Bond Liquidity and Investment

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Abstract

This paper examines the effects of bond liquidity on firms' investments. We postulate that bond liquidity increases firms' investment opportunities by reducing the cost of capital and improving access to financing. Using the exogenous variation in liquidity generated by the introduction of TRACE, we find that bond liquidity enables firms to expand capital expenditures and acquisition activity. Furthermore, by enhancing access to funding, bond liquidity facilitates acquisition financing and reduces the likelihood of investment delays. The investments are value-increasing, as we find favorable market reactions to acquisitions and a positive impact of bond liquidity on market valuations and profitability.

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1. Introduction

Liquidity is an important determinant of corporate yield spreads.[1] For any given level of credit risk, securities that are less liquid sell for a lower price to compensate investors for expected trading difficulties. Moreover, liquidity in secondary bond markets reduces financing costs in primary markets and provides relatively better borrowing opportunities for firms (He and Xiong, 2012; Qi and Wang, 2016; Anderson, 2017). Because bond market liquidity leads to a lower cost of debt and hence, a lower discount rate for firms, we postulate that higher bond liquidity may lead to an increase in investment. Since bond liquidity affords a lower hurdle rate, it may stimulate corporate investment by enabling firms to exploit investment opportunities that would otherwise be foregone. Although debt is a principal source of external financing for U.S. firms, there is no empirical evidence of the effects of bond liquidity on corporate investment. This paper seeks to fill this void.

We examine the effect of bond liquidity on firm investment by using a broad sample of firms with outstanding corporate bonds during the period 2002-2014. We rely on several commonly used proxies for corporate investment: capital expenditures, abnormal capital investment, growth in PPE, and growth in total assets. We find that firms with higher bond liquidity invest more in capital expenditures, have higher abnormal capital investments, and experience a greater growth in PPE and total assets. The results are economically significant: a one-standard-deviation increase in bond liquidity increases the average asset growth by 14%, suggesting that bond liquidity has a significant effect on facilitating internal growth.

Bond liquidity may also have a positive impact on firms' growth via acquisitions, which are among the largest and most visible investments firms undertake. Bond liquidity might expand

[1] E.g., Amihud and Mendelson, 1986; Amihud and Mendelson, 1988; Chen, Lesmond, and Wei, 2007; Dick-Nielsen, Feldhütter and Lando, 2012.

the set of potential targets by lowering the discount rate and helping firms secure funding for acquisitions. Consistent with bond liquidity enabling firms' growth through acquisitions, we find that a one standard deviation increase in bond liquidity increases the unconditional probability of being an acquirer by 13%.

Our results show that bond liquidity is positively related to firms' internal and external growth. There is, however, a possibility that the relationship between bond liquidity and firm investments may be spurious. For example, firm characteristics not fully accounted for in our analysis could simultaneously determine bond liquidity and the propensity to invest. To mitigate this concern, we utilize a quasi-natural experiment around the implementation of the Transaction Reporting and Compliance Engine (TRACE) by the Financial Industry Regulatory Agency (FINRA). TRACE introduction began in 2002 and required corporate bond dealers to report all transactions in TRACE-eligible securities. Whereas all TRACE-eligible transactions were reported to FINRA from the beginning of its operation, the trade information was not disseminated to the public on all corporate bonds simultaneously. Instead, information distribution through TRACE was expanded in stages, and TRACE enactment was completed in 2006, when pricing information on all TRACE-eligible trades was publicly distributed in real-time. Prior literature has shown that TRACE implementation led to an increase in bond liquidity as dissemination of trade information reduced transaction costs and improved transparency (e.g. Bessembinder, Maxwell, and Venkataraman, 2006; Edwards, Harris, Piwowar, 2007; Goldstein, Hotchkiss, and Sirri, 2007).

The introduction of TRACE is a good candidate to generate exogenous variation in bond liquidity because it directly affects bond liquidity but is unlikely to directly impact firms' investment decisions. Our empirical approach exploits variation generated by the staggered

implementation of TRACE, which allows us to compare firms that were selected to be on TRACE and, therefore, were subject to an exogenous shock in bond liquidity, to firms that were not. Our results suggest a causal effect from bond liquidity, as we find that an increase in a firm's bond liquidity surrounding TRACE introduction results in an increase in capital expenditures and an expansion of acquisition activity.

Having documented a positive relationship between bond liquidity and investment, we examine whether bond liquidity helps firms raise funds necessary for investment projects. One way to test this is to analyze managers' discussion of challenges they face when issuing securities and how these challenges impact investment plans. We conjecture that firms with better bond liquidity are less likely to delay their investments due to financing difficulties. Hoberg and Maksimovic (2015) develop a text-based index extracted from annual 10-K filings, which measures the degree of financing hurdles and a firm's likelihood of curtailing its investment plans. Using this index, we find that firms with higher bond liquidity are less likely to mention difficulties in obtaining financing for their investments in the annual reports. This finding suggests that firms with higher bond liquidity are not likely to reduce investments due to funding constraints.

