+2)	0.862	-2.33**	0.892	-2.48**
(-3,+3)	0.893	-1.96*	0.843	-1.99*
(-4,+4)	0.926	-1.29	0.976	-1.64*
(-5,+5)	0.944	-1.20	0.903	-1.97*
(0,+10)	0.958	-2.06*	0.948	-1.05
(0,+30)	0.923	-1.91*	0.925	-1.88*
(0,+60)	0.991	-1.54*	0.983	-1.34
(0,+90)	1.030	0.65	0.997	-1.22

4.4.6 Multivariate Analysis of Market Liquidity Changes

According the financial intermediation theory, when zero-leverage firms be issued more than one loans by the bank, the information environment is richer then information asymmetry problem will be decrease, the stock trading will be more frequent, resulting in increasing liquidity. The log-linear pooled cross-sectional multivariate regression analysis between the loan announcement and liquidity level are shown on table 4.6. Panel A presents the multivariate analysis of subsequent loans while the results of all other loans are shown on Panel B. I estimate a model for each of the five liquidity measures: absolute spreads, relative spreads, effective spreads, *RtoV* ratio and *RtoTR* ratio, under the log-linear specification of equation (4.6). In Panel A, the coefficient of subsequent loan appears negative and highly significant in the event period, bid-ask spreads are decrease as the subsequent loan been announced, and *RtoV*, *RtoTR* ratio decrease as well, the liquidity level of stock is increase. For example, after the subsequent loan announcement, the absolute bid-ask spread decreases on average by 5.9% in the post announcement period, and relative spreads, effective spreads decrease average 3.6%, 1.2% respectively, after controlling for the impact of trading volume, firm size, volatility and share price. In Panel for all other loans, the coefficient of loan announcement is -0.061, -0.024, -0.022 for absolute spread, relative spread and effective spread respectively. There is no significant difference between subsequent loan announcement and all loan announcement. The result is robust across all five liquidity benchmarks. The improvement effects of loan announcement in liquidity persist even after controlling for the effects of changes in trading volume, market capitalization, returns volatility and stock price. This suggests that all kinds of loan announcements significant increase the firm's stock liquidity, but the magnitude of initial loan are much higher than other kinds of loans.

Table 4.6 Multivariate analysis of changes in stock liquidity for subsequent and all other loans of zero-leverage firms

Table 4.6 provides the multivariate analysis of the long-term liquidity impact on subsequent loan announcement (Panel A) and all other bank loans (Panel B). The sample consists of 71 FTSE 350 listed firms that undertook a subsequent bank loan and 69 firms that undertook more than two loans during the time period of 2000-2015. A log-linear pooled time series cross-sectional multivariate analysis of quoted spread and price impact ratio is estimated as follows:

$$LogLiq_{j,t}=\beta_0+\beta_1 Sub_{j,t}+\beta_2 LogVol_{j,t}+\beta_3 LogSize_{j,t}+\beta_4 StdDev_{j,t}+\beta_5 LogPrice_{j,t}+\beta_6 LogL/A_{j,t}+\varepsilon_{j,t}.$$

$$LogLiq_{h,t}=\beta_0+\beta_1 All_{h,t}+\beta_2 LogVol_{h,t}+\beta_3 LogSize_{h,t}+\beta_4 StdDev_{h,t}+\beta_5 LogPrice_{h,t}+\beta_6 LogL/A_{h,t}+\varepsilon_{h,t}.$$

Regression variables are defined as: *loglig* represents the natural logarithm of the average daily five liquidity benchmarks, absolute spreads, relative spreads, effective spreads, *RtoV* ratio and *RtoTR* ratios for stock *i* or stock *h* in time period *t*. independent variables include the dummy variables *Sub*, which equals 1 in the post-announcement period and 0 otherwise. *All,* which equals 1 in the post all other loans announcement period and 0 otherwise. *logVol,* is the daily trading volume of the stock, *LogSize* captures the natural logarithm of the market capitalization of the sample firm. *LogStdDev* represents daily return volatility in the time period t. *LogPrice*, is the natural logarithm of the stock i's daily closing price. *logL/A ratio* is the logarithm of loan amount to total asset of sample firms. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

Panel A: Subsequent loans

	Dependent Variables									
Independent Variables	Absolute Spread	T-test	Relative Spread	T-test	Effective Spread	T-test	RtoV	T-test	RtoTR	T-test
C	-1.346	-2.99^{*}	-1.384	-1.58^{*}	-0.254	-1.10	0.090	1.51^{*}	0.141	1.52^{*}
Sub	-0.059	-3.65^{*}	-0.036	-4.74^{*}	-0.012	-1.22	-0.016	-1.19^{*}	-0.050	-3.03
Vol	-0.013	-3.02	-0.025	-1.96^{*}	-0.033	-1.17^{*}	0.473	4.27^{***}	-0.017	-1.54^{*}
Size	-0.000	-1.06	-0.000	-0.58	-0.000	-0.93	-0.345	-3.37^{***}	0.007	0.25
StdDev	0.046	4.05^{*}	0.031	2.97^{**}	0.004	1.13	0.077	2.92^{**}	-0.005	-1.05
Price	-0.012	-1.97^{**}	-0.006	-1.64^{*}	0.010	-0.32	0.025	0.93	0.004	1.57^{*}
L/A	0.003	0.65	0.001	0.98	0.000	0.76	0.001	0.28	0.000	0.81

Panel B: All other loans

	Dependent Variables									
Independent Variables	Absolute Spread	T-test	Relative Spread	T-test	Effective Spread	T-test	RtoV	T-test	RtoTR	T-test
C	-1.024	-1.17	-2.999	-2.70^{**}	-1.017	-4.11^{*}	3.125	2.96^{*}	0.154	1.06^{*}
All	-0.061	-4.61^{*}	-0.024	-3.80^{*}	-0.022	-3.18^{*}	-0.015	-2.35^{**}	-0.012	-1.11^{*}
Volume	-0.026	-3.82^{*}	-0.032	-2.85^{*}	-0.017	-3.05	0.235	4.93^{***}	-0.002	-0.80^{**}
Size	-0.000	-0.96	-0.001	-0.99	-0.001	-0.89	-0.329	-4.10^{***}	0.010	0.49
StdDev	0.053	3.35^{*}	0.028	2.49^{*}	0.007	2.73^{*}	0.003	1.49^{*}	-0.007	-2.10^{**}
Price	-0.004	-1.81^{*}	-0.000	-1.26	0.024	1.40^{*}	0.001	1.98^{*}	0.018	1.89^{*}
L/A	0.000	0.97	0.005	0.98	0.000	0.99	0.000	0.46	0.000	0.85

Most of other control variables are consistent with previous researches, the spread decreases with the increase of trading volume and stock price, and increases with the variance of stock returns, for example, in Panel A, the coefficient of trading volume with absolute spread is -0.013, this implies that a 1% increase in average trading volume is associated with a decrease of 1.3% in the average absolute bid-ask spreads when subsequent bank loan been announced. The coefficient estimate for the firm size is negative but statistical insignificant, there are no relationship between firm size and liquidity. Furthermore, there are a clear evidence that Amihud (2002)'s *RtoV* ratio are relate with firm size, the coefficient of firm size and *RtoV* is -0.345 for subsequent loan regression and -0.329 for all loans and statistical significant at 1%. it confirms the previous studies which indicate the *RtoV* ratio contains firm size bias. on the other hand, there are no statistic relations between *RtoTR* ratio and firm size.

4.4.7 Spread Components of Zero-leverage Firms around the Announcement Days

For estimating whether the decline in spreads can be attributed to a particular component of the spread or to a uniform decrease in all, I report the spread components for both subsequent loans and all loans around the announcement day in Table 4.7. The Huang and Stoll (1997) two-way spread decomposition model decomposes the spreads into two components, adverse selection plus inventory holding costs (λ) and order processing cost ($1-\lambda$). I estimate the data 181 trading days around the announcement date for both the subsequent loans and all other loans, and I interpret the results as evidence that the loan announcement results in significant changes in the spread components, especially the decrease in overall spreads can be attributed to a decrease in adverse selection (information asymmetry) costs, not only affect overall spreads. Panel A reports that the overall results, then panel B shows the results according to trade size. Portfolio 1 includes stocks with the smallest trade size, portfolio 2 and 3 incorporates stocks with the median and largest trade size respectively. In Panel A, the estimates of λ (adverse selection +inventory holding costs) in the post-announcement period are significantly smaller than the pre-announcement period. For example, λ_j before the subsequent loan announcement is 0.541 for all samples then drops to 0.492, for all other loans, the λ_h drops from 0.529 to 0.485.

In Panel B, the overall pattern is that before the announcement period, λ increase with the trade size (for example, 0.545, 0.599 and 0.624 for small, median and large trades before the subsequent loan announcements respectively). After the subsequent loan announcement, the adverse selection costs plus inventory holding costs drops to 0.484 for small trading size group, for median and large group, the difference between pre-subsequent loan announcement and post-subsequent loan announcement is 3.2% and 4.1% respectively. For all loan announcements, the proportion of the bid ask spreads that is due to adverse selection and inventory costs range from 0.550 for small trade size group to 0.628 for large trade size, and median trade is 0.563. The remaining part of spreads is the order processing components which can be regarded as a fixed cost, decreases with trade size due to economies of scale. Then I can conclude the adverse selection and inventory holding costs decrease in monetary terms as a result of the news announcement and contributed to the improvement of liquidity level.

Table 4.7 Spread components for both subsequent loans and all loans of zero-leverage firms using Huang and Stoll two-way model

Table 4.7 reports a comparison of bid-ask spread components of zero-leverage firm before and after the announcement of both subsequent and all other bank loans. The adverse selection plus inventory costs components (λ) estimated by Huang and Stoll (1997) model, order processing costs estimated by 1-λ. I estimate the data 90 trading days before the subsequent loan and all other loans' announcement day and 90 trading days after announcement days. I report the all firms result in Panel A whereas the result by trade size in Panel B. Two tailed tests of significance are reported as follows, ***significance at 1%, **significance at 5% and * significance at 10%.

Panel A: Spread components

	Before	T-stat	After	T-stat
Subsequent Loans				
λ_J (%)	0.541	18.35***	0.492	21.00***
All Loans				
λ_H(%)	0.529	17.92***	0.485	16.97***

Panel B: Spread components by trade size

		Small trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
λ_J (%)	0.545	17.96***	0.484	18.42***
All other Loans				
λ_H (%)	0.550	19.97***	0.493	14.55***
		Median Trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
λ_J (%)	0.599	14.49***	0.548	19.96***
All other Loans				
λ_H (%)	0.563	17.63***	0.522	18.72***
		Large Trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
λ_J (%)	0.624	9.34***	0.589	11.58***
All other Loans				
λ_H (%)	0.628	14.57***	0.590	7.28***

The results from Table 4.8 provide the clear evidence that the large decline in bid-ask spreads around the subsequent loan announcements can be attributed to changes in adverse selection components and inventory holding costs, for all samples, the estimates of the adverse selection are decreasing from 0.315 before the announcements to 0.298 after the announcements, the estimates of inventory holding cost components drop from 0.399 to 0.363 after the subsequent loan announcements. For all other loans, the post-announcement period fell from 0.310 to 0.300 for adverse selection costs and 0.408 to 0.370 for inventory holding costs. with a rise in trading size. Adverse selection components for median trading size is similar to that for large-size trades.

Table 4.8 Spread components for subsequent loan and all loans of zero-leverage firms using Huang and Stoll three-way model

Table 4.8 reports a comparison of the components of the bid-ask spread of zero-leverage firm before and after the announcement of both subsequent and all loans. The adverse selection (α) and inventory costs components (β) estimated by Huang and Stoll (1997) model, order processing costs estimated by $1-(\alpha+\beta)$. I estimate the data 90 trading days before the subsequent/ all loan announcement day and 90 trading days after announcement days. Panel A report the all firms whereas panel B reports the result by trade size. Two tailed tests of significance are reported as follows, ***significance at 1%, **significance at 5% and * significance at 10%.

Panel A: Spread components using three ways Method

	Before	T-stat	After	T-stat
Subsequent Loans				
α_j(%)	0.315	16.24***	0.298	19.31***
β_h(%)	0.399	18.43***	0.363	17.14***
All other Loans				
α_h (%)	0.310	19.53***	0.300	19.25***
β_h(%)	0.408	18.11***	0.370	17.58***

Panel B: Spread components by trade size using three ways method

		Small Trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
α_j (%)	0.286	16.00***	0.269	17.24***
β_j(%)	0.450	11.09	0.411	21.33***
All other Loans				
α_h (%)	0.277	15.92***	0.264	11.35***
β_h(%)	0.442	16.44***	0.401	17.23***
		Median Trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
α_j (%)	0.311	11.92***	0.300	13.13***
β_j(%)	0.393	13.49***	0.381	19.06***
All other Loans				
α_h (%)	0.309	8.94***	0.302	11.88***
β_h(%)	0.389	16.03***	0.378	9.76***
		Large Trades		
	Before	**T-stat**	**After**	**T-stat**
Subsequent Loans				
α_j (%)	0.324	8.34***	0.314	11.99***
β_j(%)	0.435	5.28***	0.426	8.33***
All other Loans				
α_h(%)	0.328	7.84***	0.315	6.33***
β_h(%)	0.452	8.91***	0.438	7.85***

Panel B highlight the importance of considering the composition of the bid-ask spreads by trade size. Same as before, the medium size trades and large size trades are more likely to be informed than small trades, the estimate of adverse selection component typically increases with trade size. The average percentage of adverse selection costs vary from 0.286 for small trades to 0.324 for large trades. For the inventory costs, the coefficients are 0.450, 0.393 and 0.435 (with t-test 11.09, 13.49 and 5.28 respectively). For all loans, the mean values of α_h are 0.277, 0.309 and 0.328 for three trading-size categories, the highest trading group has the largest percentage adverse selection components. The order-processing component is significantly lower for the largest trading size. Consequently, trading costs are higher for small trading size. After the subsequent loan announcement adverse selection decreases with all three trade size categories, with the largest decrease for small trades (from 0.286 to 0.269).

