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Initial Bank Loans, Zero-Leverage Firms and Stock Market Liquidity:

New Empirical Evidence from the UK

Abstract

We examine stock market reactions and liquidity effects following the first 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, we find evidence of a significant and permanent stock price increase as a result of the initial debt announcement. The loan announcement results in a sustained increase in trading volume and liquidity. This improvement continues to persist once we control for stock price and trading volume effects in both the short and long run. Furthermore, we examine the spread decomposition around the same period, and discover the adverse selection of the bid-ask spread is significantly related to the initial bank loan announcement. Our results can be attributed to the information cost/liquidity hypothesis, suggesting that investors demand a lower premium for trading stocks with more available information.

Keywords: Zero-leverage, initial bank loans, liquidity, bid-ask spreads, information asymmetry, price impact.

1. Introduction

One of the most puzzling issues in financial management research is that some firms adopt a zero-leverage capital structure policy. This is when a company does not possess any short or long-term debt. The reason that zero-leverage is surprising is that companies should use debt financing when they build up their capital structure (Modigliani & Miller, 1958).

However, a zero-leverage capital structure policy is becoming increasingly popular over time. Strebulaev and Yang (2013) finds for United States (US) companies on average, 10.2% of firms do not have any debts in a period from 1962 to 2009. Dang (2013) discovers more than 12.18% of public, nonfinancial United Kingdom (UK) companies operate a zero-leverage policy between 1980 and 2007. Devos, Dhillon, Jagannathan and Krishnamurthy (2012) establishes three main motivations for firms to remain debt free, namely, the need for financial flexibility (Graham & Harvey, 2001), managerial entrenchment (Jensen & Mecking, 1976), and credit constraints (Diamonds, 1991). The Financial flexibility hypothesis suggests firms remain zero-leverage to avoid financial distress when they suffer negative exogenous shocks. The managerial entrenchment hypothesis states that the management of the firm chooses to remain debt free in order to reduce financial risks, protect their personal capital and/or increase their control among the board. On the other hand, the supporters of credit hypothesis believe that firms do not remain unlevered by choice, credit constraints are the main reason as they do not have access to public markets, which limits their ability to borrow.

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 stock market liquidity (bid-ask spreads) and information asymmetry.

Our research contributes to the previous literature in the following ways: First, prior studies make the unrealistic assumption that changes in total bid-ask spreads are directly associated with movements in information asymmetry. 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, Nijman and Roell, 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 & Stoll, 1997). The asymmetric cost 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 & Milgrom, 1985). We are the only study to date to empirically examine the relationship between initial loan announcements and information asymmetry of firms. We accomplish this by decomposing the asymmetric cost component from the total bid-ask spread.

Second, we are the only study to inspect the impact of initial loan announcements on liquidity in both the short and long run. This is achieved by analysing a 90 day event window and also by capturing liquidity affects through price impacts rather than just via bid-ask spreads. Price impact ratios established by Amihud (2002) and Florackis, Gregoriou and Kostakis (2011) encapsulate the long term financial stability of a company as permanent changes in prices reflect alterations in the information environment of a firm.

Third, previous empirical evidence is undertaken only on a single industry. According to Strebulaev and Yang (2013), the zero-leverage phenomenon has no relationship with any particular industry, implying that we should look at a variety of industries in order to obtain robust results. We provide a complete analysis that is representative of the entire UK stock market, by focusing on the FTSE 350 index listed on the London Stock Exchange. The FTSE 350 index 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. The FTSE 350 is a good proxy of the UK stock market as it contributes to around 89% of the entire trading volume on the London Stock Exchange.

The remainder of the paper is organized in the following way. In the next section we provide a review of the previous literature. Section 3 discusses the data resources and methodology used. Section 4 reports the empirical analysis of the stock market reaction of bank loan announcements of zero-leverage firm. Our summary and conclusion are presented in section 5.

2. Literature review

Previous studies have primarily focused on establishing the economic rationale behind the zero-leverage phenomenon. Devos, Dhillon, Jagannathan and Krishnamurthy (2012) find that the zero-leverage firms are usually small, private, and young, thus the reason to keep debt-free is credit constrained. More recent work by Strebulaev and Yang (2013) show that some zero-leverage firms are more profitable, pay substantially higher dividends, have higher market-to-book ratios and cash balances. In contrast to earlier studies, they find that zero-debt firms are neither younger nor smaller than their leveraged proxy firms. Under the trade-off theory of capital structure, when zero-debt firms discover the net benefit of debt is positive, they will move towards their preferred capital structure by levering up. Strebulaev and Yang 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% in tax shields when they lever up.