To provide further evidence on how bond liquidity enables firms to finance their investment projects, we explore whether bond liquidity affects firms' propensity to fund acquisitions with debt. We expect firms with more liquid debt to take advantage of the lower cost of capital by issuing bonds to finance acquisitions. We find that firms with higher bond liquidity are more likely to issue bonds prior to a merger. For example, a one standard deviation increase in bond liquidity increases the probability of issuing bonds in the year prior to an acquisition by 12%. To provide a tighter link between bond issuance and acquisitions, we examine whether

firms plan to use bond proceeds to fund acquisitions. Based on the primary use of bond proceeds from the SDC Bond Issues database, we find that firms with higher bond liquidity are more likely to indicate that the newly-issued bonds will be used for acquisitions. If firms with more liquid bonds use proceeds to pay for targets, we expect these firms to be more likely to use cash as a method of payment. Consistent with this intuition, we find that acquisitions made by firms with higher bond liquidity are more likely to be financed by cash. Collectively, these results suggest that bond liquidity expands investment activity by helping firms secure funding for their projects.

We have shown that bond liquidity expands firms' investments through an increase in both acquisition activity and capital expenditures. By lowering the cost of debt and improving access to debt markets, bond liquidity may help firms undertake positive NPV projects which otherwise may be foregone. Alternatively, as higher bond liquidity enables firms more easily raise capital, firms may have an incentive to squander cash and waste resources in value-decreasing investments (e.g., Jensen, 1986). Thus, we next examine the relationship between bond liquidity and value creation.

Unlike the majority of internal investment projects, acquisitions are discrete investments which are publicly announced and have readily observable performance measures at the time of announcement. Hence, we rely on bidders' acquisition announcement returns to measure the effect that deals have on acquirers. If acquisitions enhance shareholder value, we expect a positive market response. In contrast, if acquisitions lead to an overinvestment, the market reaction will be negative. We find that the median and average announcement returns are significantly positive for firms with liquid debt, supporting the idea that acquisitions undertaken by firms with high bond liquidity increase shareholder value. When we sort firms based on bond

liquidity, we observe that firms with more liquid bonds generate a positive market reaction similar in magnitude to the market response received by firms with less liquid bonds. The combined target and acquirer value-weighted announcement returns, which reflect the total value created by the merger, are likewise positive. Taken together, these findings suggest that bond liquidity allows firms to undertake value-increasing acquisitions.

Finally, we examine the relationship between bond liquidity and firm value more generally. If bond liquidity encourages empire building, then the relationship between bond liquidity and market valuations will be negative. Alternatively, if bond liquidity allows firms to undertake projects that are value-creating, then we would expect a positive impact of bond liquidity on shareholder wealth. Consistent with the latter, the evidence suggests that bond liquidity is positively associated with market-to-book ratios, indicating that investments undertaken by firms with liquid debt are value-increasing. Last, we examine accounting-based measure of operating performance and document that firms with more liquid debt have higher operating profitability: a one-standard-deviation increase in bond liquidity increases the average ROA by 22%.

This paper's main contribution is to provide causal evidence on the impact of bond liquidity on corporate investment and firm value. In this respect, this study adds to an emerging body of empirical literature that examines the link between corporate finance and market microstructure. Prior studies provide ample evidence on how stock liquidity affects firm value, innovation, and investment by impacting price informativeness, executive compensation, and institutional monitoring (e.g., Fang, Noe, Tice, 2009; Fang, Tian, and Tice, 2014; Edmans and Manso, 2011; Roosenboom, Schlingemann, Vasconcelos, 2014). However, there is little evidence on the effect of bond liquidity on firm performance. Our results fill this gap by showing

that bond liquidity increases firm value by improving access to debt markets and enabling firms to undertake profitable projects that otherwise would be passed by. Our findings complement survey evidence which reveals that firms facing hurdles in raising external financing are more likely to forego or postpone attractive investment opportunities (Campello, Graham, and Harvey, 2010). Furthermore, by establishing a positive impact of bond liquidity on corporate valuations and profitability, our paper documents an important ramification of regulatory effort to enhance transparency in bond markets.