For all loans announcements, the inventory holding costs on the sample firms range from 0.442 for the smallest trades to 0.452 for the largest trades, inventory holding costs are related to trading size as well. Similarly, inventory holding costs decrease across all trade size categories, Since I have concluded that the loan announcements will lead to the decrease of spreads, the decline in spreads are attributed to changes in both the adverse selection and inventory costs. The difference in medium and large trades is not as significant as the small trades with medium trades. According to previous studies, even though the adverse selection costs which is caused by information-based trading are increasing with the trade size, the information asymmetry problem is more influenced on the small trade size. The findings in table 4.7 and 4.8 document that the subsequent loan and all loan announcements will reduce the adverse selection+ inventory holding costs components.

4.4.8 Regression Results between Spread Components and Firm Characteristics

Table 4.9 (4.10) presents OLS regression estimates of two (three) way Huang and Stoll (1997) model of subsequent and all other loans of zero-leverage firms. For the two-way Huang and Stoll (1997) model, the dependent variables in my OLS analysis include adverse selection plus inventory holding costs (λ), and order processing costs ($1-\lambda$). Like the previous section, the regressions are run for small, medium and large trades separately. I adopt an OLS approach to examine the joint determination of these variables:

$$Ln\lambda_j=\mu_0+\mu_1 Sub_{j,t}+\mu_2 Vol_{j,t}+\mu_3 Size_{j,t}+\mu_4 StdDev_{j,t}+\mu_5 Price_{j,t}+\mu_6 L/A_{j,t}+\varepsilon_{j,t} \qquad (4.15)$$

$$\text{Ln}(1-\lambda_j)=\mu_0+\mu_1 Sub_{j,t}+\mu_2 Vol_{j,t}+\mu_3 Size_{j,t}+\mu_4 StdDev_{j,t}+\mu_5 Price_{j,t}+\mu_6 L/A_{j,t}+\varepsilon_{j,t} \quad (4.16)$$

$$\text{Ln}\lambda_h=\mu_0+\mu_1 All_{h,t}+\mu_2 Vol_{h,t}+\mu_3 Size_{h,t}+\mu_4 StdDev_{h,t}+\mu_5 Price_{h,t}+\mu_6 L/A_{h,t}+\varepsilon_{h,t} \quad (4.17)$$

$$\text{Ln}(1-\lambda_h)=\mu_0+\mu_1 All_{h,t}+\mu_2 Vol_{h,t}+\mu_3 Size_{h,t}+\mu_4 StdDev_{h,t}+\mu_5 Price_{h,t}+\mu_6 L/A_{h,t}+\varepsilon_{h,t} \quad (4.18)$$

Where λ_j, λ_h, $1-\lambda_j$ and $1-\lambda_h$ is the adverse selection plus inventory holding costs and order processing costs, for subsequent loan announcement stock *j*, and all other loan announcement stock *h*, respectively. Independent variables include *Sub*, which is a dummy variable equal to one if the trading occurs after the subsequent loan announcements and zero otherwise. *All*, is a dummy variable equals to one if the trading occurs after the all other loan announcements and zero otherwise. *Vol* is the average daily volume of trading, *Size* is the market capitalization of zero-leverage firms, *StdDev* is the standard deviation of the stock prices, which approximates stock price volatility. *Price* is the daily average share price and *L/A* is the Loan amounts to total assets ratio.

The evidence in Table 4.9 reports a significant statistical relation between the adverse selection plus inventory holding costs and the loan announcement. For all samples in Panel A, the coefficient of subsequent loan and λ_j is -0.034 with a t-statistic of -3.66, a subsequent loan announcement leads to a 3.4% decrease in λ. Similarly, for all loans, the coefficient of λ_h is -0.039 negatively and significantly related to the all loans announcements. Panel B shows that for subsequent loan announcement, the estimated significant coefficient for λ_j is -0.078, 0.021 and -0.013 for small, medium and large trades respectively. The lowest trading size groups has the largest coefficients of adverse selection, which is significantly different from median and large trading size group. These results indicate that the subsequent loan announcements appear to have an overwhelming negative effect on λ. The subsequent loan announcement has more influence on the small trades rather than medium and large trades. I also find that the adverse selection plus inventory holding costs of the spread and standard deviation of stock returns are positive and significantly related.

For all model where order processing costs ($1-\lambda$) act as a dependent variable, all coefficients of the subsequent variable are not significant, that there are no statistical relationships between the loan announcement and order processing costs. The reduction of spreads after the loan announcements are mainly due to the decrease of λ. The results also show that the order processing costs depends on firm size, there is a positive and significant relation between them regardless of trade size. Standard deviation of stock prices, which proxy volatility are positively related with both λ_j and λ_h but negative and insignificantly associated with the order processing cost. My research speculate that the improvement of market performance and abnormal returns associated with the announcement of subsequent and all other loans mainly arise from the improvement of direct trading costs, that is, the improvement of asymmetric information costs. An increase in informational efficiencies due to the loan announcement leads to an enhancement in liquidity and the abnormal returns on the zero-leverage firm.

Table 4.10 presents the results of the firm determinants and the three spared components which are computed by suing three-way Huang and Stoll (1997) model. For all samples in Panel A, similar with two-way decomposition model, order processing costs are negligible in every subsample with both the subsequent and all other loan announcement. This suggests that the large decline in spreads cannot be attributed to changes in the order processing costs. In the relation between adverse selection costs and the loan announcements dummy, for subsequent loan the coefficient is -0.015 with t-statistic of -2.58, for all other loans the coefficient is -0.017 with t-statistic of -2.94. The coefficient between inventory holding costs and *Sub* is -0.004 and significant at the 10% level, and for *All* dummy, the coefficient is -0.003 but insignificant. This clear evidence indicates that the improvement in bid-ask spread after the subsequent loan and all other loans stems mainly from a significant reduce in the adverse selection component of bid-ask spread, that is, the reduce of information asymmetry problem of transactions.

Table 4.9 Regression of spread components using the two-way Huang and Stoll model (subsequent and all other loans)

Table 4.9 presents the OLS regression results for the determinants of the adverse selection plus inventory cost, and order processing costs from 2000 to 2015, for the zero-leverage firms which announce their subsequent (all) bank loans. The dependent variable is the adverse selection plus inventory cost (λ), and order processing costs (1-λ), estimated using the Huang and Stoll (1997) two ways spread decomposition model. The independent variables include the dummy variable *Sub (all)* which denotes the initial loan of zero-leverage firms. The logarithm of trading volume (*Vol*), the logarithm of daily average market capitalization (*Size*), the logarithm of daily return standard deviation (*StdDev*), the logarithm of daily average share price (*Price*), and the loan amount to total asset ratio (*L/A*). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%,** significance at 5% and * significance at 10%.

$$Ln\lambda_j=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln\lambda_h=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln(1-\lambda_j)=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln(1-\lambda_h)=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

Dependent Variables		Independent Variables													
		C		***Subsequent/All***		***Volume***		***Size***		***StdDev***		***Price***		***L/A Ratio***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: All Trades															
Subsequent Loans															
All	λ_j	1.524	5.88***	-0.034	-3.66***	-0.008	-2.17*	-0.000	-0.89	0.010	2.14*	-0.002	-1.88*	0.009	0.48
	$1-\lambda_j$	4.005	5.03***	0.003	1.29	-0.045	-4.75***	0.044	4.83***	-0.001	-1.66*	-0.000	-1.04	0.000	0.33
All Loans															
All	λ_h	2.588	3.45***	-0.039	-3.44***	-0.006	-2.25*	-0.001	-1.13	0.007	2.27**	-0.003	-1.45*	0.003	1.44*
	$1-\lambda$	3.005	6.83***	0.000	0.96	-0.034	-4.54***	0.045	4.30***	-0.002	-0.98	-0.001	-1.03	0.002	1.25
Panel B: Regression of Spread Components by Trade Size															
Subsequent Loans															
Small	λ_j	4.308	8.65***	-0.078	-4.14*	-0.003	-2.05*	-0.001	-0.88	0.025	2.65**	-0.001	-1.02	0.010	1.66*
	$1-\lambda_j$	5.124	6.05***	0.001	1.28	-0.028	-3.56***	0.029	3.03**	-0.001	-1.09	-0.001	-0.68	0.005	1.10
Median	λ_j	4.063	9.39***	-0.021	-2.65**	-0.004	-2.33*	-0.000	-1.08	0.016	3.45***	-0.000	-1.98*	0.004	0.93
	$1-\lambda_j$	5.466	12.45***	0.001	1.23	-0.033	-5.65***	0.041	2.44**	-0.000	-1.35	-0.000	-0.77	0.001	0.74
Large	λ_j	4.050	5.05***	-0.013	-3.48***	-0.008	-2.66**	-0.002	-0.58	0.013	2.45**	-0.003	-2.06*	0.005	1.32
	$1-\lambda$	2.527	5.66***	0.000	0.29	-0.049	-3.43***	0.045	3.22***	-0.000	-1.45*	-0.000	-0.65	0.000	0.53
All Loans															
Small	λ_h	5.647	6.54***	-0.074	-3.03**	-0.005	-1.67*	-0.000	-1.05	0.011	2.18*	-0.001	-2.64**	0.006	1.20
	$1-\lambda_h$	4.350	5.65***	0.001	1.05	-0.029	-3.46***	0.032	2.83**	-0.000	-1.06	-0.000	-0.45	0.000	0.46
Median	λ_h	6.506	8.85***	-0.027	-2.99**	-0.003	-2.68**	-0.000	-0.54	0.006	2.55**	-0.006	-2.33*	0.001	0.22
	$1-\lambda_h$	2.433	9.14***	0.000	1.25	-0.033	-3.54***	0.046	3.05**	-0.001	-0.98	-0.002	-0.56	0.002	0.91
Large	λ_h	2.508	6.02***	-0.011	-2.23**	-0.009	-1.44*	-0.002	-0.33	0.007	2.42**	-0.001	-2.09*	0.002	0.47
	$1-\lambda_h$	5.063	5.82***	0.001	1.67*	-0.035	-4.45***	0.049	4.14***	-0.002	-1.21	-0.000	-0.66	0.001	0.65

Panel B reports the regression results for the panel data regressions with three spread components as dependent variables sorted by trade size. The correlations between adverse selection components and subsequent loan announcements are fairly significant in the small trading group, the coefficient is -0.020 with a t-statistic 4.14. It reveals that for subsequent loan announcement, the decrease of information asymmetry is more pronounced in the small trading. It also suggests that the level of decrease falls when the trade size increases. For all other loan announcements, the correlation between α and loan announcement dummy *All* is -0.017 for small trading group, -0.010 and -0.011 for median and large trading respectively. While there is no detectable relation between β and the announcement dummy.

In particular, for both of loan announcement event, I find a significant positive relation between adverse selection costs and stock return volatility. For all samples, the correlation between them is 0.017 for subsequent loan event with a t-statistic of 3.44, and 0.010 with a t-value equals to 3.48 for all other loans. And the magnificent of coefficient is decline with the trading size. My results also show that the firm with large stand deviation of returns with more inventory holding costs, for example, in the β_j regression of subsequent loan announcement, the correlation between the standard deviation of stock return and inventory holding components is 0.018 for all samples, 0.031 for the small trading, 0.019 and 0.013 for medium and large trading group respectively. The more volatile the stock, the greater the inventory holding problem faced by the market maker. Furthermore, large firm size will lead to lower order processing costs for individual stock transaction due to the order processing cots is a fixed cost. Less trading volume can have more order processing cost for the single transactions. Higher priced stocks also lead to less adverse selection cots and inventory holding costs.