Diamond (1991) finds that zero-leverage firms have the opportunity to increase their leverage but are still choosing to keep debt free. He believes it is due to financial constraints because firms may not be able to find debt sources. Thus, firms that have low or zero-leverage are more likely to borrow from financial intermediaries like banks, since they are more informationally opaque. Very little public information is available about such firms, and given their small size, the relative cost of collecting information can be quite high (Faulkender & Petersen, 2006). Hadlock and James (2002) indicate that zero-leverage firms derive greater benefits from the screening and monitoring entailed in bank lending relations, because they suffer more from adverse selection and information asymmetry problem than the levered firms. When firms are well monitored and have established reputations, banks have less comparative advantage in the external financing process and there are no loan announcement effects. On the other hand, for firms which are younger, less reputable with scarce public information, the market reaction of initial loan announcements is significantly positive (Aintablian & Roberts, 2000).

Diamond (1991) indicates that bank lending activities certify firm quality and signal credit worthiness to outside investors. Bank relations allow firms to borrow and repay from bank until they establish a good credit history to counter adverse selection and moral hazard problems intrinsic to the external financing process. Datta, Iskandar-Datta and Patel (1999) believes that the initial bank loan means the borrower starts to be monitored by financial intermediates and the bank debt significantly reduces the monitoring cost.

3. Data and Methodology

3.1 Data

We collect data from all the FTSE 350 firms actively traded from the start of January 2000 to the end of December 2015[1]. The FTSE 350 consists of the 350 largest firms listed on the London

[1]Our sample excludes financial, utility companies and closed-end funds.

Stock Exchange with respect to market capitalization[2].

We 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). We also collect information concerning the initial loan undertaken by the firm including the issue date, loan amount, and loan maturity.[3] We also 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 our study.

3.2 Methodology

3.2.1 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 & Milgrom, 1985) predict that a reduction in information asymmetry will motivate the market maker to decrease the bid-ask spread. The simplest way to measure the spread is the absolute bid-ask spread (*AS*), which is defined in equation (1).

$$AS_{i,t}=A_{i,t}-B_{i,t} \quad (1)$$

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

[2] For more information on the FTSE 350 please see londonstockexchange.com. Also the FTSE 350 factsheet is available from http://www.ftse.com/Analytics/Factsheets/temp/1550722b-648a-4ee7-82d6-bed50f09bb55.pdf.
[3] In our dataset the announcement and the issue date of the loan are identical.

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.

$$\mathrm{RS}_{i,t} = \frac{\mathrm{A}_{i,t} - \mathrm{B}_{i,t}}{(\mathrm{A}_{i,t} + \mathrm{B}_{i,t})/2} \qquad (2)$$

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 (1). The relative bid-ask spread also has a problem, which is that any changes in the midpoint (*Mid*, defined as ask price minus bid price then divided by 2) of the stock price will automatically impact on the bid-ask spread (see among others, Florackis, Gregoriou and Kostakis (2011) for more information). In addition, the relative bid-ask spread fails to account for the tendency of stock prices to increase following a buy and decrease following a sale, and overestimates the liquidity cost of a stock[4]. 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.

$$\mathrm{ES}_{i,t} = 2\left|\mathrm{P}_{i,t} - \mathrm{Mid}_{i,t}\right| \qquad (3)$$

[4]For more information on the bid-ask bounce see Roll (1984).

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. 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 we estimate all three bid-ask spread measures in our study.

3.2.2 Price Impact 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, Gregoriou & Kostakis,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.

$$\text{RtoV}_i = \frac{1}{D_i}\sum_{d=1}^{D_i} \frac{|R_{i,d}|}{V_{i,d}} \quad (4)$$

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 computes 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, Gregoriou and Kostakis (2011) and many other researches, *RtoV* ratios carry a significant size bias, since trading volume variables in monetary terms is positively correlated with market capitalization. Given these shortcomings, Florackis, Gregoriou and

Kostakis (2011) construct a new price impact ratio, defined as the average ratio of daily absolute stock return to its turnover ratio (*RtoTR* ratio):

$$RtoTR_i = \frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{i,d}|}{TR_{i,d}} \quad (5)$$

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 (4). The *RtoTR* ratio is free of any size bias (Floracks, Gregoriou & Kostakis, 2011). Therefore, it can be compared across the firms with different market capitalizations. Given these analysis, in our study we compute both the *RtoV* ratio and *RtoTR* ratios for completeness.