Additionally, this paper expands upon studies linking leverage and access to public debt to firms' investment decisions. For example, Uysal (2011) and Almazan, de Motta, Titman, and Uysal (2010) show that overleveraged firms are less likely to make acquisitions. Harford and Uysal (2014) suggest that overleveraged firms with access to public debt markets, measured by the existence of a credit rating, could still pursue acquisitions: rated firms make more acquisitions than do nonrated firms. In this paper, we explore whether another important aspect of a firm's debt, i.e., the liquidity of the firm's public bonds, impacts corporate investment. The evidence presented in this paper shows that bond liquidity is a significant determinant of a firm's investment even after controlling for leverage and credit rating. Our results demonstrate that corporate investment of firms with publicly traded bonds is impacted by a variation in the cost of debt arising from differences in liquidity.

2. Sample selection, variable measurement and descriptive statistics

2.1. Sample

We obtain ratings and bond-specific information from the Fixed Investment Securities Database (FISD), which reports detailed information for all U.S. corporate bonds maturing in 1989 or later (e.g., coupon rate, maturity, issue amount, provisions, and credit ratings). We

combine the FISD database with FINRA's TRACE to obtain price and trading data. There appear to be a number of problematic trades during the early period of the TRACE database. Consequently, we eliminate canceled, corrected, and commission trades from the data. Following prior literature, bond transactions under $100,000 are deleted to avoid the effects of retail investors (e.g., Harris and Piwowar, 2006; Dick-Nielsen et al., 2012). We also remove bonds with time to maturity of less than one year because of high pricing errors.

We aggregate bond-level data to the firm level, as described in Section 2.2, and merge it with the Center for Research in Security Prices (CRSP) database and Compustat Industrial Annual Files to obtain stock prices and accounting information. The sample includes all U.S. public firms in the intersection of Compustat, CRSP, FISD and TRACE databases from 2002 to 2014, consisting of 9,620 firm-year observations for 1,319 firms.

For each firm in the sample, we obtain all completed domestic acquisitions listed in the Securities Data Company (SDC) Mergers and Acquisitions database.[2] We include acquisitions of private, public and subsidiary targets and exclude buybacks, recapitalizations and exchange offers. Consistent with prior studies, we require that the acquirer obtain at least 51% of the target shares and that the acquisition represent at least 1% of the acquirer's market value, measured at the fiscal year end before the announcement.[3] Of the 1,319 firms in our sample, 576 firms have completed 1,160 acquisitions during our sample period of 2002 through 2014.

Panel A of Table 1 reports descriptive statistics of firms in the sample. Sample firms are quite large, for example, the median book value of total assets is $8.59 billion compared to $0.32 billion for a median-sized Compustat firm. The median firm in our sample has a market-to-book

[2] Results are similar if we also include foreign targets.

[3] E.g., Fuller, Netter, and Stegemoller, 2002; Moeller, Schlingemann, and Stulz, 2005; Moeller, Schlingemann, and Stulz, 2004.

ratio of 1.31 and leverage ratio of 21%. Thirty-eight percent of our firms have high-yield bonds with an S&P rating of BB+ or below. Firms made acquisitions in 12% of the firm-year observations.

2.2. Measuring liquidity

To measure bond liquidity, we adopt one of the most frequently-used price impact measures, the Amihud illiquidity ratio. The Amihud illiquidity ratio is computed using high-frequency transaction data from TRACE and is defined as the daily average of absolute returns divided by the trade size Q_j (in million \$) of consecutive transactions:

$$Amihud_t = \frac{1}{N_t}\sum_{j=1}^{N_t}\frac{\left|P_j - P_{j-1}\right|/P_{j-1}}{Q_j}$$

where N_t is the number of returns on day t. At least two transactions are required on a given day to calculate the measure. A larger Amihud measure indicates that a trade of a given size would have a larger impact on price, reflecting lower liquidity.

We first calculate the monthly bond-level liquidity measure as the median of the daily bond-level liquidity measures. Next, we average the monthly measures over a fiscal year to construct an annualized bond-level liquidity metric. Since corporate bonds trade infrequently, bond-level liquidity measures are less reliable than their counterparts in the equity market. Helwege, Huang and Wang (2014) show that the explanatory power of liquidity measures is improved by incorporating price information from other bonds issued by the same firm. Therefore, we employ a firm-level liquidity measure, which combines the liquidity metrics of all outstanding bonds. We aggregate bond-level metrics to the firm-level bond liquidity measure by

calculating the offering-amount weighted average of annual bond-level liquidity.[4] We winsorize the liquidity metric at 1%.

The Pearson correlation matrix in Panel B of Table 1 shows that the Amihud illiquidity ratio is positively correlated with firm size and leverage, suggesting that larger and more levered firms in our sample have less liquid bonds. On the other hand, firms with higher market-to-book ratios, higher ROA, and better credit ratings have more liquid bonds. Although all of the correlations are statistically significant, none of them is particularly high.