Table 4.10 Regression of spread components using three-way Huang and Stoll model for Subsequent and all other loans

Table 4.10 presents the OLS regression results for the determinants of the adverse selection costs inventory holding cost, and order processing costs from 2000 to 2015, for the zero-leverage firms which announce their subsequent (all) bank loans. The dependent variable is the adverse selection (α), inventory cost (β), and order processing costs (1-α-β), estimated using the Huang and Stoll (1997) three-way spread decomposition model. The independent variables include the dummy variable *Sub (all)* which denotes the initial loan of zero-leverage firms. The logarithm of trading volume (*Vol*), the logarithm of daily average market capitalization (*Size*), the logarithm of daily return standard deviation (*StdDev*), the logarithm of daily average share price (*Price*), and the loan amount to total asset ratio (*L/A*). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%,** significance at 5% and * significance at 10%.

$$Ln\alpha_j=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln\alpha_h=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln\beta_j=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln\beta_h=\mu_0+\mu_1 Alll+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln(1-\alpha_j-\beta_j)=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln(1-\alpha_h-\beta_h)=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

Dependent Variables		Independent Variables													
		C		***Subsequent/All***		***Volume***		***Size***		***StdDev***		***Price***		***L/A Ratio***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: All Trades															
Subsequent Loans															
	α_j	2.588	10.67***	-0.015	-2.58**	-0.002	-1.45*	-0.001	-3.03**	0.017	3.44***	-0.001	-2.04*	0.004	1.03
All	β_j	7.069	5.04***	-0.004	-1.93*	-0.013	-3.00**	-0.002	-1.22	0.018	1.76*	-0.003	2.19**	-0.007	-1.20
	$1-\alpha_j-\beta_j$	2.099	6.98***	0.002	1.98*	-0.058	-5.98***	0.033	2.34*	-0.001	-1.33	-0.000	-1.06	0.000	0.99
All Loans															
	α_h	1.783	9.09***	-0.017	-2.94**	-0.004	-1.88*	-0.003	-2.55**	0.010	3.48***	-0.002	2.11*	0.006	0.24
All	β	4.044	9.56***	-0.003	-1.25	-0.016	-3.08**	-0.001	-1.45*	0.023	1.23	-0.004	1.03	-0.003	-0.28
	$1-\alpha-\beta$	3.205	4.55***	0.000	1.03	-0.062	-2.97**	0.035	1.44*	-0.000	-1.58	-0.000	-1.14	0.001	0.49

Table 4.10 Regression of spread components using three-way Huang and Stoll model for subsequent and all other loans (Continued)

Table 4.10 presents the OLS regression results for the determinants of the adverse selection costs inventory holding cost, and order processing costs from 2000 to 2015, for the zero-leverage firms which announce their subsequent (all) bank loans. The dependent variable is the adverse selection (α), inventory cost (β), and order processing costs (1-α-β), estimated using the Huang and Stoll (1997) three-way spread decomposition model. The independent variables include the dummy variable *Sub (all)* which denotes the initial loan of zero-leverage firms. The logarithm of trading volume (*Vol*), the logarithm of daily average market capitalization (*Size*), the logarithm of daily return standard deviation (*StdDev*), the logarithm of daily average share price (*Price*), and the loan amount to total asset ratio (*L/A*). I report the entire sample results in Panel A and the results by trade size in Panel B. Two tailed tests of significance are reported as follows, *** significance at 1%,** significance at 5% and * significance at 10%.

$$Ln\alpha_j=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln\alpha_h=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln\beta_j=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln\beta_h=\mu_0+\mu_1 Alll+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln(1-\alpha_j-\beta_j)=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad Ln(1-\alpha_h-\beta_h)=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

Dependent Variables		Independent Variables													
		C		***Subsequent/All***		***Volume***		***Size***		***StdDev***		***Price***		***L/A Ratio***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel B: Regression of Spread Components by Trade Size															
Subsequent Loans															
Small	α_j	3.025	12.21***	-0.020	-4.14***	-0.006	-1.44*	-0.001	-1.38	0.024	3.06**	-0.005	-1.67*	0.007	1.99
	β_j	1.245	7.46***	-0.008	-1.35	-0.021	-3.25***	-0.001	-0.96	0.031	2.16*	-0.006	-1.55*	-0.009	-0.44
	$1-\alpha_j-\beta_j$	2.977	4.56***	0.001	1.28	-0.069	-3.66***	0.031	2.79**	-0.000	-1.78*	-0.000	-1.94*	0.000	2.01*
Median	α_j	3.011	5.43***	-0.010	-1.33	-0.003	-1.14	-0.000	-2.88**	0.015	2.42**	-0.002	-1.10	0.000	0.48
	β_j	1.054	12.53***	-0.006	-1.22	-0.014	-2.76**	-0.003	-1.28	0.019	2.94**	-0.001	-1.43*	-0.004	-0.86
	$1-\alpha_j-\beta_j$	3.715	9.00***	0.001	2.23**	-0.040	-2.41**	0.038	1.82*	-0.000	-1.18	-0.001	-1.82*	0.000	0.76
Large	α_j	2.034	11.31***	-0.013	-1.83*	-0.006	-1.34	-0.000	-1.69*	0.011	3.14*	-0.000	-1.91*	0.000	0.64
	β_j	2.001	10.35***	-0.001	-0.96	-0.008	-2.75**	-0.003	-1.67*	0.013	1.87*	-0.001	-1.36	-0.003	-1.11
	$1-\alpha_j-\beta_j$	3.020	6.68***	0.000	1.22	-0.049	-1.76*	0.040	2.68**	-0.002	-1.29	-0.000	-2.66**	0.000	1.02
All Loans															
Small	α_h	1.028	4.97***	-0.017	-1.16	-0.008	-0.87	-0.002	-1.93*	0.018	1.96*	-0.002	-2.35**	0.010	1.28
	β_h	2.003	4.28***	-0.004	-0.95	-0.024	-2.84**	-0.001	-1.13	0.024	0.88	-0.005	-0.82	-0.007	-1.05
	$1-\alpha_h-\beta_h$	3.215	3.56***	0.003	1.02	-0.074	-2.47**	0.026	1.39	-0.001	-1.48	-0.000	-1.88*	0.000	0.74
Median	α_h	2.555	3.36***	-0.010	-1.77*	-0.006	-1.54*	-0.000	-1.91*	0.003	2.17*	-0.000	-2.17*	0.004	0.84
	β_h	5.010	12.77**	-0.000	-1.88*	-0.013	-2.45**	-0.000	-2.34**	0.015	1.93*	-0.000	-1.93*	-0.000	-1.32
	$1-\alpha_h-\beta_h$	5.002	7.15***	0.001	1.49	-0.037	-2.20**	0.032	1.95*	-0.001	-1.45	-0.001	-1.57*	0.002	0.88
Large	α_h	4.002	4.11***	-0.011	-1.63*	-0.000	-1.04	-0.001	-1.36	0.005	1.97*	-0.001	-2.73**	0.000	0.26
	β_h	4.001	5.59**	-0.002	-1.14	-0.011	-1.81**	-0.004	-0.77	0.017	1.57*	-0.001	-1.26	-0.002	-0.33
	$1-\alpha_h-\beta_h$	1.002	2.75**	0.000	1.24	-0.036	-1.37	0.037	1.88*	-0.000	-1.90*	-0.000	-1.33	0.000	0.95

Table 4.11 Regression of spread components using MRR model for subsequent and all other loans)

Table 4.11 presents the OLS regression results for the determinants of the adverse selection (λ) and order processing costs (1-λ), which are estimated using Madhavan et al. (1997) spread decomposition model (MRR model). Over the period of 2000 to 2015, for zero-leverage firms which announced their subsequent (all other) bank loans. The independent variables include the dummy variable (*Sub/All))*, the subsequent /all loan of zero-leverage firms. The logarithm of trading volume (*Vol),* the logarithm of daily average market capitalization (*Size*), the logarithm of daily return standard deviation (*StdDev),* the logarithm of daily average share price *(Price*), and the loan amount to total asset ratio (*L/A*).. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$Ln\lambda=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \quad Ln\lambda=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln(1-\lambda)=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \quad Ln(1-\lambda)=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

Dependent Variables		**Independent Variables**													
		C		***Subsequent/All***		***Volume***		***Size***		***StdDev***		***Price***		***L/A Ratio***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: All Trades															
Subsequent Loans															
All	λ_j	3.204	3.69***	-0.037	-4.11***	-0.013	-3.33***	-0.003	-2.14*	0.039	4.18***	-0.007	-2.14**	0.000	1.13
	$1-\lambda_j$	2.338	3.44***	0.002	1.13	-0.044	-6.72***	0.049	3.38***	-0.000	-0.96	-0.001	-1.63*	0.001	0.44
All Loans															
All	λ_h	2.650	3.44***	-0.029	-3.56***	-0.009	-3.98***	-0.006	-1.85*	0.031	4.25***	-0.010	-1.99*	0.000	1.07
	$1-\lambda_h$	2.997	3.98***	0.001	1.12	-0.038	-5.06***	0.031	4.96***	-0.001	-1.38	-0.004	-0.78	0.001	1.99*
Panel B: Regression of Spread Components by Trade Size															
Subsequent Loans															
Small	λ_j	3.089	2.43***	-0.039	-3.98***	-0.010	-2.87**	-0.002	-1.98*	0.041	3.34***	-0.004	-1.80*	0.004	1.08
	$1-\lambda_j$	2.046	2.27***	0.001	1.38	-0.052	-3.86***	0.024	2.88**	-0.000	-2.01*	-0.000	-1.52*	0.013	1.25
Median	λ_j	3.001	4.56***	-0.014	-2.73**	-0.008	-2.74**	-0.006	-0.84	0.019	3.56***	-0.011	-1.40*	0.000	0.87
	$1-\lambda_j$	5.020	3.46***	0.000	0.97	-0.027	-3.02***	0.038	2.48**	-0.002	-0.39	-0.001	-1.05	0.001	0.95
Large	λ_j	2.005	3.16***	-0.010	-2.56**	-0.017	-2.65**	-0.010	-0.82	0.010	2.78**	-0.013	-1.39	0.000	0.36
	$1-\lambda_j$	2.000	2.54**	0.002	0.86	-0.013	-2.95**	0.051	1.64*	-0.001	-0.91	-0.000	-0.93	0.000	0.44
All Loans															
Small	λ_h	3.003	2.36***	-0.030	-3.64***	-0.009	-2.77**	-0.007	-2.07*	0.032	2.87**	-0.001	-1.49*	0.000	0.74
	$1-\lambda_h$	5.003	3.74***	0.003	0.91	-0.053	-3.38***	0.020	2.42**	-0.001	-0.56	-0.000	-1.38	0.001	1.00
Median	λ_h	1.072	3.98***	-0.012	-2.02*	-0.006	-1.99*	-0.002	-2.58**	0.025	2.46**	-0.009	-0.73	0.002	0.37
	$1-\lambda_h$	3.047	4.69***	0.001	1.00	-0.029	-2.94**	0.032	1.37	-0.000	-0.68	-0.005	-1.04	0.000	0.96
Large	λ_h	1.006	6.54***	-0.013	-2.35**	-0.012	-2.08*	-0.019	-0.33	0.016	2.97**	-0.010	-1.06	0.000	0.88
	$1-\lambda_h$	2.009	4.07***	0.000	1.08	-0.027	-1.40*	0.034	1.53*	-0.001	-1.02	-0.001	-1.07	0.000	0.69

Table 4.12 Regression of spread components using PIN model for subsequent and all other loans

Table 4.12 presents the OLS regression results for the determinants of the informed trading costs and non-informed trading costs of share spread, which are estimated using the probability of information-based trading (PIN model) by Easley et al. (1997). Over the time period of 2000 to 2015, for zero-leverage firms that announce their Subsequent (all) bank loans. The independent variables include the dummy variable *Sub/All*, which denotes the subsequent/all loan of zero-leverage firm. The logarithm of trading volume (*Vol),*the logarithm of daily average market capitalization *(Size),* the logarithm of daily return standard deviation (*StdDev),* the logarithm of daily average share price (*Price),* and the loan amount to total asset ratio (*L/A*). Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$LnPIN=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \qquad LnPIN=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$Ln(1-PIN)=\mu_0+\mu_1 Sub+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price++\mu_6 L/A+\varepsilon_t \qquad Ln(1-PIN)=\mu_0+\mu_1 All+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price++\mu_6 L/A+\varepsilon_t$$

Dependent Variables		Independent Variables													
		C		***Subsequent/All***		***Volume***		***Size***		***StdDev***		***Price***		***L/A Ratio***	
		Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat	Coef.	T-stat
Panel A: All Trades															
Subsequent Loans															
All	PIN_j	-2.938	-3.006***	-0.007	-1.39	-0.000	-1.44*	-0.034	-3.25***	0.015	1.96*	-0.000	-0.66	0.019	2.56**
	$1- PIN_j$	-1.055	-4.527***	-0.010	-1.08	-0.002	-1.07	0.042	2.68**	-0.043	-1.88*	0.001	1.25	0.010	1.28
All Loans															
All	PIN_h	-3.045	-5.206***	-0.003	-1.95*	-0.004	-1.23	-0.106	-2.99**	0.019	2.98**	-0.001	-1.24	0.017	1.87*
	$1- PIN_h$	-2.887	-3.445***	-0.002	-1.57*	-0.000	-1.45*	0.029	2.58**	-0.050	-2.33*	0.000	1.17	0.000	1.55*
Panel B: Regression of Spread Components by Trade Size															
Subsequent Loans															
Small	PIN_j	-1.009	-6.34***	-0.009	-1.25	-0.003	-1.38	-0.068	-2.96**	0.016	0.87	-0.001	-2.00*	0.012	1.28
	$1- PIN_j$	-2.038	-3.05***	-0.012	-2.08*	-0.003	-2.46**	0.014	2.57**	-0.054	-1.26	0.004	1.03	0.033	0.95
Median	PIN_j	-4.019	-3.36***	-0.001	-1.84*	-0.004	-2.77**	-0.075	-2.85**	0.030	1.85*	-0.001	-1.07	0.022	1.23
	PIN_j	-6.330	-3.64***	-0.000	-1.04	-0.002	-2.32**	0.049	2.98**	-0.057	-0.75	0.002	1.23	0.000	0.89
Large	PIN_j	-3.034	2.68***	-0.000	1.64*	-0.000	-1.35	-0.089	-2.71**	0.009	1.06	-0.003	-1.24	0.010	0.67
	PIN_j	-2.016	-3.64***	-0.006	-1.02	-0.002	-1.89*	0.040	1.11	-0.041	-0.88	0.009	1.26	0.000	0.71
All Loans															
Small	PIN_h	-2.315	-2.62**	-0.006	-1.28	-0.003	-1.66*	-0.073	-3.77***	0.009	1.25	-0.008	-1.99*	0.013	0.11
	$1- PIN_h$	-2.134	-4.88***	-0.003	-1.65*	-0.000	-0.83	0.012	2.12*	-0.045	-1.67*	0.003	1.96*	0.001	0.94
Median	PIN_h	-3.560	-3.56***	-0.001	-0.88	-0.000	-2.55**	-0.107	-2.87**	0.017	1.63*	-0.002	-2.06*	0.021	0.98
	$1- PIN_h$	-3.328	-6.54***	-0.000	-1.23	-0.002	-1.98*	0.028	1.66*	-0.034	-1.05	0.000	1.63*	0.000	0.69
Large	PIN_h	-2.103	-3.25***	-0.001	-1.08	-0.001	-2.44**	-0.114	-2.98**	0.021	1.07	-0.003	-1.24	0.000	0.33
	$1- PIN_h$	-2.088	-6.23***	-0.001	-1.25	-0.010	-1.67*	0.026	2.33**	-0.039	-1.24	0.001	1.08	0.000	0.45

4.4.9 Robustness Test: Regression of Spread Components by MRR Model and PIN Model

As I discussed above, the spread component estimations are sensitive to model specifications. In this section, I examine the regression of spread components with the firm variables from the two alternative models, *MRR* model and *PIN* model. I regress the two spread components against various stock characteristics, inducing a dummy variable for the subsequent/all loan announcement.