3.2.3 Multivariate Analysis

Following Hedge and McDermott (2003) and other previous studies, we test the relation between liquidity changes and other determinants by a pooled time series cross-sectional multivariate analysis:

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

for i=1,2…..96 and t=1,2 (6)

Where $t=1$ corresponds to the pre-announcement period and $t=2$ corresponds to the post-announcement period. The subscript i denotes the 96 zero-leverage firms' stock in our 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. We are primarily interested in the significant and the magnificent of the dummy variable *Initial*, β_1.

3.2.4 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, Liefer, O'Hara and Papeman (1996). Numerous studies (see among others, Glosten & Milgrom, 1985) have found evidence of adverse selection costs due to 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 □, informed traders buy. Bad news occur take place with a probability (1-δ), 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, Kiefer, O'Hara and Papeman (1996), We 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:

$$L[M|\theta]=\sum_{t=1}^{T}[-2\square+M_t Ln\chi+(Buy_t+Sell_t)\ln(u+\omega)]+\sum_{T=1}^{T} ln[a(1-a)e^{-mu}\chi Sell_t\text{-}M_t \quad +a\delta e^{-u}\chi\; Buy_t\text{-}M_t+(1-a)\chi Buy_t+Sell_t\text{-}M_t]. \qquad (7a)$$

With M_t equals to min (Buy_t, $Sell_t$) +max (Buy_t,$Sell_t$)/2, and $\chi_t =\varpi/(u+\varpi)$. Where we define the Buy and Sell are the number of buy orders and sell orders for a given data and parameter space θ= a,δ, ϖ, u. Buy arrival rate as ϖ_b, sell arrival rate as ϖ_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:

$$PIN = \frac{au}{a + 2\square} \tag{7b}$$

Boehmer, Gramming and Theissen (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, 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. the Nasdaq), this information is not publicly available.

The second model we 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, equalling 1 if the trade is buy-oriented, and -1 if it is sell-oriented. The MRR model can be computed as:

$$P_t - P_{t-1} = \alpha(Q_t - \rho Q_{t-1}) + \varphi(Q_t - Q_{t-1}) + \varepsilon_t \tag{8}$$

Where □ 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, $\square(Q_t - Q_{t-1})$ captures the effect of the bid-ask bounce, where $\square \geq 0$ denotes the liquidity suppliers' cost per share for supplying liquidity. And $\square_t$ is a random error term. Following the MRR model, the parameter vector, □, □ and □ 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:

$$E(Q_{t-1}|Q_{t-2})=(1-2\pi)Q_{t-2} \tag{9}$$

$$\Delta Mid_t=(\alpha+\beta)\frac{S_{t-1}}{2}Q_{t-1}-\alpha\frac{S_{t-2}}{2}Q_{t-2}(1-2\pi)+\varepsilon_t \tag{10}$$

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 we consider that the inventory holding costs β is equal to 0, we can rewrite equation (10) as follows:

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

The order processing costs is then equal to 1-α. We use the Huang and Stoll (1997) model for reporting our 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 our spread decomposition estimations.

3.3 Event Study

The announcement date (day *0*) is the day of the first bank loan announcement where the zero-leverage firm start to lever up. In terms of the short-term event period, we 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 we calculate the event periods as long as 180 days [-90, +90] around the announcement dates. More specifically, we estimate the abnormal returns by using an economically market-adjusted model:

$$AR_{i,t}=R_{i,t}-R_{m,t} \tag{12}$$

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, we 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:

$$CAR_{i,t(-q,+q)}=\sum_{t=q}^{S} AR_{i,t} \tag{13}$$

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.

4. Empirical Results

4.1 Descriptive statistics

The descriptive statistics are presented in Table 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. We 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.

Furthermore, zero-leverage firms are less liquid then all FTSE 350 firms regardless of the measure of liquidity. This is because zero-leverage firms have less information available due to their lower market capitalization and their 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.