3. Bond liquidity and firm investment

Prior research has shown that bond liquidity is negatively related to yields, and it lowers the expected return required by investors to hold debt securities. For example, Bao, Pan, and Wang (2011) find that for bonds with the same rating category, an increase in illiquidity of one standard deviation leads to an increase in yield spreads as large as 65 bps. Furthermore, firms with more liquid bonds face relatively better opportunities in the primary market as they are able to issue new bonds at a lower cost (He and Xiong, 2012; Qi and Wang, 2016; Anderson, 2017). Hence, we postulate that an improvement in bond liquidity may lead to an expansion in firm investment by reducing the hurdle rate firms use to evaluate new investments. In this section, we examine the impact of bond liquidity on corporate investment through both internal and external growth.

[4] It can be argued that a more appropriate measure of liquidity would include only the most recent bond issues. Due to sparse bond trading, however, the bond-level liquidity measure can be a less reliable indicator of bond liquidity. Nevertheless, as a robustness check, we repeat our analysis using a measure of liquidity that only captures the liquidity of bonds issued in the year prior to the acquisition and obtain similar, though slightly weaker, results.

3.1. Internal investment

We first examine the relationship between bond liquidity and internal investment. To measure internal investment, we use several measures of internal investment, the first of which is capital expenditures, a commonly used measure of capital investment that captures managerial efforts to exploit current investment opportunities. In Table 2, we explore univariate relations of bond liquidity and capital expenditures. We first classify firms into having high or low liquidity based on the Amihud illiquidity ratio: firms with low liquidity have an Amihud ratio that is above the sample median, while those with below-median Amihud ratios are classified as having low liquidity. As shown in Table 2, the median capital expenditures for firms with high bond liquidity is 3.6%, significantly higher than the median 3.3% for firms with low bond liquidity.

Next, we examine how the effect of bond liquidity on capital expenditures varies by firm size or credit rating. As shown in Table 2, bond liquidity is positively related to capital expenditures across all size terciles. The difference in capital expenditures between subsamples of firms with high and low liquidity is highest for the largest firms. For the largest size tercile, the difference in capital expenditures for high and low liquidity is a statistically significant 0.5%. Table 2 further shows, regardless of credit rating, firms with high bond liquidity have significantly higher capital expenditures than those with low bond liquidity. The difference of 0.3% is significant at the 1% level both for firms with below-investment grade ratings and for firms with investment-grade ratings. Therefore, the univariate results suggest a positive relationship between bond liquidity and internal investment.

We examine the effects of bond liquidity on internal capital investment in a multivariate setting in Table 3. In model (1), the dependent variable is capital expenditures scaled by the assets (measured at the beginning of the year). We control for several factors that may potentially

affect internal investment, including firm size, the market-to-book ratio, leverage, cash, return on assets, abnormal stock returns, and stock liquidity. Additionally, since firms with less liquid debt may be more opaque, we include the ratio of research and development expenses to sales as a proxy for the degree of a firm's information asymmetry.[5] To disentangle the effects of bond liquidity from credit risk, we control for credit rating (based on S&P ratings). We account for credit risk using a conversion process in which AAA-rated bonds are assigned a value of 1 and C-rated bonds receive a value of 21. Following prior literature, we include a high yield dummy that equals one for firms with a credit rating BB+ or lower to control for the non-linearity in credit ratings (Klock, Mansi, Maxwell, 2005; Kecskés, Mansi and Zhang, 2012).[6] We include calendar year fixed effects to account for macroeconomic changes during the sample period. We also add firm fixed effects to control for time-invariant unobservable characteristics that could be correlated with bond liquidity and firms' investment policy. In untabulated robustness tests, we also examine models that include Fama-French industry and year fixed effects and obtain similar results.

The results in Table 3 support the hypothesis that bond liquidity expands the plausible investments set. The coefficient on the Amihud ratio in model (1) is negative and significant at the 5% level, which shows that, even after controlling for a host of firm characteristics such as firm size and credit rating, firms with higher bond liquidity invest more in capital expenditures.

Coefficients on the control variables are consistent with prior research. The market-to-book ratio, a commonly used proxy for a firm's investment opportunities, is positively related to

[5] The literature lacks a firm consensus on the best measures of information asymmetry. Therefore, for robustness, we also measure information asymmetry using idiosyncratic risk (measured as the standard deviation of a firm's daily excess returns), the ratio of intangible assets to assets, and firm age to capture information asymmetry. Our results are similar if these measures are used instead.

[6] Results are robust if we control for credit risk using credit rating dummies.

corporate investment. Prior literature shows that operating cash flow has a large amount of explanatory power beyond market-to-book ratio for investment (e.g., Fazzari, Hubbard, and Petersen (1988)). Consistent with this, our results show that ROA correlates positively with investment. Similar to prior studies, we find a negative relationship between leverage and capital expenditures, suggesting that firms with high leverage are more likely to suffer a debt overhang problem that will force them to underinvest (e.g., Myers, 1977).