The *MRR* regression results in table 4.11 confirms the results that I have obtained before, the adverse selection component is increasing in trade size. The results of all trades are exhibited in Panel A of table 4.11. In Panel A for all samples, the coefficient on the dummy variable is significantly negative, indicating that the adverse selection plus inventory holding costs estimated by *MRR* model is decreasing with the subsequent loan announcement. The coefficient of λ_j is -0.037, which, in fact, is larger in magnitude than the coefficient of λ_h (-0.029). This evidence shows there still is an excess effect on subsequent loans than any other loans. In Panel B of table 4.11, the magnitude of this coefficient implies that λ is smaller for small trading size. This result is broadly consistent with the initial loan announcement results in Chapter 3. The regression results suggest that there are reliable and significant relations between the loan announcements and λ.

The estimation results according to *PIN* model are shown in the table 4.12. The loan announcement dummy is positive for *PIN* model on both the subsequent loan and all other loan announcement, but the result as not as significant as other models. It indicates that the information costs components of spread decrease with the loan announcements. Overall, the results of robustness test provide support for the liquidity effect of both subsequent loans and any other loans of zero-leverage firms.

4.5 Summary

In this chapter, I examine stock market reactions and liquidity effects following the subsequent and all other loan announcements of zero-leverage firms. After the initial loan announcement, there are 71 sample firms that continue to borrow from the bank and have been issued a subsequent loan. My sample also contains 69 companies that received three or more loans. Like the initial loan announcement, the announcement of a subsequent bank loan causes a positive reaction in the stock price of borrowing firms, which is consistent with the financial intermediation hypothesis. However, the increase level is not as significant as the initial loan announcement. The announcement of the news results in a sustained increase in trading volume and liquidity. The improvement in liquidity continues to persist once I control for stock price and trading volume effects in both the short-and long-run. My results are robust across five alternative measures of liquidity. I also examine that during the 181 days around the announcement date, bid-ask spreads are significantly decreasing for both the subsequent loan and all other loan announcements. This is different with the results for the initial loan. This is because in the long-term the improvement of liquidity is diminishing.

When I decompose the bid-ask spread into its three components, I find that information asymmetry is driving the enhancement in liquidity rather than changes in order processing and inventory holding costs. My results are significant when I decompose the spread using both the Huang and Stoll and MRR model.

Chapter Five

Price Impact and Order Flow Ratio of Zero-Leverage Firms

5.1 Background

In the last two chapters, I have examined that an announcement of a bank loan agreement causes a positive reaction in the market value of the borrowing firm. In particular, my findings show a significant decrease in the bid-ask spread of the stocks after there has been an issue of any bank loan. The decrease in spread and increase in liquidity is maintained over the long-run after the announcement. Therefore, the changes of the bid-ask spread size and information effects, makes the price impact around the loan announcement worthy of examination. The price impact of trades has been an extensively research area in both empirical and theoretical microstructure. Extant literatures analyze the asymmetry in the price of buyer-and seller-initiated trades on financial markets all over the world. Such as the London Stock Exchange (Gemmill, 1996), the Australian equity market (Aitken and Frino, 1996), and the U.S. market (Chiyachantana et al., 2017). Aitken and Frino (1996), consistent with many previous researchers, establish that the sellers pay a liquidity premium while buyers do not, as price reversals are usually associated with sales while price continuations follow purchases. In the real world, price responses to buyer-initiated versus seller-initiated trades may be asymmetric for a variety of reasons. One of the common explanations (e.g.: Kraus and Stoll, 1972; Chan and Lakonishok, 1993; Keim and Madhavan, 1996) is that sellers and buyers respond to information differently, buyer-initiated are usually found to be better informed than seller-initiated trades, leading to buy orders having a greater permanent price impact than sells. Engle and Patton (2004) believe that purchases have a greater impact on the ask price, whereas sells have a greater impact on the bid price. Keim and Madhavan (1996) believe that sells are more often than buys liquidity-motivated instead of information-based. Buy orders create new long-term positions and thus imply a preference to hold a particular stock. Chiyachantana et al. (2017) indicates that the permanent asymmetric price impact between buys and sells is positive at the initial stage of price run-up, which then reverses in the prolonged price increasing period. These results are based on the behavior of block trades, which are defined as an order submitted with a minimum trade size of 10,000 shares (Madhavan and Cheng, 1997; Gregoriou, 2008).

I expect to find the asymmetric buy and sell impact during the announcement period of zero-leverage firms, and I believe that this could be explained by the bid-ask bounce. The bid-ask bounce refers to the bouncing of trading prices between the bid and ask sides of the markets which would be the case if the order flow was imbalanced. As trades move out from the mid-point between the bid and ask price this results in a spurious gain or loss which is later reversed as transactions resume back to the mid-point (Gosnell et al., 1996). My research is aim to explore the price impact and order flow imbalance which caused by bid-ask bounce of zero-leverage firms' trading around the initial loan announcement, to identify the trading costs and stock performance related with bid-ask bounce.

A company announcement event can result in a movement of closing prices toward either the bid (a predominance of sell orders) or the ask quote (a predominance of buy orders), and it can be measured by order flow ratio. Gosnell et al. (1996) reveals that order flow is significant imbalance around the news announcements. For bad news in their research, the transaction price location shifts towards a dominance of sell orders immediately after the bad news announcement, and the imbalance in the order flow ratio last in the long term. Therefore, as the favourable corporate event, the announcement of initial loan will attract more buyer-initialled orders and the transaction price location should shifts towards a dominance of buy orders. Moreover, Lee (1992) finds that during the post-announcement period, there is no difference between the number of large buy and sell orders, but there is a significantly increase in the volume of small buy and sell orders. Han and Lesmond (2011) reveal that the bid-ask bounce is more important for the pricing of small and illiquid stocks. Kaul and Nimalendran (1990) show that in their sample from the NASDAQ between 1983 to 1987, bid-ask errors can explain about 50% of the daily return variances of small firms, whereas for the largest firms in their sample this proportion is just 23%.

The bid-ask spread bias also as a possible explanation for return anomalies. Kaul and Nimalendran (1990) observe transaction-price returns could contain measurement errors due to both overreaction and the bid-ask spread errors, bid-ask errors are the predominant source of apparent price reversals in the short run, lead to substantial spurious volatility. Therefore the examination of both closing-price returns and mid-point returns are necessary for the stock performance measurement. Harris (1986) and Wood et al. (1985) pay attention on the bias on measurement of return, there is an intraday pattern to security price returns that could produce biased results if returns are calculated on closing prices. Due to randomness bouncing between bid and ask prices, closing-price returns series should have a higher volatility than the mid-point return. To operationalize my microstructure bias hypothesis, I calculate the return based on both closing price and midpoints price.

5.2 Data

Following Lee and Ready (1991), I construct buy and sell indicator variables in the following way. If the stock price is higher than the mid-quote, the trade is considered ‘‘buyer-initiated’’. If the stock price is lower than the mid-price, then it is considered “seller-initiated”. Hasbrouck and Ho (1987) state that the basic bid-ask model relies on the assumption that buyers and sellers arrive independently and with equal probability. Hence, a transaction at the bid price is equally likely to be followed by a transaction at the bid or ask price. Table 5.1 presents the trades analyzed in my research. The overall sample consists of 28,342,080 purchases and 26,101,600 sales, which is substantially larger when compared with previous research. For instance, Madhavan and Cheng (1997) only examine 21077 block trades while Chan and Lakonishok (1993) analyze 1,215,387 transactions. Alzahrani et al. (2013) contains around 4,200,000 trades in their research with 2,300,000 of buy orders and 1,800,000 sell orders.

Table 5.1 Summary statistics

Table 5.1 presents the summary statistics of 96 zero-leverage firms in FTSE 350 index purchase and sales for the period January 1, 2000 to December 31, 2015, including the number of observations, the mean, median, minimum, maximum and standard deviation for zero-leverage firms' stock trade size.

Descriptive Statistics

	No. of Observations	Mean	Median	Minimum	Maximum	SD
Buys	28,342,080	9978	6630	14	7,334,000	41,256.8
Sells	26,101,600	9484	6508	10	6.902.687	44,523.0

The mean and median trade sizes were 9978 and 6630 respectively for purchases, and 9484 and 6508 respectively for sales. For the standard deviation of my samples, stock purchases have a standard deviation of 41256.8 whereas the stock sell standard deviation is 44523.0. They are significantly larger than the previous research which focuses on block trades. It indicates that the zero-leverage firms are more risky than block trading firms. The block trading firms usually have large market capitalization and a higher level of monitoring, whereas zero-leverage firms usually have smaller market capitalization, more asymmetric information causing greater risk on their stocks. Moreover, the standard deviation of buyer-initiated orders is larger than the seller-initiated, indicates that the buy order is more volatility than sells.

5.3 Methodology

5.3.1 Price Impact

Kraus and Stoll (1972), consistent with Scholes (1972), suggest that the total price impact is comprised of two parts: temporary price impact and permanent price impact. Temporary and permanent price effects can be explained by different theories. In particular, liquidity costs and price pressure theories are used to explain temporary trade price effects, while for permanent price effects the substitution effect and the release of new information are given as potential descriptions. Anderson et al. (2006) reports that temporary price effect following sells because prices typically rebound back to the previous levels. In contrast, prices remain significantly higher following purchases.

Following previous literatures (see among others Madhavan and Cheng, 1997), trade price effects are measured as follows:

$$\text{Temporary Effect} = \text{Log}\frac{P_a}{P_c} \qquad (5.1)$$

$$\text{Permanent Effect} = \text{Log}\frac{P_c}{P_p} \qquad (5.2)$$

$$\text{Total Effect} = \text{Log}\frac{P_a}{P_p} \qquad (5.3)$$

Where P_p is the market price prior to the initial (subsequent/all other) loan announcement, while P_c is the price after the every loan announcement event. P_a is the average trading price around the announcement time. Given data limitations, it is not possible to do one-to-one correspondence between announcement time and trades executed on the announcement moment. I use the closing price of one day before announcement day and the closing price of announcement day as P_p and P_c respectively, and the average trading price around the announcement time for P_a.

5.3.2 Order Flow Ratio

For exploring whether the asymmetry between purchases and sells is attributable to the tendency to trade at the ask price, I test the bid-ask bounce by determining the location of trade. Using the trade classification of Lee and Ready (1991), the location of trade prices can be classified as: A. Above and at the ask price. B. Between the ask and midpoint price. C. Between the midpoint price and the bid price. D. At and below the bid price. Buyers are assumed to purchase at ask price whereas sellers trades as bid price. The frequency of trades at the bid and the ask price are computed using the order flow ratio, which is calculated for the open and closing price on the loan announcement days, as follows:

$$\text{Order flow ratio}=\frac{(\text{ask}-\text{price})}{(\text{ask}-\text{bid})} \quad (5.4)$$

The closer the order flow ratio is to 1, the more likely the transaction price is at the bid quote, indicating the selling pressure. While the closer this ratio is to zero the greater the likelihood the trade is at the ask, an indication of buying pressure (Lease et al., 1991).

5.3.3 Event Return around the Loan Announcement

In general, I use the standard market model method for both transaction price-based return and midpoint quote-based return. As with previous chapters, I estimate the abnormal returns by using an economically market-adjusted model:

$$AR_t=R_t-R_{m,t} \quad (5.5)$$

Where AR_t equals to $AR_{i,t}$, $AR_{j,t}$ or $AR_{h,t}$, represents the abnormal return earned by stock *i,* stock *j or* stock *h* at time *t* respectively. R_t is the return on stock *i,j,*or *h* at time *t,* and $R_{m,t}$ is the value-weighted market index return at time *t*. As a proxy for the market's return, I use the FTSE index returns for the sample period. The announcement date (day *0*) is the day of every bank loan announcement. In terms of the short-term period, I examine abnormal returns (*AR*s) for the announcement day [day 0], three-day period around the announcement day [-1, +1], five-day period around the announcement day [−2, +2] and eleven-day period around the announcement days [-5, +5]. I calculate the long event period as long as 181 days [-90, +90] around the announcement dates.

To operationalize my microstructure bias hypothesis, following Kaul and Nimalendran (1990), Lease et al. (1991) and many other studies, I calculate the return based on both closing price and midpoint price.

$$AR'_t = R'_t - R_{m,t} \quad (5.6)$$

I have defined *R* as returns calculated using closing prices, now I introduce *R'* as returns calculated using midpoint price. *R* contains pricing errors due to the bid-ask spreads. *R'*, however, is constructed using only midpoint price it will not under influence of the bid-ask spread errors. R_i', R_j' and R_h' represents the mid-point-based returns for stock *i*, *j* and *h* respectively. I can thus construct tests to evaluate both the *R* and *R'* and obtain a direct estimate of the relative importance of asymmetric price impact and bid-ask errors.