[INSERT TABLE 1 HERE]

4.2 Univariate changes in share price

Table 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 the announcement of initial loan announcements of zero-leverage firms. Our analysis is based on an event window starting 90 days before the effective day and ending 90 days after the effective day. A long prior announcement window is used to examine if there is any information leakage before the news. 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 second loan, third loan and any subsequent loans after that) during our 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.

Our 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 12.2), 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 6.4 and 4.56 percent respectively which are highly significant. In terms of all loans, on the announcement day the abnormal return is 2.125% with a t-statistics 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.

Our results are strongly consistent with the information hypothesis. The positive information (e.g. issuing of a loan by a reputable bank to invest in possible positive net present value projects) causes increases in stock prices immediately and the effects could be permanent (Denis & Mihov, 2003). This is because bank lending decisions provide positive signals to equity market participants. Moreover, the gains obtained by zero-leverage firms from the initial loan are more pronounced than any other subsequent loans.

[INSERT TABLE 2 HERE]

4.3 Trading volume effects of zero-leverage firms' initial bank loan

In this section we 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, we employ the following dummy variable panel fixed effects regression model.

$$Vol_{j,t} = \eta_{j,t} + \gamma_{j,t} + \sum_{-5}^{5} D_{j,t} \; AVol_{j,t} + \square_{j,t} \qquad (14)$$

Where $Vol_{j,t}$ refers to the logarithm of trading volume for stock *j* at time *t*, *j is a 96*96* identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. $\square_{j,t}$ captures the variation in trading volume across all the companies in our sample. $\square_{j,t}$ captures the change in trading volume per day that is common across all the companies in our sample. $D_{j,t}$ is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_{j,t}$ captures the abnormal trading volume during the event interval [-5, +5], $\square_{j,t}$ is a random disturbance term with a mean of zero and a variance of σ^2, $\square$, γ, and *AVol* are the parameters to be estimated. Equation (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. 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 our short-run event period, all coefficients are positive and statistically significant.

In order to analyse the trading volume changes in the long-run, we 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 for the same day. The results of the long-term changes in trading volume are reported in Panel B of Table 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 state that based on the liquidity-motivated hypothesis, trading volume is negative 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 we will analyse the impact of initial loan announcements on the bid-ask spread.

[INSERT TABLE 3 HERE]

4.4 Univariate Changes in overall bid-ask spreads

We 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 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 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 centred 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.

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 (0.925 and 0.954 for relative and effective spreads respectively) although not at a statistically significant level (t-statistics=-0.98). However, there is a significant increase in liquidity when we use the relative and effective measures of the bid-ask spread (-2.26 and -2.44 respectively). Given the advantages of the effective over the absolute bid-ask spread discussed earlier in the paper, we can say with some confidence that loan announcements enhance liquidity in the long run.

[INSERT TABLE 4 HERE]

4.5 Robustness Test

We 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 5, we 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, although the *RtoTR* ratio is statistic insignificant. 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.

[INSERT TABLE 5 HERE]

4.6 Multivariate analysis of market liquidity changes

Table 6 provides our results for the log-linear pooled cross-sectional multivariate regression analysis for initial bank loan announcements. We estimate a model for each of the five liquidity measures: absolute spreads, relative spreads, effective spreads, and the two price impact ratios, *RtoV* and *RtoTR*. Under the log-linear specification of equation (6), we are mainly concern with the coefficient in the dummy variable, β_1. The coefficient of the initial loan appears negative and highly significant in the event period. The 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, after controlling for the impact of trading volume, firm size, volatility and share price. In table 6 most of the control variables are consistent with findings documented in prior research, trading volume is negative whereas volatility is positive related with liquidity. Interestingly however, the coefficient estimate for the firm size is negative but statistical insignificant, suggesting that there is no statistical relationship between firm size and liquidity.

[INSERT TABLE 6 HERE]

4.7 Spread Components of zero-leverage firms around the announcement days

Table 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) and order processing cost (1-λ). We estimate the data 90 trading days before the initial loan announcements and 90 trading days after the announcement day. We present the results of all sample in Panel A, then divide our 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 we look across the percentage of adverse selection + inventory holding costs (λ) in Panel A, the estimates of λ in the post-announcement period are significantly smaller than the pre- announcement period for zero-leverage firms. For example, λ 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 increase with the trade size (0.589, 0.590 and 0.663 for small, median and large trades respectively). It is consistent with Lin, Sanger and Booth (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. The results in Table 7 support our hypothesis that the initial loan announcement leads to increasing liquidity, since the order processing costs is a fixed cost, we can conclude the adverse selection and 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, we continue our study by applying Huang and Stoll (1997) three-way spread decomposition model.