To further explore the relationship between bond liquidity and firm investment, we consider several other proxies for internal investment. First, we focus on an abnormal capital investment, which we define following Titman, Wei, and Xie (2004) as follows:

$$CI_t = \frac{CE_t}{(CE_{t-1}+CE_{t-2}+CE_{t-3})/3} - 1,$$

where CE_t is a firm's capital expenditure scales by its total assets in year t. Model (2) of Table 3 examines the relationship between bond liquidity and abnormal capital investment. Consistent with our conjecture that bond liquidity has a positive impact on firm investment, we find a statistically significant positive association between bond liquidity and abnormal capital investment in model (2). For robustness, we use sales instead of book assets as the denominator of capital expenditures and define abnormal capital investment as the residual from a regression of current capital expenditures on three lagged values. The results are similar across all specifications (untabulated) and show that bond liquidity is an important factor in expanding internal investment.

Next, we examine the relationship between bond liquidity and growth in assets. We conjecture that firms with higher bond liquidity will have greater asset growth. We measure asset growth as growth in fixed assets in model (3) and growth in total assets in model (4). Model (3) shows that firms with higher bond liquidity grow fixed assets faster than do firms with lower

bond liquidity. In terms of economic significance, a one-standard-deviation increase in bond liquidity leads to an increase in PPE growth of 20%. The results in model (4) show a significant positive relationship between bond liquidity and growth in total assets.

Overall, the findings in this section show a strong positive relationship between bond liquidity and several measures of internal investment. In the next section, we examine the sensitivity of this result to alternative measures of bond liquidity.

3.2. Alternative liquidity measures

The literature utilizes a number of measures to capture bond liquidity. Hence, in Table 4, we use four different bond liquidity proxies used in prior studies to examine the relationship between bond liquidity and internal investment. In model (1), the variable of interest is the Roll measure, which is based on the negative autocovariance of the returns from trade prices. In model (2), we use the inter-quartile range of trade prices as a bid-ask spread estimator. In model (3), we measure bond liquidity using imputed roundtrip trades, which captures differences in prices of trades that occur within a short period of time. In model (4) we rely on relative price dispersion, which measures bond liquidity as a deviation from expected market valuations. Similar to the Amihud measure, larger values of these measures imply lower liquidity. The Appendix describes the measures in more detail.

Table 4 shows that all four of these alternative liquidity measures are negatively related to capital expenditures. The coefficients on the Roll, inter-quartile range and imputed roundtrip trades measures are significant at the 5% level, and the coefficient on the price dispersion measure is significant at the 10% level. These results provide further support for a positive relationship between bond liquidity and capital expenditures. For brevity purposes, later tables

report results based only on the Amihud ratio, but we note that results are robust to these alternative liquidity measures.

Findings so far show that bond liquidity has an economically significant effect on internal investment after controlling for firm size, leverage, and credit ratings. Furthermore, the positive relationship between bond liquidity and internal investment is robust to alternative measures of investment and is not impacted by the way in which we measure bond liquidity. In the next section, we examine the effect of bond liquidity on external firm investments, specifically focusing on acquisitions.

3.3. External investment

Our conjecture that bond liquidity leads to an expanded investment set is not limited to internal growth. A growing body of M&A research has provided evidence that debt is an important source of financing in acquisitions. For example, Harford, Klasa, and Walcott (2009) show that most acquisitions which are entirely or partially paid in cash are financed with new debt issues. Similarly, Bharadwaj and Shivdasani (2003) find that most cash offers are debt-financed. We conjecture that bond liquidity may lead to an expansion of acquisition activity by lowering the discount rate used to evaluate potential targets and helping firms secure funding for acquisitions.

We test the univariate relationship between bond liquidity and the likelihood of making an acquisition in Table 5. Similar to our earlier analysis, we classify firms into those with high and low bond liquidity based on the median Amihud ratio. As can be seen from Table 5, the unconditional probability of making an acquisition is 13.3% for firms with high bond liquidity and 10.8% for firms with low bond liquidity. The difference of 2.5% is significant at the 1% level and is large relative to the mean unconditional probability of being an acquirer, which is

12.0%. Table 5 also shows that bond liquidity is positively related to acquisitions for all but the largest firms. Further, the effect of bond liquidity on acquisition likelihood is much larger for firms with below-investment-grade ratings relative to those with investment-grade ratings, for which the effect is insignificant.

To account for differences in firm characteristics between firms with high and low bond liquidity, in Table 6 we examine the relationship between bond liquidity and acquisition activity in a multivariate setting. Model (1) presents the results of a probit regression in which the dependent variable is a dummy variable that equals one if a firm undertakes at least one acquisition in a given year. In model (2) we estimate a Poisson model with the annual acquisition count as the dependent variable. In model (3) we estimate a Tobit regression in which the dependent variable is the total size of all targets acquired in a year, scaled by the firm's market value of equity. We include a similar set of controls as in our earlier regressions and add industry and year fixed effects. We cluster standard errors at the firm level.[7] Control variables are measured at the fiscal-year end prior to an acquisition.