Cumulative abnormal return (*CAR*) of the event window can be calculated using the following formulas:

$$CAR_{,t(-q,+q)} = \sum_{t=q}^{s} AR_t \quad (5.7)$$

$$CAR'_{,t(-q,+q)} = \sum_{t=q}^{s} AR'_t \quad (5.8)$$

Where *q* is equals to 1, 2, 5, 10, 20,.......90 respectively, represents the different time period during the event window. The standard *t-test* is used to test whether the AR_t, CAR_t, AR'_t, and CAR', differ significantly from zero. This equation uses the closing price of the stock to calculate the total return, so that the bid-ask bounce effect is ignored.

5.3.4 Financial Returns and Order Flow Ratios

I use the ordinary least squares method to obtain the cross-sectional variables of both closing price and midpoint returns for zero-leverage firms around the loan announcement period. Specifically, the regression takes the following forms:

$$R_i=\mu_0+\mu_1 Initial_i+\mu_2 O_i+\mu_3 Vol_i+\mu_4 Size_i+\mu_5 StdDev_i+\mu_6 Price_i+\mu_7 LA_i+\varepsilon_i \quad (5.9a)$$

$$R_j=\mu_0+\mu_1 Sub_j+\mu_2 O_j+\mu_3 Vol_j+\mu_4 Size_j+\mu_5 StdDev_j+\mu_6 Price_j+\mu_7 LA_j+\varepsilon_j \quad (5.9b)$$

$$R_h=\mu_0+\mu_1 All_h+\mu_2 O_h+\mu_3 Vol_h+\mu_4 Size_h+\mu_5 StdDev_h+\mu_6 Price_h+\mu_7 LA_h+\varepsilon_h \quad (5.9c)$$

$$R_i'=\mu_0+\mu_1 Initial_i+\mu_2 O_i+\mu_3 Vol_i+\mu_4 Size_i+\mu_5 StdDev_i+\mu_6 Price_i+\mu_7 LA_i+\varepsilon_i \quad (5.10a)$$

$$R_j'=\mu_0+\mu_1 Sub_j+\mu_2 O_j+\mu_3 Vol_j+\mu_4 Size_j+\mu_5 StdDev_j+\mu_6 Price_j+\mu_7 LA_j+\varepsilon_j \quad (5.10b)$$

$$R_h'=\mu_0+\mu_1 All_h+\mu_2 O_h+\mu_3 Vol_h+\mu_4 Size_h+\mu_5 StdDev_h+\mu_6 Price_h+\mu_7 LA_h+\varepsilon_h \quad (5.10c)$$

Where R and R' is the closing price-based return and midpoint-based return respectively. Independent variables include *Initial*, *Sub* and *All* defined as the dummy variables which is equal to one if the trading occurs after the initial, subsequent or all other loan announcements otherwise it is equals to zero. *O* refers to the order flow ratio. *Vol* is the average daily volume of trading, *Size* is the market capitalization of zero-leverage firms, *StdDev* is the standard deviation of the stock prices as to capture the volatility in the true price. *Price* is the daily average share price and *L/A* is the Loan amounts to total assets ratio. I am primarily interested in the coefficient of *O*, which I predict *O* should have a negative relationship with stock returns.

5.4 Empirical Results

5.4.1 Transaction Price Effects of Zero-leverage Trades

Table 5.2 summarizes the price impact of purchases and sales for zero-leverage firms based on the closing price. Generally, I observe a significant asymmetry in the price behavior of buyer and seller- initiated trades during the announcement of initial loan, subsequent loan and all other loans. Panel A exhibits that for initial loan announcements, purchases are executed at prices 40.00 percent above the opening price, and show a clear continuation, which is subsequently subsumed into the permanent effect of 27.99 basis points. For seller-initiated trades during the initial loan announcement day, sales are associated with a continuation of 2.56 basis points in temporary price effects, which is not consistent with the reversal predicted by the short-run liquidity costs hypothesis. Permanent price effects suggest that sales move the stock price on average by -22.69 basis points, which is consistent with the information hypothesis established by Kraus and Stoll (1972). Sales exhibit a total effect of -33.07 basis points. Tests of equality for all three measured price impacts show that purchases have a significantly greater impact than sales, and the asymmetry is more pronounced in permanent effects.

Table 5.2 Transaction price effects of zero-leverage firm trades

Table 5.2 reports the transaction returns of zero-leverage firms in FTSE 350 index, which trading on their initial, subsequent and all other loan announcement day for the period January 1, 2000 to December 31, 2015, broken down by buyer and seller. Three measures of price impact are reported. (1) Temporary effect, defined as the logarithmic return from the closing price on the day of the loan announcement to the share price. (2) Permanent effects, defined as the logarithmic return from the opening price on the day of loan announcement to the closing price on the announcement day. (3) Total effect, defined as the logarithmic return from the opening price on the announcement day to the trading price. Panel A shows the result of initial loan announcement day and subsequent loan, all other loans are shown in Panel B and C respectively. The tests of equality between two groups by performing a two-sample mean comparison t-test. Standard errors are reported in parentheses, * significance at the 10% level. ** significance at the 5% level. *** significant at the 1% level.

Panel A: Initial Loans			
	Temporary	Permanent	Total
Buys			
Mean	-4.84	27.99	40.00
SD	100.50	228.00	144.00
T-statistic	-1.33	26.08***	34.66***
Sells			
Mean	2.56	-22.69	-33.07
SD	158.00	96.27	106.28
T-statistic	6.26**	-62.07***	-49.54***
Tests of equality			
Mean	2.28	5.30	6.93
T-statistic	5.80**	2.96**	2.58*
Panel B: Subsequent Loans			
	Temporary	Permanent	Total
Buys			
Mean	6.22	20.01	33.24
SD	124.88	200.75	133.05
T-statistic	5.26	31.88	30.46
Sells			
Mean	4.16	-18.30	-29.84
SD	119.22	121.69	93.38
T-statistic	3.47***	-23.37***	-33.29***
Tests of equality			
Mean	2.06	1.71	3.40
T-statistic	3.47***	5.25***	3.28***
Panel C: All other Loans			
	Temporary	Permanent	Total
Buys			
Mean	3.23	18.02	30.56
SD	158.29	138.56	144.17
T-statistic	12.38***	19.79***	17.38***
Sells			
Mean	1.69	-16.93	-27.72
SD	98.34	123.44	94.08
T-statistic	17.36***	9.88***	14.03***
Panel C: Tests of equality			
Mean	3.54	1.09	2.84
T-statistic	2.29*	7.35***	5.46***

Panel B and Panel C reports the price impact of buyer-initialed and seller-initialed orders during the subsequent loan and all other loans respectively. During the subsequent loan event day, buy orders are associated with a significant permanent price of 33.24 basis points and a permanent effect of 20.01. On the other hand, sale orders move the price a security on average by-18.30 basis points which consistent with the information hypothesis. For results of all other loans in Panel C, the total effect shows clear positive effects for purchases orders, and clear negative effects for sell orders. The reaction to sells appears to be smaller than for buy orders (-27.72 basis points versus 30.56 basis points). Buy orders are executed at price above the opening prices demonstrates that the traders earn a positive return to the close of trade. Tests of equality for all three kinds of loans show that the purchases have a significantly greater impact than sells, the differences is most significantly in the initial loan announcement day, price impact on subsequent loans and all loans are similar in magnitude.

Overall, price impacts exhibited in table 5.2 are relatively larger than some previous comparable researches (e.g.: Chan and Lakonishok, 1993 and Gregoriou, 2008). The price changes are perhaps more dramatic because the relative illiquidity of zero-leverage firms which sampled in my research.

5.4.2 Price Impacts of Trades Purged of Bid-ask Bias

My research thus far has shown that purchases exhibit a greater impact stock price on all kinds of loan announcement, more specially, the price impact are most significant during the initial loan announcement event. Engle and Patton (2004) discover an asymmetric impact of buyer- or seller-initiated transactions on market quotes. This is because purchases represent a greater impact on the ask price than on the bid price, while sells have a greater impact on the bid side of market. Therefore, in this section to control for any microstructural biases in the trade price data, I examine the buyer-initiated trades using ask price and seller-initiated trade price effects using bid price. I incorporate this by replacing the transaction price, P_c in equations (5.1) and (5.2), P_p in equation (5.2) and (5.3) with the bid/ask quote price for initial, subsequent and all other loan announcement, while maintaining P_a as the trading price. Mean and median returns purged of bid-ask bias displayed in Table 5.3 give a different impression of a trade around the loan announcement of zero-leverage firms.

Table 5.3 Quotes price effects of zero-leverage firm trades

Table 5.3 reports the quote returns which purged of bid-ask bias of zero-leverage firms in FTSE350 index, which trading on their initial, subsequent and all other loan announcement day for the period January 1, 2000 to December 31, 2015, broken down by buyer and seller. Three measures of price impact are reported. (1) Temporary effect, defined as the logarithmic return from the closing price on the day of the loan event announcement to the share price. (2) Permanent effects, defined as the logarithmic return from the opening price on the day of loan event announcement to the losing price on the announcement day. (3) Total effect, defined as the logarithmic return from the opening price on the announcement day to the trading price. Panel A shows the result of initial loan announcement day and subsequent loan, all other loans are shown in Panel B and C respectively. The tests of equality between two groups by performing a two-sample mean comparison t-test. Standard errors are reported in parentheses, * significance at the 10% level. ** significance at the 5% level. *** significant at the 1% level.

Panel A: Initial loans			
	Temporary	Permanent	Total
Buys Ask-trade-ask return			
Mean	1.38	20.49	33.76
SD	99.82	104.33	155.26
T-statistic	24.33***	26.98***	20.74***
Sells Bid-trade-bid return			
Mean	-3.26	-16.39	-30.28
SD	150.74	123.55	213.49
T-statistic	-27.83***	-20.65***	-31.22***
Tests of equality			
Mean	1.88	4.10	3.48
T-statistic	9.46***	2.48*	2.90**
Panel B: Subsequent loans			
	Temporary	Permanent	Total
Buys Ask-trade-ask return			
Mean	6.85	14.35	28.37
SD	187.34	199.37	163.23
T-statistic	4.33***	26.54***	22.89***
Sells Bid-trade-bid return			
Mean	-4.42	-13.30	-26.04
SD	98.77	110.08	90.23
T-statistic	-17.85***	-15.26***	-18.05***
Tests of equality			
Mean	2.43	1.05	2.33
T-statistic	4.29***	6.03***	2.28*
Panel C: All other loans			
	Temporary	Permanent	Total
Buys Ask-trade-ask return			
Mean	3.54	14.64	29.14
SD	177.26	119.09	133.28
T-statistic	7.29***	24.28***	20.09***
Sells Bid-trade-bid return			
Mean	-0.66	-14.00	28.51
SD	111.06	98.75	87.13
T-statistic	-22.33***	11.88***	22.65***
Tests of equality			
Mean	2.88	0.64	0.63
T-statistic	1.29	1.37	2.25

First, Panel A of table 5.3 represents the results of the initial loan announcement day. Ask-trade-ask returns, purchases are associated with a significant permanent price of 20.49 basis point, and a total effect of 33.26 basis points. In terms of seller-initiated trades, reversals following sales moved the price at -3.26 basis points in the temporary effect predicted by short run liquidity costs, and in the total impact of -30.28 basic points. The results of tests of equality suggest that even though purchases remain significantly different to sales, there is a reduction in the magnitude of the asymmetry relative to the results of Table 5.3. For example, after I purged the bid-ask bias, the temporary price impact asymmetry between buys and sells decrease from 2.28 (in table 5.2) to 1.88, which is significantly different at the 1% level. For permanent impact and total impact, the reduction in asymmetry is more pronounced, from 5.3 to 4.10, and 6.93 to 3.48 respectively. Therefore, bid-ask bias could be a possible explanation for the directional asymmetry in return between buyer-and seller-initiated trades.

Panel B and Panel C exhibits the results of subsequent loan and all other loans respectively. The total effect is similar with the results of initial loan announcement, is clearly positive for purchases, and clearly negative for sales, in each of subsequent and all other loan announcement day, this result consistent with the trading price results exhibited in the Table 5.2. The permanent effect for purchases on the loan announcement day present clear positive, 14.35 for subsequent loans and 14.64 for all other loans, both of them are smaller than initial loan announcements. While seller-initialed orders have significantly negative returns (-13.30 for subsequent loans and -14.00 basis points for all other loans). The asymmetry of the price impacts associated with buyer-initialed and seller-initialed transactions is eliminated to some extant once I account for bid-ask bias. The initial loan announcement, as with trading prices results in table 5.2, show that initial loan announcement have larger price effects than other loans.

Interestingly, the temporary effect experiences significantly change when I replacing the trading data by quote data. For the initial loan, the continuation following sales have transformed into reversals. For example, the temporary effect of initial loan announcement day is 2.56 basis points in table 5.2 while it is -3.26 for quote data return. These transformations are robust across the three event groups. I think it is because the short-term liquidity effect influence on the total effects.

My research is consistent with Harris (1989) and Foerster et al. (1990) which both believe that bid-ask bias can explain part of the intraday patterns in stock returns, microstructural biases in transactions data lead to systematic trading at the bid or ask.