[INSERT TABLE 7 HERE]

Table 8 reveals the spread components for both zero-leverage firms and all firms using the three-way Huang and Stoll (1997) model. 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.

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 and β decrease for all three groups. Since we have concluded that the initial 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. Looking into the trade size and the changes of every component, for small trades, adverse selection costs drop from 0.293 to 0.275, for medium and large trades are 0.311 to 0.298, and 0.315 to 0.301 respectively, with the corresponding change levels of 1.8%, 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%, 1.6% 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. The findings in table 7 and 8 document that adverse selection components are decreasing with the announcements of the initial loan.

[INSERT TABLE 8 HERE]

4.8 Regression Results between Spread Components and Firm Characteristics

In this section, we 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 9 (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 ($1-\lambda$). Like the previous section, the regressions are run for small, medium and large trades separately. Specifically, the regression takes the following forms:

$$Ln\lambda=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \quad (15)$$

$$Ln(1-\lambda)=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t \quad (16)$$

Where λ and 1-λ is the adverse selection plus inventory holding costs and order processing costs respectively. Independent variables are same as we have defined before.

Table 9 shows that for all of λ there is a strong negative correlation with the *Initial* 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, where the estimated significant coefficient for λ is -0.097, 0.019 and -0.004 for small, medium and large trades respectively. These results indicate that the initial loan announcements appears to have an overwhelming negative effect on λ. Furthermore, the correlation between λ and the initial dummy are fairly large in the small trades, and the correlation is 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 our second model where order processing costs (1-λ) act as a dependent variable, all coefficients of the initial variable are not significant. This is consistent with the results which we 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. The results also show that 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, Sanger and Booth (1995), which state that higher trading volume is not connected with changes in order processing costs. Standard deviation of stock prices, which proxy volatility are positively related with λ 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. For share price, the estimates are highly significant and confirm an inverse relation between λ 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.

[INSERT TABLE 9 HERE]

Table 10 summarizes the results of the firm determinants and the three spread components, adverse selection (α), inventory holding costs (β) and order processing costs (1-α-β). The spread components are computed by using the three ways 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 an initial loan announcement. 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 and α 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, Van Ness and Warr (2001) finds that the adverse selection and stock return volatility are positively and significantly related. Our results reaffirm their findings. For all samples, the correlation 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 of stock return and inventory holding components indicates that the more volatile the stock, the greater the inventory holding problem faced by the market maker.

In our zero-leverage samples, the coefficient between market capitalization and α is -0.003,-0.000 and -0.001 with the t statistics of -2.77, -1.06 and 1.65 respectively. In our sample, 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 our result in section 4.3 and many other previous research, that more highly traded stocks have fewer information problems. 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.

[INSERT TABLE 10 HERE]

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

In this section we replicate the single equation in section 4.8 using two alternative proxies, the MRR model (1997) and PIN, to test whether our findings are driven by methodological differences. Given that both the MRR and PIN models are two-way spread decomposition models, we compare the results with the two-way Huang and Stoll model. The results are displayed on Tables 11 (MRR model) and 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 our estimate from the Huang and Stoll model, whereas the estimation from the PIN model is lower. The first column in Table 11 presents the relationship between adverse selection estimated by the MRR model and firm determinants. Again, for Panel A with small trade sizes, the estimated coefficients of the adverse selection component is -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.

For the PIN model, 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 we 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. We think it is due to the misclassification between the buyer and seller-initiated trades.

[INSERT TABLE 11 HERE]

5. Conclusion

We 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, we 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.

We 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. Our results are robust across five alternative measures of liquidity. When we decompose the bid-ask spread into its three components we find that information asymmetry is driving the enhancement in liquidity rather than changes in order processing and inventory holding costs.

We believe that our findings can be attributed to the information cost/liquidity hypothesis. For policy makers and governments, bank monitoring improves the measurement of information asymmetry through a richer information environment, greater monitoring and more corporate disclosure. Avenues of further research along the lines of how the impact of the news affects market value of the companies would be very interesting from both a finance and accounting perspective.