Consistent with the univariate results, model (1) of Table 6 shows that the coefficient on the Amihud iliquidity ratio is negative and statistically significant at the 1% level. The negative coefficient implies that firms with higher bond liquidity are more likely to make acquisitions, supporting our conjecture that bond liquidity is positively associated with an increase in investment. The effect of bond liquidity on acquisition likelihood is economically meaningful: one standard deviation increase in bond liquidity leads to a 1.6% increase in the likelihood of conducting an acquisition. For comparison, a one standard deviation decrease in the log of firm size leads to a 2.3% increase in the likelihood of an acquisition. Model (2) reports the results

[7] As a robustness check, we re-estimate p-values based on clustering by firm and time (year), following Petersen (2009). The results are similar.

from a Poisson count model and shows that firms with higher bond liquidity pursue more acquisitions per year relative to firms with lower bond liquidity.[8] Furthermore, the Tobit regression in model (3) shows that targets acquired by firms with higher bond liquidity are larger relative to targets purchased by firms with lower bond liquidity, providing further evidence to suggest that bond liquidity positively impacts firms' external investment. The coefficients of the control variables are consistent with results documented in the prior literature. For instance, the coefficients on stock return and return on assets are positive and significant, suggesting that better performing firms are more likely to undertake acquisitions.

Our results show that bond liquidity has a positive impact on capital expenditures, asset growth, and acquisition activity. In the next section, we examine a potential endogeneity of the relationship between bond liquidity and firms' investment.

4. A natural experiment

It is possible that firm characteristics not fully accounted for in the regression analysis simultaneously determine a firm's investment and bond liquidity. To address this possibility, we employ the introduction of TRACE, which was implemented over time based on the size and credit rating of bonds. On July 1, 2002, Phase I of TRACE began to report bond transactions for investment grade securities with an initial issue size of $1 billion or greater, as well as 50 representative non-investment-grade bonds. Phase II was implemented on March 3, 2003 and started to disseminate trades in 120 selected BBB-rated bonds and higher-rated bonds with initial issue sizes over $100 million. Phase III was implemented in two stages, on October 1, 2004 and

[8] A Poisson process assumes, however, that the event of interest occurs at a fixed rate over the period and imposes the condition that the mean and variance are equal, which can bias parameter estimates. Therefore, as a robustness test, we use a negative binomial specification, which allows the variance and mean to differ. Negative binomial regression generalizes the Poisson model by allowing the rate of the underlying processes to vary across observations. Our results are robust to this alternative specification.

on February 7, 2005, requiring reporting on almost all public corporate bond transactions (excluding "newly issued" and "lightly traded" bonds). By January 2006, trades in all publicly issued bonds were disseminated to the public. Prior research has shown that bond liquidity improved in response to TRACE, as the introduction of TRACE increased transparency and reduced transaction costs (e.g., Bessembinder et al., 2006; Edwards et al., 2007; Goldstein et al., 2007).

Since TRACE coverage is not likely to be directly related to a firm's investment decision, the change in liquidity caused by TRACE implementation represents an exogenous shock to bond liquidity that allows us to isolate the impact of bond liquidity on a firm's investment. For this analysis, we restrict our sample to the period from 2002 to 2006. Our identification strategy exploits the variation generated by the staggered introduction of TRACE. We estimate a model, in spirit of Bertrand and Mullainathan (1999a, 1999b, 2003), as follows:

$$\text{Capital Expenditures}_{it} = \alpha_t + \beta_i + \gamma \mathbf{X}_{it} + \delta \text{Post-TRACE} + \varepsilon_{it}$$

where *i* indexes the firm, *t* indexes the years from 2002 to 2006, α_t are year fixed effects which account for any market-wide fluctuations, β_i are firm fixed effects which allow for more precise control of any time-invariant unobservable differences between firms, and $\mathbf{X}_{it}$ represents a vector of control variables. The variable of interest is the Post-TRACE dummy, which captures the impact of an increase in liquidity in the years following TRACE introduction. For each firm *i,* the TRACE variable takes the value of one if the firm's bonds are covered by TRACE during year t, and it takes the value of zero for years prior to TRACE coverage. Since not all firms were introduced to TRACE at once, the Post-TRACE dummy takes the value of one in different years for different firms. We present the results of this estimation in Table 7. In model (1) we observe that the coefficient on the Post-TRACE dummy is positive and significant at the 5% level,

suggesting that investment in capital expenditures increases following TRACE coverage. This result is consistent with bond liquidity having a causal effect on internal corporate investment.