5.4.3 The Price Effects associated with Bank Loan announcements

Following Lease et al. (1991), I mitigate the influence of order flow disruptions in the transactions by examining the midpoints-based returns then comparing with the closing price returns. The mid-point-based return eliminates some return biases induced by order flow bias, since the effect of closing price movements toward the bid price or the ask price is eliminated. For the convenience of comparison, I represent the closing price-based abnormal returns reported in Chapter 3 and chapter 4 in the table 5.4. Comparing between closing price-based return and mid-point-based returns, there is a clear result to show that the bid-ask effects and order flow ratio have some implications on the stock markets. Panel A exhibits the results of initial loan announcements, the abnormal returns are positive from 60 days prior to the announcement date for both the closing price based return and mid-point-based return, indicating the possibility of information leakage before the loan announcement. The mid-point abnormal returns achieve the peak at the event date, 2.365, and are statistically significant. In the event day +1, the abnormal return is 1.870 with a t-test equals to 6.13. During the 5 days [-2, +2] period and 11 days [-5, +5] period around the announcement date, the cumulative return are 7.193 and 9.564 respectively. During the post-announcement period for midpoint-based abnormal return, I observe relatively larger positive returns than transaction-based returns. According to Lease et al. (1991), as positive information is announced through the trading process, more buyers are expected to become interested in the zero-leverage firms' stock and they start to increase their inventory level in the zero-leverage firm's stock. In sequential trading, this leads to a sequential raise in stock price.

Table 5.4 The price effect associated with loan announcement events of zero-leverage firm

Table 5.4 provides the daily average returns (AAR) from the pre-announcement to the post-announcement period calculated by closing-price and midpoint price, which provides the bid-ask bias purged return. The sample consists of 96 FTSE 350 listed zero-leverage firms that undertook an initial bank loan during the time period of 2000-2015. The abnormal return around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. Event day (day zero) presents the day of the bank loan announcement. T-statistics are presented to show if sample loans' AAR are significantly different from zero. Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel A: Initial Loan

Event day	**Closing-price Return (N=96)**		**Midpoint return (N=96)**	
	AAR (%)	T-stat	AAR (%)	T-Stat
(-90,0)	0.167	2.32**	0.103	1.79*
(-80,0)	0.212	2.60**	0.000	1.92*
(-70,0)	-0.327	-2.57**	-0.024	-2.83**
(-60,0)	0.519	3.46***	0.445	2.34*
(-50,0)	0.392	2.48**	0.288	2.17*
(-40,0)	0.273	2.46**	0.269	1.69*
(-30,0)	0.256	2.97**	0.244	2.43**
(-20,0)	0.135	2.03*	0.120	1.96*
(-10,0)	0.167	2.56**	0.031	3.45***
-5	0.268	3.18***	0.028	4.39***
-4	0.196	2.08*	0.177	5.91***
-3	0.103	2.44**	0.214	3.76***
-2	0.449	3.27***	0.417	3.03**
-1	0.517	2.29*	0.633	3.88***
0	2.394	12.20***	2.365	12.84***
1	1.645	7.44***	1.870	6.13***
2	1.395	7.73***	1.908	8.25***
3	0.816	2.49**	1.000	3.97***
4	0.657	2.72**	0.734	4.88***
5	0.565	1.69*	0.518	3.28***
(-1, +1)	4.556	6.06***	4.868	4.99***
(-2, +2)	6.400	4.55***	7.193	4.87***
(-5,+5)	9.005	4.37***	9.564	5.73***
(0,10)	0.258	2.25**	0.297	3.41***
(0,20)	0.428	2.91**	0.490	1.34
(0,30)	0.152	2.58**	0.233	6.59***
(0.40)	0.161	2.14*	0.258	3.27***
(0,50)	0.170	1.76*	0.186	2.48***
(0,60)	0.151	2.82**	0.174	2.77**
(0,70)	0.319	1.62*	0.481	3.18**
(0,80)	0.167	2.43**	0.198	3.09**
(0,90)	0.155	2.82**	0.243	4.66***

Table 5.4 The price effect associated with loan announcement events of zero-leverage firm (Continued)

Table 5.4 provides the daily average returns (AAR) from the pre-announcement to the post-announcement period calculated by closing-price and midpoint price, which provides the bid-ask bias purged return. The sample consists of 96 FTSE 350 listed zero-leverage firms that undertook an initial bank loan during the time period of 2000-2015. The abnormal return around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. Event day (day zero) presents the day of the bank loan announcement. T-statistics are presented to show if sample loans' AAR are significantly different from zero. Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel B: Subsequent Loans

Event day	Closing-price Return (N=71)		Midpoint return (N=71)	
	AAR (%)	T-stat	AAR (%)	T-Stat
(-90,0)	0.043	1.75*	0.106	2.13**
(-80,0)	-0.028	-0.92	-0.035	-1.16
(-70,0)	-0.395	-1.40*	0.480	1.89*
(-60,0)	0.001	1.45*	0.009	2.01*
(-50,0)	-0.003	-0.56	-0.000	-1.34
(-40,0)	0.244	2.38*	0.278	3.15**
(-30,0)	0.189	2.96**	0.207	2.08*
(-20,0)	0.268	2.43*	0.299	2.47**
(-10,0)	0.151	2.64**	0.176	2.17*
-5	0.260	2.07*	0.287	2.99**
-4	0.137	2.11*	0.225	3.44***
-3	0.156	2.93**	0.142	3.14**
-2	0.163	1.75*	0.173	1.67*
-1	0.448	2.88**	0.403	2.98**
0	2.003	12.45***	2.999	14.01***
1	1.467	5.91***	1.834	7.19***
2	1.005	7.57***	1.337	6.03***
3	0.938	2.75**	1.075	3.45***
4	1.006	2.56**	1.203	2.01*
5	0.663	2.07*	0.987	2.88**
(-1, +1)	5.418	7.37***	5.236	6.34***
(-2, +2)	6.586	6.68***	6.746	7.01***
(-5,+5)	10.746	6.07***	7.400	6.99***
(0,10)	0.580	2.58**	0.734	2.67**
(0,20)	0.740	1.74*	0.638	2.45**
(0,30)	0.582	1.58*	0.752	1.43
(0.40)	0.533	1.53*	0.603	1.99*
(0,50)	0.520	0.52	0.619	1.03
(0,60)	0.469	1.47*	0.554	0.64
(0,70)	0.233	0.44	0.307	0.99
(0,80)	0.102	0.64	0.213	0.77
(0,90)	0.243	1.00	0.245	1.13

Panel B of Table 5.4 reproduces the event study show in Panel A for estimating the difference in average abnormal returns derived from closing price and midpoint price for subsequent loan announcement period. Similarly, the evidence of bid-ask bias arises from the difference between the closing price-based return and mid-point-based returns. The average return bias obtained from this procedure is 2.999 in the event day. In Panel C, I report the result of all loans, I observe relatively larger abnormal returns in the event day, 2.458 for midpoint-based returns (for closing price return the result is 2.033, both are statistical significant).

Table 5.4 The price effect associated with loan announcement events of zero-leverage firm (Continued)

Table 5.4 provides the daily average returns (AAR) from the pre-announcement to the post-announcement period calculated by closing-price and midpoint price, which provides the bid-ask bias purged return. The sample consists of 96 FTSE 350 listed zero-leverage firms that undertook an initial bank loan during the time period of 2000-2015. The abnormal return around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. Event day (day zero) presents the day of the bank loan announcement. T-statistics are presented to show if sample loans' AAR are significantly different from zero. Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel C: All other Loans

Event day	**Closing-price Return (N=198)**		**Midpoint return (N=198)**	
	AAR (%)	**T-stat**	**AAR (%)**	**T-Stat**
(-90,0)	-0.051	-1.09	-0.197	-1.76*
(-80,0)	0.003	1.68*	0.134	1.55*
(-70,0)	-0.017	-1.34	-0.001	-0.87
(-60,0)	-0.045	-1.01	-0.301	-1.98*
(-50,0)	0.306	2.55**	0.286	2.44**
(-40,0)	0.255	1.96*	0.199	2.58**
(-30,0)	0.134	1.57*	0.197	3.01**
(-20,0)	0.283	1.88*	0.275	2.45**
(-10,0)	0.315	2.17*	0.144	1.88*
-5	0.006	1.08	0.271	1.09
-4	0.113	1.96*	0.173	2.74**
-3	0.014	1.03	0.203	2.66**
-2	0.000	1.55*	0.145	2.97**
-1	0.138	2.97**	0.293	3.55***
0	2.033	11.84***	2.458	10.38***
1	1.098	4.66***	1.605	6.79***
2	1.114	5.98***	1.738	6.33***
3	1.000	6.05***	1.034	7.27***
4	0.462	3.14**	0.037	5.24***
5	0.434	3.23***	0.124	5.98***
(-1, +1)	3.269	6.66***	4.365	3.29***
(-2, +2)	4.383	5.09***	6.248	4.10***
(-5,+5)	6.412	4.98***	8.09	5.66***
(0,10)	0.004	1.73*	0.213	3.45***
(0,20)	0.015	1.61*	0.188	1.98*
(0,30)	0.296	2.55**	0.177	1.24
(0.40)	0.003	1.38	0.093	1.07
(0,50)	0.245	2.54**	0.172	1.55*
(0,60)	0.681	2.69**	0.111	1.63*
(0,70)	0.054	1.32	0.043	0.87
(0,80)	0.017	1.18	0.100	0.99
(0,90)	0.023	1.01	0.203	1.65*

Overall, the results indicate that using an alternative return method to isolate the microstructure bias, causes the same direction results with the different magnitude. Whether I use the quote midpoint or closing price-based estimate of returns, I observe the positive abnormal return after the initial loan announcement. From the results of zero-leverage firms which are believe have a smaller size, severe information asymmetry problem and larger bid-ask spreads, I observe an interesting point is, Rhee and Wang (1997) indicate that the size of the spreads is one of the sources of transaction errors. The bid-ask bounce can be trivial if the size of spread is minimal. The transaction prices bounce randomly between bid and ask price, but the spread is so small which makes the difference between bid and ask prices unnoticeable. Therefore, in the loan announcement event day, the difference between transaction-price-based return and midpoint-based return should be smaller than pre-announcement period. However, in my research, after the loan announcement, even though the spread size decreasing after the loan announcement but the bias still exists.

5.4.4 Propensity to Trade at the Ask Quotes Order Flow

One approach to inferring whether a transaction is initiated by a buy or sell order is to measure the proximity of the closing transaction price to the closing bid and ask quotes. Table 5.5 presents the percentage of closing price occurring at the ask, at the bid, at the midpoint for the event window. In Panel A, after the initial loan has been announced, the tendency of both the opening and closing prices to be at the ask price are highly significant. The percentage of closing transaction prices occurring at the ask quote are larger than at the bid quote from 50 days before the announcement date. In the event day, the percentage of closing prices occurring at the ask quote and bid quote is 42.58 and 30.70 respectively. A decrease in sell orders and an increase in buy orders on the day of the initial loan announcement suggests that buy orders are related to some good news rather than bad news. Large one-day price increases are occurring on the announcement day. These are likely to be associated with substantial buying pressure, enhancing the probability that a closing transaction is at the ask price and leading to a continuous the next day. It is consistent with Chan and Lakonishok (1993) who mention that buying a stock is associated with favorable firm-specific news, since it reflects the choice of one specific security out of many. The last column of Panel A presents the order flow ratio of initial loan announcement. I calculate the average ratio of (ask-close)/(ask-bid) for the individual stocks on each event day surrounding the initial loan announcement. On the announcement date, the mean ratio decreases from 45.13 on day -1 to 41.66 and continues to be smaller than 0.5 (nearer to 0) during the post-announcement period. It indicates that after the initial loan announcement, buy orders are much larger than the sell orders, and it does not subside during the short term.

Table 5.5 Closing prices relative to bid and ask quotes surrounding the loan announcement date of zero-leverage firm

Table 5.5 reports the event day relative to the announcement day (day 0), the percentage distribution of closing prices in relation to the bid and ask quotes, and order flow ratios for the 96 FTSE 350 listed zero-leverage firms that undertook the bank loan during the time period of 2000-2015. The results around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. The order flow ratio is calculated as (ask price-trading price)/(ask price – bid price). Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel A: Initial Loans

Distribution of Closing Prices			
Day	At ask	At bid	Order flow ratio
-90	29.80	37.64	53.06
-80	32.23	28.06	49.58
-20	35.27	33.33	49.77
-60	30.66	34.65	51.06
-50	39.09	35.42	48.23
-40	38.21	37.26	49.77
-30	39.22	34.89	48.91
-20	34.86	32.24	49.10
-10	39.67	37.59	49.28
-5	34.34	31.81	48.69
-4	38.22	32.96	48.33
-3	41.01	35.27	47.01
-2	39.67	34.90	47.29
-1	36.66	29.74	45.13
0	42.58	30.70	41.66
1	42.34	31.41	41.97
2	41.66	31.62	42.00
3	40.08	29.02	41.78
4	39.87	30.61	43.26
5	40.69	31.72	43.93
10	37.34	31.01	46.09
20	35.08	32.00	48.88
30	37.66	31.12	45.24
40	39.80	35.76	47.36
50	32.44	28.65	47.59
60	37.07	31.87	47.24
70	36.26	30.33	46.57
80	37.28	31.02	46.33
90	36.01	30.90	47.25
Test of mean order flow ratio on Day 0 to the Comparison period			
	Pre-announcement period		Post-announcement period
T-test	4.88^{***}		9.74^{***}

In panel B, there is significant evidence that both the opening and closing prices have a propensity to be at the ask around the subsequent loan announcement event. On the announcement day of subsequent loans, the order flow ratio is a dramatic decrease of 41.69 percentage of trades are at the ask price, while 31.85 are at the bid. For one day after the announcement, the percentage is 41.38 and 35.00 respectively. Therefore I can conclude that similar with initial loan announcement, following the subsequent loan announcement, stock market buying increases, creating an upward trend in closing prices and daily returns.