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Table 1. Descriptive Statistics.

Table 1 provides the descriptive statistics for our 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 natural logarithm of the firm's market capitalization measured by pounds (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	**All firm**
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: LOANS 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

Table 2. Price effects associated with initial bank loans of zero-leverage firms.

Table 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 returns (AAR) surrounding the initial bank loan announcements. 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**

Table 3. Short and long-run trading volume affects around the initial loan announcement

Panel A: Short-run trading volume.

Panel A of table 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 of2000-2015. 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:

$$Vol_{j,t} = □_{j,t} + □_{j,t} + \sum_{-5}^{+5} D_{j,t} AVol_{j,t} + □_{j,t}$$

Where $Vol_{j,t}$ refers to the logarithm of trading volume for stock j at time t, j *is a 96*96* identity matrix for captures the variation in trading volume across all zero-leverage companies in the sample. $□_{j,t}$ captures the variation in trading volume across all the companies in our sample. $□_{j,t}$ captures the change in trading volume per day that is common across all the companies in our sample. $D_{j,t}$ is dummy variables for each trading day *(t)* in the event window [-5, +5]. The coefficients of the 11 dummy variables, $AVol_{j,t}$ 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, □, γ, and $AVol$ 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
η	0.014	16.57**
γ	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**
$AVOL_{0}$	1.970	11.48***
$AVOL_{1}$	1.152	6.34**
$AVOL_{2}$	0.272	2.98**
$AVOL_{3}$	0.361	2.71**
$AVOL_{4}$	0.198	1.98*
$AVOL_{5}$	0.204	1.87*
ADJUST R^2=26.1%		

Panel B: Long-run trading volume.

Panel B of table 4 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**

Table 4. Bid-Ask spread ratios.

Table 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**

Table 5 Price impact ratios.

Table 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.Liquidity is measured by the *RtoV* (Amihud, 2002) and the *RtoTR* ratio (Florackis et al., 2011). The *RtoV* ratio is defined as the average daily absolute stock return to its trading volume. The *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%.

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

$$RtoTR_i = \frac{1}{D_i}\sum_{d=1}^{D_i}\frac{|R_{i,d}|}{TR_{i,d}}$$

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

Table 6. Multivariate analysis of changes in stock liquidity.

Table 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 :

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

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* in time period *t*. independent variables include the dummy variables *Initial*, which equals 1 in the post-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 zero-leverage firms. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.
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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***
Volume	-0.028	-5.83***	-0.041	-3.17***	-0.011	-1.99*	0.669	8.28***	-0.0005	-0.75
Firm 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

Table 7 Spread components for zero-leverage and all FTSE 350 firms using the Huang and Stoll two-way model.

Table 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 (α) plus inventory costs components (β) is estimated by the Huang and Stoll (1997) model. They also estimate the order processing costs by computing 1-($\boldsymbol{\alpha+\beta}$). We estimate the data 90 trading days before the initial loan announcement day and 90 trading days after the announcement day. For all firms, we 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 Ways

Zero-leverage Firms

Initial loans	Before	T-stat	After	T-stat
α+β (%)	0.632	18.67***	0.547	19.67***

All FTSE 350 Firms

Initial Loans	Before	T-stat	After	T-stat
α+β(%)	0.448	5.44***	0.452	6.73***

Panel B: Spread Components by Trade Size Two Ways

Small Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α+β(%)	0.589	21.11***	0.500	19.96***

Median Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α+β(%)	0.590	18.39***	0.527	15.36***

Large Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α+β(%)	0.663	10.42***	0.617	6.40***

Table 8 Spread components by trade size for zero-leverage firms and all FTSE 350 firms using the Huang and Stoll three-way model.