Next, we use the TRACE experiment to the test the relationship between bond liquidity and acquisition likelihood. In model (2) of Table 7, we replace capital expenditures with an acquisition dummy as the dependent variable. Similar to our earlier results, the coefficient on the Post-TRACE dummy is positive and significant at the 5% level, showing that the exogenous increase in bond liquidity generated by TRACE introduction leads to an increase in acquisition activity. The coefficient estimate suggests that the likelihood of undertaking an acquisition increases by 2.7% following TRACE coverage, similar in magnitude to a one-standard-deviation change in firm size. The results of this identification test suggest a positive causal effect from bond liquidity to corporate investment.

5. How does liquidity expand investment?

The prior section demonstrates a causal relationship between bond liquidity and corporate investment. In this section, we run several tests to identify how bond liquidity enables firms expand investment. Specifically, we examine the relationships between bond liquidity and (a) delays in investment, (b) the issuance of debt prior to acquisition, and (c) the cash financing of acquisitions.

5.1. Investment delays

We posit that bond liquidity facilitates investment by improving access to credit markets and enabling firms to secure funds for investments. One way to test this conjecture is to examine the relationship between bond liquidity and investment challenges as reported by management. As noted by Hoberg and Maksimovic (2015), SEC Regulation S-K requires firms to discuss their

investment plans as well as the challenges they face in obtaining adequate amounts of financing. Using textual analysis, Hoberg and Maksimovic (2015) develop a text-based index derived from the "Management's Discussion and Analysis" section in annual 10-K filings. Higher values of this measure indicate that firms are at a higher risk of delaying, abandoning, or curtailing their investment plans due to an inability to obtain financing for desired projects.

In Table 8, we use the text-based index, labeled Investment Delay Score, as our dependent variable. We expect firms with more liquid bonds to have easier access to debt markets and to have lower Investment Delay Scores. As shown in model (1), firms with more liquid bonds are less likely to cut their investment plans, as shown by the positive and significant coefficient on the Amihud ratio. The results are also economically significant: a one-standard-deviation increase in bond liquidity leads to a 27% reduction in the average Investment Delay Score. Control variables indicate that large and cash-rich firms are less likely to mention funding constraints. Conversely, firms with higher market-to-book ratios are more likely to postpone investment.

In model (2) of Table 8, we rely on the exogenous variation in bond liquidity generated by the TRACE shock to test the relationship between bond liquidity and investment delay. We limit our sample to the time period surrounding TRACE introduction and replace the Amihud ratio with a Post-TRACE dummy. Results show that the coefficient on the Post-TRACE dummy is negative and significant, confirming that firms are less likely to delay their investment after experiencing a positive shock to bond liquidity in the years following TRACE introduction.

This section suggests that firms with higher bond liquidity have better access to bond markets, which allows them to issue debt according to their investment needs. Next, we examine

the financing of acquisitions. We posit that firms with higher bond liquidity will use their access to bond markets to finance their acquisitions.

5.2. Bond issuance before acquisition

Our results in the previous section show that firms with higher bond liquidity are less likely to face difficulties in obtaining funds for new investment projects. We conjecture that firms with more liquid bonds that are planning to undertake an acquisition might raise debt prior to the acquisition. To examine this conjecture, we estimate a probit regression in which the dependent variable is equal to one if a firm issues debt in the year prior to an acquisition. Our main variable of interest is the Amihud ratio which captures the bond liquidity. We expect that firms with lower values of the Amihud ratio will be more likely to issue debt as they have an enhanced ability to access public debt markets.

Results are presented in Table 9. Model (1) shows that the coefficient on the Amihud ratio is negative and significant at the 1% level. Thus, firms with higher bond liquidity are more likely to raise debt capital in the year preceding an acquisition, consistent with the idea that firms with better liquidity have easier access to debt markets. A one-standard-deviation decrease in the Amihud ratio increases the average probability of issuing bonds by 12%. This finding indicates that bond liquidity makes debt financing more readily available.

The results in model (1) demonstrate that firms with high bond liquidity are more likely to issue debt prior to undertaking acquisitions. To provide more direct evidence on the link between bond issuance and acquisitions, we examine whether firms plan to use proceeds from the newly-issued bonds for acquisition purposes. To identify the primary use of bond proceeds, we use the SDC Bond Issues database and create a dummy variable that is equal to one if a firm discloses that the bonds are issued for acquisitions. Model (2) shows a negative and significant

coefficient on the Amihud ratio, suggesting that firms with higher bond liquidity are more likely to use the newly-issued bonds to pursue acquisitions. A one standard deviation increase in bond liquidity increases the unconditional likelihood of issuing acquisition-related bonds by 17%.[9]

In models (3) and (4) of Table 9, we re-estimate the relationship between bond liquidity and the propensity of issuing debt using TRACE introduction as an exogenous liquidity shock. As shown, the coefficient on the Post-TRACE dummy is positive and significant, suggesting that firms experiencing an exogenous improvement in bond liquidity are more likely to issue debt for acquisitions.