Table 5.5 Closing prices relative to bid and ask quotes surrounding the loan announcement date of zero-leverage firm (Continued)

Table 5.5 reports the event day relative to the announcement day (day 0), the percentage distribution of closing prices in relation to the bid and ask quotes, and order flow ratios for the 96 FTSE 350 listed zero-leverage firms that undertook the bank loans during the time period of 2000-2015. The results around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. The order flow ratio is calculated as (ask price-trading price)/(ask price – bid price). Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel B: Subsequent Loans

Distribution of Closing Prices			
Day	At ask	At bid	Order flow ratio
-90	25.06	30.28	51.88
-80	31.17	33.59	51.29
-20	33.04	31.24	49.17
-60	29.70	30.25	52.78
-50	33.65	38.89	54.07
-40	34.98	29.74	48.04
-30	30.24	24.23	46.92
-20	31.28	37.51	54.68
-10	24.99	28.18	53.66
-5	29.38	28.40	49.96
-4	30.27	31.95	52.37
-3	39.48	36.53	49.99
-2	32.85	29.61	48.95
-1	38.47	33.39	47.83
0	41.69	31.85	42.58
1	41.38	35.00	45.89
2	39.27	30.71	43.44
3	39.64	32.39	44.68
4	41.65	32.32	42.96
5	40.33	37.75	49.24
10	37.24	34.80	49.33
20	39.87	38.84	49.78
30	39.23	38.23	49.65
40	40.01	33.92	45.73
50	37.98	41.25	53.08
60	34.98	41.63	54.97
70	30.64	42.96	55.26
80	31.07	28.80	48.33
90	28.13	39.25	55.07
Test of mean order flow ratio on Day 0 to the Comparison period			
	Pre-announcement period		Post-announcement period
T-test	2.697**		6.345***

For all other loans, I report that from 2 days prior to the loan announcement, the order flow ratio starts to less than 0.5, the closing price have a propensity to be at the ask price. And on the event day, the order flow ratio is 43.56, 42.34 percentage of trades are happened at the ask. The difference between open and closing price order flow ratio suggests a decrease in sell orders and an increase in buy orders on the day of the loan announcement. The loan announcement news will cause trading prices to occur more frequently at the ask quotes, and a positive impact on the announcement period return.

In all of three group of loan announcement, I document a significant upward shift in the average location of the closing price relative to the closing bid quote and ask quotes on the announcement period. Indicating an excess of buy orders in the market, this order imbalance induces a significant upward bias in the stocks' return. For samples of stocks where percentage bid-ask spreads are relatively large, for example, stocks of smaller firms or stocks with high price variability, this order flow bias is of greater concern since the magnitude of the bias is larger. Moreover, the percentage of closing prices occurring at the ask price are larger than the bid price from 3 days before announcement for subsequent loan event period, and 2 days before all other loans, it is much shorter than the results of initial loan.

Table 5.5 Closing prices relative to bid and ask quotes surrounding the loan announcement date of zero-leverage firm (Continued)

Table 5.5 reports the event day relative to the announcement day (day 0), the percentage distribution of closing prices in relation to the bid and ask quotes, and order flow ratios for the 96 FTSE 350 listed zero-leverage firms that undertook the bank loan during the time period of 2000-2015. The results around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. The order flow ratio is calculated as (ask price-trading price)/(ask price – bid price). Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel C: All other Loans

Distribution of Closing Prices			
Day	At ask	At bid	Order flow ratio
-90	26.88	34.25	54.66
-80	23.24	30.97	54.98
-20	30.19	24.54	48.27
-60	26.03	29.55	51.03
-50	27.74	31.78	53.65
-40	33.28	30.27	49.11
-30	30.54	32.21	50.75
-20	29.53	33.51	52.64
-10	31.25	37.10	54.88
-5	33.06	30.38	49.88
-4	35.88	32.82	49.65
-3	29.74	32.32	51.98
-2	38.26	33.18	47.14
-1	42.98	35.54	47.68
0	42.34	30.26	43.56
1	40.86	31.90	44.08
2	37.98	30.93	45.98
3	39.73	32.90	45.37
4	40.25	36.40	48.97
5	39.24	30.80	44.25
10	38.43	31.15	46.31
20	33.06	36.68	52.93
30	39.58	35.25	48.25
40	37.24	31.22	47.04
50	37.09	33.01	48.28
60	35.19	39.25	51.47
70	33.88	30.04	49.26
80	25.06	33.77	54.89
90	30.07	31.99	50.03
Test of mean order flow ratio on Day 0 to the Comparison period			
	Pre-announcement period		Post-announcement period
T-test	3.064***		7.288***

5.4.5 Regression of Returns and Order Flow Ratios

I apply the regression method in order to address the order flow imbalance that may be evident in the relation between returns and loan announcement. For initial loan results in Panel A of Table 5.6, the closing price-based returns have a strong negative correlation with the order flow ratio. This is reflected with the coefficient is -0.057 with a t-statistics -4.69. As I have previously mentioned, the nearer this ratio is to 0, the more likely the closing transaction price is at the ask price. The negative coefficients between order flow ratio and stock returns indicate that the more likely the trades will be executed at the ask price, the larger return of stocks. For results which is based on the midpoint returns, the coefficient is -0.042 with a t-statistic equal to -2.14, which is slightly smaller than the closing-based return. It implies that when I purged the bid-ask bias by measuring the return by midpoint, the negative association between order flow and stock returns still exist. The results of subsequent loans are reported in Panel B, the estimated coefficients for the closing price returns is -0.044 for closing price returns and -0.037 for mid-point-based returns. For all other loans in Panel C, the coefficient between order flow and closing price return is -0.040 with t-statistic equal to -4.03, for mid-point-based return the coefficient is -0.023 with t-statistic equal to -5.27. My results related with the study of Lo and Coggins (2006), who discover that the size of returns increase as the magnitude of order imbalance increase.

Related with Chapter 3 and 4, for all of three kinds of loan announcements, the positive and significant coefficient on the loan announcement dummy variables indicates that the return has improved in the post-announcement periods, the dummy variable represents all the three loan announcement groups appears to have a positive relationship with both the closing price-based and mid-point-based return. It indicates that the loan announcement has a positive influence on the stock return, even after controlling for the effects of order flow. Moreover, the results show that the coefficients of the standard deviation which measures the volatility of midpoint return are smaller than the closing-price based return, for initial loan regression model, the sensitivity of average standard deviation of stocks to the returns decrease from -0.012 for closing price returns to -0.001 for mid-point returns. For subsequent loans, the coefficient is -0.020 for closing price return whereas -0.009 for midpoint price return. For all other loans, the results is -0.017 for closing price return and -0.012 for mid-point based return, the level of reduction is smaller than the initial loan and subsequent loans. These results confirming the results of Han and Lesmond (2011) and many other researchers, closing price-based return idiosyncratic volatility is usually larger than that of the quote midpoint-based return. My multivariate analysis re confirm a general tendency of order flow to the ask price after the loan announcement. The reduced sensitivity of coefficients of mid-point-based returns suggests that the noise-trading decrease after loan announcements still existed in the subsequent loan and all other loans announcements. In addition, the loan announcement also can directly influence the stock returns if the market interprets the loan announcement as a credible signal of the firms.

Table 5.6 Regression between transaction returns and firm variables by quote price effects

Table 5.6 reports the relationship between stock return and firm-level variables, for 96 zero-leverage firms in FTSE 350 index, over the period from 1 January 2000 to 31 December 2015. The results around the initial loan announcement are shown on Panel A, whereas for subsequent loans and all other loans are shown on Panel B and C respectively. The regression calculated as:

$R_i=\mu_0+\mu_1 Initial_i+\mu_2 O_i+\mu_3 Vol_i+\mu_4 Size_i+\mu_5 StdDev_i+\mu_6 Price_i+\mu_7 LA_i+\varepsilon_{i,t}$ $R_i'=\mu_0+\mu_1 Initial_i+\mu_2 O_i+\mu_3 Vol_i+\mu_4 Size_i+\mu_5 StdDev_i+\mu_6 Price_i+\mu_7 LA_i+\varepsilon_{i,t}$

$R_j=\mu_0+\mu_1 Sub_j+\mu_2 O_j+\mu_3 Vol_j+\mu_4 Size_j+\mu_5 StdDev_j+\mu_6 Price_j+\mu_7 LA_j+\varepsilon_{j,t}$ $R_j'=\mu_0+\mu_1 Sub_j+\mu_2 O_j+\mu_3 Vol_j+\mu_4 Size_j+\mu_5 StdDev_j+\mu_6 Price_j+\mu_7 LA_j+\varepsilon_{j,t}$

$R_h=\mu_0+\mu_1 All_h+\mu_2 O_h+\mu_3 Vol_h+\mu_4 Size_h+\mu_5 StdDev_h+\mu_6 Price_h+\mu_7 LA_h+\varepsilon_{h,t}$ $R_h'=\mu_0+\mu_1 All_h+\mu_2 O_h+\mu_3 Vol_h+\mu_4 Size_h+\mu_5 StdDev_h+\mu_6 Price_h+\mu_7 LA_h+\varepsilon_{h,t}$

The independent variables including *C* represents the constant. *Initial*, is the dummy variables equal to one if the trading occurs after the initial loan announcements otherwise equals to zero. *O* is the order flow ratio of zero-leverage firm. *Vol* is the natural logarithm of average daily volume of trading, *Size* is the natural logarithm of market capitalization of zero-leverage firms, *StdDev* is the natural logarithm of standard deviation of the stock prices as to capture the volatility in the true price. *Price* is the natural logarithm of daily average share price and *L/A* is the Loan amounts to total assets ratio. Two tailed tests of significance are reported as follows, ***less than 1%, **less than 5% and * less than 10%.

Panel A: Initial Loan

	Closing price return		Mid-point return	
	Coef.	T-stat	Coef.	T-stat
C	-3.066	-1.02	-2.533	-2.58**
Order Flow	-0.057	-4.69***	-0.042	-2.14*
Initial	0.023	2.05*	0.018	1.44*
Vol	0.004	3.18**	0.004	2.21**
Size	0.000	1.22	0.007	1.33
StdDev.	-0.012	-3.03**	-0.001	-1.99*
Price	0.035	2.37**	0.001	1.25
L/A	0.000	0.98	0.000	1.04

Panel B: Subsequent Loan

	Closing price return		Mid-point return	
	Coef.	T-stat	Coef.	T-stat
C	-1.384	-2.04*	-2.484	-1.96*
Order Flow	-0.044	-3.85***	-0.037	-4.07***
Sub	0.019	2.98**	0.013	3.00**
Vol	0.009	2.96**	0.004	2.88**
Size	0.000	1.08	0.001	0.94
StdDev.	-0.020	-3.64***	-0.009	2.01*
Price	0.028	2.95**	0.010	1.37
L/A	0.000	0.37	0.000	0.96

Panel C: All Loan

	Closing price return		Mid-point return	
	Coef.	T-stat	Coef.	T-stat
C	-0.975	-1.98*	-1.445	-2.45**
Order Flow	-0.040	-4.03***	-0.023	-5.27***
All	0.017	3.44***	0.016	3.98***
Vol	0.003	2.78**	0.010	2.34*
Size	0.000	0.96	0.000	0.74
StdDev.	-0.017	-4.83***	-0.012	-2.33*
Price	0.034	3.16**	0.017	3.60***
L/A	0.000	1.07	0.000	1.18

5.4.6 Bid-ask Bounce of Buy and Sell around the Loan Announcement of Zero-leverage Firms

Following Alzahrani et al. (2013), I compare the spreads between buyer-initialed orders and seller-initialed orders of zero-leverage firms in Table 5.7. Panel A represents the bid-ask bounce at 90 days before the initial loan announcement, on the loan announcement date and 90 days after the initial loan announcement. First, I observe that at the 90 days pre-initial loan announcement period, the quoted spreads of buy orders (2.080) is larger than sell orders (2.076), with a difference of 0.004. On the contrary, the average relative spread is slightly lower for purchases at 0.016 compared to 0.019 for sales, with a difference of 0.003. All differences are small but are statistically significant. For subsequent loans in Panel B, in 90 days before the subsequent loan announcement, the difference between buyer-initialed and seller-initialed orders' is 0.009 in quoted spread whereas for relative spread the difference is -0.010. Inconsistent with initial and subsequent loans, for all other loans, in 90 days pre-announcement period, the buyer-initialed orders' quoted spread is already smaller than the seller-initialed orders whereas for relative spread the buy orders are larger than sell orders' spread.

On the initial loan announcement day, the quoted spread of buy orders, is 1.902 whereas the sell orders are 1.983. The difference is 0.081 and is significantly different at the 1% level, which is much larger than the period before the announcement. It shows that the market liquidity reacts strongly when a bank sends a favorable signal through the announcement of the initial loan announcement. Turning to the relative spread, the difference between buy-orders and sell-orders is 0.005, and is statistically significant at the 10% level, which is larger than the difference in the pre-announcement period. The different significant level between absolute spread and relative spread can be explained as the absolute spread is more volatility than relative spread and more influence by the change of bid price or ask price. On the subsequent announcement day in Panel B, the average quoted spread is slightly higher for sells (1.813) as compared to 1.740 for purchases. The relative spread, shows that the spread is larger for sale trades than for buys as well, however, the difference is small. In panel C, on the all other loans announcement day, the average quoted spread for buy orders is 2.389 and sell orders is 2.433, the difference is as large as 0.044.