Table 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), inventory costs components (β) and order processing costs (1-α-β) are estimated by the Huang and Stoll (1997) model. We compute the data 90 trading days before the initial loan announcement day and 90 trading days after announcement days. For all firms, we calculate the average bid-ask spread components on the same days corresponds to the zero-leverage firms. We 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 Ways Method

Zero-leverage Firms

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α(%)	0.326	23.13***	0.299	21.26***
β(%)	0.348	25.28***	0.307	19.00***

All FTSE 350 Firms

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α(%)	0.213	11.76***	0.224	10.05***
β(%)	0.327	9.25**	0.330	11.14***

Panel B: Spread Components by Trade Size Using Three Ways Method

Small Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α(%)	0.293	21.04***	0.274	18.92***
β(%)	0.445	18.76***	0.428	22.66***

Median Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α(%)	0.311	16.32***	0.298	13.50***
β(%)	0.396	14.14***	0.390	19.19***

Large Trades

Initial Loans	**Before**	**T-stat**	**After**	**T-stat**
α(%)	0.315	14.11***	0.301	18.40***
β(%)	0.447	16.83***	0.436	16.12***

Table 9 Regression of spread components using the two-way Huang and Stoll model.

Table 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 initial 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 *INITIAL* which denotes the initial loan of zero-leverage firms. The logarithm of trading volume (*VOLUME*), 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 ratio*).We 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%.

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

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

Dependent Variables		Independent Variables													
		C		**Initial**		**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: Regression of Spread Components															
All	λ	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-λ	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	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*
Median	1-λ	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
	λ	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
Large	1-λ	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
	λ	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-λ	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 10 Regression of spread components using the three-way Huang and Stoll model.

Table 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 which announced their initial bank loans. The dependent variable is the adverse selection *(α)*, inventory cost *(β)*, and order processing costs (*1-α-β*), estimated using Huang and Stoll (1997) three ways spread decomposition model. The independent variables include the dummy variable *INITIAL*, which denotes the initial loan of zero-leverage firms. The logarithm of trading volume (*VOLUME*), 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 ratio*).We 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%.

$$\ln\alpha=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$\ln\beta=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

$$\ln(1-\alpha-\beta)=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$

Dependent Variables		Independent Variables													
		C		**Initial**		**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: Regression of Spread Components															
All	α	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	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-α-β	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	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	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-α-β	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	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	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-α-β	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	2.809	6.41***	-0.007	-1.34	-0.003	-0.83	-0.001	-1.65	0.008	2.44**	0.003	2.63**	0.001	0.47
	β	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-α-β	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

Table 11 Regression of spread components using the MRR model.

Table 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 which announced their initial bank loans. The independent variables include the dummy variable (*INITIAL)*, the initial loan of zero-leverage firms. The logarithm of trading volume (*VOLUME),* 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 ratio*).. Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

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

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

Dependent Variables		**Independent Variables**													
		C		Initial		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: Regression of Spread Components															
All	λ	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-λ	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	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-λ	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	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-λ	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	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-λ	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 12. Regression of spread components using the PIN model.

Table 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 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 (*VOLUME),*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 ratio*). Two tailed tests of significance are reported as follows, *** significance at 1%, ** significance at 5% and * significance at 10%.

$$\mathrm{Ln}PIN=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price+\mu_6 L/A+\varepsilon_t$$
$$\mathrm{Ln}(1\text{-}PIN)=\mu_0+\mu_1 Initial+\mu_2 Vol+\mu_3 Size+\mu_4 StdDev+\mu_5 Price++\mu_6 L/A+\varepsilon_t$$

Dependent Variables		**Independent Variables**													
		C		Initial		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: Regression of Spread Components															
All	*PIN*	11.88	9.65***	-0.004	0.95	-0.003	-1.24	-0.103	-3.25***	0.017	3.96***	-0.000	-0.74	0.018	1.05
	1-*PIN*	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*	-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-*PIN*	-2.007	-3.41***	-0.006	-1.86*	-0.000	-0.29	0.010	2.03*	-0.006	-0.99	0.000	1.00	0.030	2.55**
Median	*PIN*	-2.055	-2.27*	-0.000	-1.92*	-0.008	-1.32	-0.012	-4.87***	0.030	0.73	-0.010	-1.03	0.009	1.04
	1-*PIN*	-2.113	-1.04	-0.001	-1.55	-0.044	-2.03*	0.031	2.46**	-0.004	-1.64	0.006	1.75*	0.000	1.22
Large	*PIN*	-2.819	-3.12**	-0.005	-0.75	-0.002	-1.46	-0.045	-1.07	0.001	2.15**	-0.001	-1.33	0.000	1.07
	1-*PIN*	-3.007	-3.69***	-0.000	-0.43	-0.031	-0.89	0.037	2.08*	-0.000	-1.21	0.004	1.86*	0.002	0.64