Finally, during the 90 days after the initial loan announcement, the quoted spread of buy order is 2.022 and 2.050 for sell orders, the difference is 0.028, which is significant at 10% level. For relative spread the difference is small, 0.019 and 0.025 respectively. And the results are same in the all kinds of loans. Overall, after the loan announcements, in my research, both quoted spread and relative spread of buy orders is smaller than sell orders. This asymmetry of buy and sell orders always exists in my sample regardless of the event announcements. The loan announcements can be regarded as favorable firm-specific news that attract more buyers from the market. The larger amount of buy orders causes the deviation, which is more pronounced on the announcement day. My empirical analysis provides strong statistical evidence that the bid-ask bounce is a viable explanation for the price impact asymmetry for buy and sell orders for zero leverage firms. Before the loan announcement of zero leverage firms, the spread of buy orders are higher than sell orders. This is due to the fact that buy orders are motivated by both information and liquidity factors. Market makers post a higher spread according to their requirements based on both private information and liquidity. During the announcement period, the favorable firm-level news attracts more buy orders leading to the liquidity increasing, reflected by decreasing bid-ask spreads. These effects are permanent because the increasing liquidity is present in the long-term.

Table 5.7 Bid-ask Bounce of Buy and Sell around the initial loan announcement of zero-leverage firms

Table 5.5 reports the bid-ask bounce effect around the loan announcement period of 96 zero-leverage firm in FTSE350 index, which trading around the loan announcement day for the period January 1, 2000 to December 31, 2015. The results around the initial loan announcement are shown on Panel A, whereas for subsequent loan and all other loans are shown on Panel B and C respectively. Quoted spread is defined as the ask price minus the bid price, and the average relative spread defined as the ask price minus the bid price, divided by the average of the bid and ask prices. Standard errors are reported in parentheses, * significance at the 10% level. ** significance at the 5% level. *** significant at the 1% level.

Panel A: Initial Loans		
	Quoted Spread	Relative Spread
90 days before announcement day		
Buy	2.080	0.016
Sell	2.076	0.019
Asymmetry	0.004	-0.003
T-statistic	23.88**	-7.69**
The announcement day		
Buy	1.902	0.012
Sell	1.983	0.017
Asymmetry	-0.081	-0.005
T-statistic	-44.30***	-25.67**
90 days after announcement day		
Buy	2.022	0.019
Sell	2.050	0.025
Asymmetry	-0.028	-0.006
T-statistic	-19.35**	-11.44**
Panel B: Subsequent Loans		
	Quoted Spread	Relative Spread
90 days before announcement day		
Buy	2.145	0.024
Sell	2.136	0.034
Asymmetry	-0.009	-0.010
T-statistic	-17.99***	-11.83**
The announcement day		
Buy	1.740	0.017
Sell	1.813	0.018
Asymmetry	-0.073	-0.001
T-statistic	-22.83**	-15.48**
90 days after announcement day		
Buy	1.945	0.019
Sell	1.956	0.016
Asymmetry	-0.011	0.003
T-statistic	-9.38**	8.35**
Panel C: All Loans		
	Quoted Spread	Relative Spread
90 days before announcement day		
Buy	2.978	0.047
Sell	2.985	0.039
Asymmetry	-0.007	0.008
T-statistic	-9.34***	14.58***
The announcement day		
Buy	2.389	0.029
Sell	2.433	0.038
Asymmetry	-0.044	-0.003
T-statistic	-17.86***	-14.52***
90 days after announcement day		
Buy	2.350	0.041
Sell	2.358	0.030
Asymmetry	-0.008	0.011
T-statistic	-6.44***	5.28**

5.5 Summary

In this chapter I demonstrates that there is a clear tendency that trades are executed at the ask price during the initial, subsequent and all other loan announcement periods. I discover that price continuations following buys and reversals succeeding sales around the loan announcement period. I also observe that purchases have a greater impact on permanent price changes, supporting the information hypothesis. Once price effects are estimated using quote returns to eliminate the bid-ask bias, the asymmetry in buyer-and seller-initiated trades is dramatically reduced. Order flow disruption causes a bias in the calculation of returns around the company event announcement, and the imbalance does not subside during the short term in the post-announcement period. Furthermore, the order flow ratio is negatively related to the stock return. As the order flow ratio goes towards zero, this is related with more buy orders, causing the stock return to increase. In order to measure the bid-ask bounce error caused by stock trading, I compare the quoted and relative spreads of buy and sell orders around the loan announcement period. The results indicate that price increases and spread decreases are associated with the buy pressure. This is because the announcement of the loan is regarded as favorable firm-level news. The stock market liquidity reacts strongly when a bank reports favorable news via the announcement of a loan agreement. I conclude that the order flow imbalance can explain part of the bid-ask spread bias and asymmetry, in the trading direction of zero-leverage firms when they are issued a loan from a bank.

Chapter Six

Conclusion

In my research, I examine my opinion in one of the central issues in corporate finance, the impact of financial leverage on a firm's financial performance. Since Modigliani and Miller (1958) prove the irrelevance of financial leverage in perfect capital markets, numerous theoretical and empirical papers have addressed the firm's capital choice in imperfect capital markets. In the presence of market frictions, one of the main theories of capital structure: The Trade-off theory and the Pecking order theory. Frank and Goyal (2003) and Fama and French (2002) argue that firms with more asymmetric information should follow the pecking order more diligently, since it is believes that costs of asymmetric information drive firms' financing choices. Based on this, Strebulaev and Yang (2013) indicate that low-leverage firms follow a pecking order style financial policy, but some research reveal that the zero-leverage puzzle is incompatible with any these two standard capital structure theories. Recent studies explicitly analyze zero-leverage firms primality from two aspects, the motivation of keep debt free and the characteristics of zero-leverage firm. For example, Devos et al. (2012), Dang (2012), Byoun and Xu (2013) and Strebulaev and Yang (2013), report that zero-leverage firms tend to be smaller, accumulate higher cash reserves, and exhibit higher market-to-book ratios as well as higher payout ratios. Another strand of the literature document that financial flexibility, credit constraints and managerial entrenchment as the potential explanations for zero-leverage.

However, it is difficult to make a comprehensive understanding of zero-leverage firms with just motivation and firm level variables. In my research, I relate the zero-leverage puzzle to the bank loan announcement. I analyze the debt-free phenomenon from the financial performance of sample firms when they been issued the initial, subsequent and all other loans, by examining the stock market reactions and liquidity effects following the loan announcement of zero-leverage firms. Bank lending can provide unique monitoring services, as the provider of private informative signals. A bank loan announcement can make investors assess the value and the credit quality of the borrower in a more comprehensive manner. Thus, an announcement of a bank loan causes a positive reaction in the market value of the firm, and the positive announcement effects are stronger when a bank announces an initial loan.

Using a sample of 96 initial loan ,71 subsequent loan and 198 all other loan announcements from zero-leverage firms listed on the FTSE 350 index over the time period of 2000-2015, I find evidence of a significant and permanent stock price increase as a result of the initial debt announcement, as well as the subsequent loan, all other loans announcement. The announcement of an initial bank loan causes a positive reaction in the stock price of borrowing firms, which is consistent with the financial intermediation hypothesis. Bank relations allow zero-leverage firms to build-up reputation to encounter credit constraints and that financial intermediaries play a unique role in monitoring and signal effects to the market. More specially, I find even though initial loan, subsequent loan and all other bank loans all lead to a positive market reaction, the initial loans are associated with a most significant positive return in the long run. I also examine that during the 181 days around the announcement date, bid-ask spreads are significant decreasing for initial loan, subsequent loan and all other loan announcement, and the announcement of the news results in a sustained increase in trading volume and liquidity. Consistent with the information liquidity hypothesis, a permanent increase in trading volume will relate with a decrease in the bid-ask spread. The improvement in liquidity continues to persist once I control for stock price and trading volume effects in both the short-and long-run. My results are robust across five alternative measures of liquidity. Moreover, the gains obtained by zero-leverage firms from the initial loan are more pronounced than any other loans. Related with results in the abnormal return and trading volume in my thesis, the post-announcement behavior of the bid-ask spreads and share prices are consistent with Amihud and Mendelson (1986,1989), who predict that a decrease in the bid-ask spread will lead to a reduction in the investor's required return and a consequent increase in share price.

When I decompose the bid-ask spread into its three components, I find that information asymmetry is driving the enhancement in liquidity rather than changes in order processing. This is a very powerful result which remains intact regardless of whether I use the Huang and Stoll or MRR models of spread decomposition, for PIN model, the result is not as significant as the other two models. Using Huang and Stoll two- and three-way spread decomposition, I discover that both the adverse selection and inventory holding are decreasing after the initial and subsequent loan announcement. The decline in spreads are attributed to changes in both the adverse selection and inventory costs. The regression results between spread components and firm characteristics show that the initial loan announcement has more influence on small trades rather than medium and large transactions. For subsequent loans and all other loans there are no significant differences between different trade size groups. There is no statistical relationship between the loan announcement and order processing costs. The reduction of bid-ask spreads after the initial loan announcements are mainly due to the decrease of adverse selection and inventory costs.

Subsequently, based on a large sample of around 28 million share purchases and 26 million sell orders during my sample period, my research continues to examine the price impact and the bid-ask bounce of zero-leverage firm around the bank loan announcement period. There is a clear tendency that the trades are executed at the ask price during the initial loan, subsequent and all other announcement period of zero-leverage firms. I discover price continuations following buys and reversals succeeding sales around the loans announcement periods. I also observe that purchases have a greater impact on permanent price changes, supporting the information hypothesis. Order flow disruption causes a bias in the calculation of return around the company event announcement. Once price effects are estimated using quote returns to eliminate the bid-ask bias, the asymmetry in buyer-and seller-initiated trades is dramatically reduced. The effects are more pronounced around the initial loan announcement, shows that the market liquidity reacts strongly when a bank sends a favorable signal through the announcement of an initial loan. The announcement of bank loans is regarded as favorable firm-level news, buying pressure effects on the stock performance during the period, the prices increase and spreads decrease. The order flow imbalance does not subside during the short term in the post-initial loan announcement, but it is eliminated during the subsequent and all loan's long-term period. These phenomena are significant regardless of the times of the loans.

I believe that my findings can be attributed to the information cost/liquidity hypothesis, because investors demand a lower premium for trading stocks with more available information. My results have significant impact for policy makers and governments, this is because bank monitoring improves the measurement of information asymmetry through a richer information environment, greater monitoring and more corporate disclosure. The announcement effect impact on the initial loan are significant different from any other bank loans. It indicates that the unique role of bank system and the significant effect of the levering up of debt free firms. Avenues of further research along the lines of how the impact of the news affects market value of the companies would be of great interesting from both a finance and accounting perspective. My results suggest that the order flow imbalance and bid-ask bounce can explain part of bid-ask spread bias and asymmetry in the trading direction of zero-leverage firms when they encounter debt for the first and second time.

My results show that the information affect diminishes as the company exhibits subsequent loans. This suggests that as we include more information the market reacts in a diminishing way. I believe that a theoretical model which incorporates diminishing returns as information environment increases would make a significant contribution to the finance literature.

Moreover, there is still some questions in the previous studies which cannot be solved by my research. In my research, I am only looking at a single market----the U.K. Stock Exchange. I would like to extend my research to other developed markets. Different countries and banking environments may influence the market response to bank loan announcements. For example, previous studies have shown that in the U.S. stock market, the loan announcement is more responsive to the market compared to the U.K. market. Furthermore, different levels of economic growth cause the different adverse selection costs which are captured by information asymmetry. In an economic slowdown country, firms are more likely to choose a conservative debt policy because the value of collateral, against which they borrow would decline. In an uncertain macro economy, bank loan announcements are expected to convey more information than in normal times. In the future, I would like to continue my research to compare the difference announcement effect of zero-leverage firms for various nations under different banking systems.

Appendix: an example of loan announcement

Smiths News signs £135m refi

UK newspaper and magazine wholesaler Smiths News signed on August 27 a new £135m loan with a syndicate of five banks.

03 Sep 2010

HSBC, National Australia Bank and Royal Bank of Scotland are bookrunners. Banco Santander and Barclays Capital are mandated lead arrangers. Some of these banks were new lenders to the UK company.

The loan matures at the end of November 2014, with £10m due over the last three years and the balance repayable at maturity.

The loan refinances an £85m five year facility, £5m of which was due this June with the remainder set to mature in June 2011. Costs net of fees on the new facility will increase from around 340bp in the current financial year to around 480bp in the first full year of the new loan.

Smiths News was formed in 2006 following the demerger of WHSmith. The company announced a pre-tax profit of £15.3m for the first half of the financial year. It had net debt of £57.3m, up £7.8m in the six months since August 2009, including bank facilities of £110m.

At the end of February, £53.8m of these facilities had been drawn down.

03 Sep 2010

More like this

Smiths News signs £135m refi — 02 Sep 2010

Sainsbury's refinances revolver in brighter times — 09 Nov 2017

Glencore to refinance $15.3bn loan package — 31 Mar 2015

Imperial Tobacco launches in final issuance spurt of 2010 — 19 Nov 2010

UK's BBA Aviation plans to land refi early — 06 Mar 2018

Something lighter

The Pained Trader: scenes of the week — 14 Feb 2019

The Pained Trader: supermouse — 07 Feb 2019

The Pained Trader: rough seas — 31 Jan 2019

Resources: Global Capital https://www.globalcapital.com/article/k4tm1n8nr9bd/smiths-news-signs-135m-refi

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