The regressions also show that bond issuance is more likely when firms have a better credit rating, as indicated by a significantly negative coefficient on the credit rating variable. Additionally, we find that the decision to issue debt is related to the availability of internal funds. The negative coefficient on the cash-to-assets ratio shows that firms are more likely to issue debt when firms' internal cash reserves are low. This result is consistent with the Myers and Majluf (1984) conjecture that firms prefer to use financial slack over external financing for new investments. Among other firm-level characteristics, we find that leverage and prior stock return positively impact the probability of issuing new bonds.

Results in this section demonstrate that firms with more liquid bonds are more likely to issue bonds prior to acquisitions. We conjecture that these bond issuances are done to finance acquisitions. If this is the case, we expect the acquisitions to be financed with cash. In the next section, we examine the relationship between method of payment and bond liquidity.

[9] As recently issued bonds tend to be more liquid (e.g. Edwards et al., 2007), it is possible that our earlier results showing a positive relationship between bond liquidity and investment are driven by newly-issued debt. To address this concern, we perform several tests. First, we re-estimate our earlier regressions by including a dummy variable that equals one if a firm issued debt during the fiscal year. Second, we use a lagged Amihud ratio. Third, we exclude firms with recently-issued bonds. In all additional tests, we continue to find a positive relationship between bond liquidity and investment (untabulated).

5.3. Method of payment

Prior literature has shown that cash consideration is related to several beneficial outcomes for shareholders of bidding firms, such as faster deal completion, lower risk of bid rejection, deterrence of competitive bids, and favorable valuation effects. Since cash offers generally utilize debt financing, a bidder's payment choice can be strongly influenced by its ability to raise debt. Indeed, prior literature has shown that leverage and access to debt play an important role in choosing the method of financing in acquisitions. For example, Faccio and Masulis (2005) document that firms with greater debt capacity are more likely to finance acquisitions with cash. Karampatsasa, Petmezasa, and Travlos (2014) find that firms with higher ratings (i.e. lower credit risk) are more likely to use cash financing in a takeover as opposed to equity. In light of our earlier results showing that firms with higher bond liquidity are more likely to issue debt prior to acquisitions, we expect these firms to be more likely to use cash as a method of payment.

In order to analyze the relationship between bond liquidity and the choice of payment in acquisitions, we utilize two different measures of cash as the method of payment. First we use the cash proportion of the consideration as the dependent variable. Since the dependent variable is a fractional response variable and lies between 0 and 1, we follow Papke and Wooldridge (1996) and estimate a fractional response regression in model (1) of Table 10. Second, we classify deals as cash deals if at least 75% of the deal value is financed by cash (zero otherwise) and estimate a probit regression in model (2) of Table 10. For the analysis, we include only sample firms that have completed at least one acquisition during our sample period. We control for the same bidder characteristics used in our earlier regressions. In addition, we include the target's public status and relative deal size, as these variables have been shown to be important determinants of the payment method (e.g., Faccio and Masulis, 2005).

Model (1) in Table 10 shows that the coefficient on the Amihud ratio is negative and significant at the 5% level, suggesting that higher bond liquidity enables firms to use a greater proportion of cash in acquisitions. Similarly, in model (2), we observe that cash financing is more feasible for firms with higher bond liquidity. In models (3) and (4), we replace the Amihud ratio with the Post-TRACE dummy and further confirm the positive relationship between bond liquidity and cash financing. These results suggest that firms with higher bond liquidity have better access to cash, allowing them greater flexibility to choose the method of payment. Consistent with prior literature, we find that firms with higher ROA are more likely to use cash as an acquisition currency. In contrast, acquisitions of large and public targets are less likely to be financed by cash.

Overall, our results demonstrate the importance of access to debt markets in expanding firms' internal and external investment. Our analysis shows that firms with higher bond liquidity are less likely to delay investments due to financing hurdles. Furthermore, these firms tend to issue debt shortly prior to acquisitions and use the proceeds to pay for targets. In the next section, we examine whether the expanded investment is beneficial for shareholders.

6. Bond liquidity and firm performance

Our analysis thus far has focused on the role of bond liquidity in expanding investment. A natural question that arises is whether this investment contributes to firm value. By enlarging the firm's investment set, bond liquidity may allow firms to expand capacity and increase profits by undertaking new value-increasing projects. Therefore, if higher bond liquidity lowers the cost of capital and allows firms to undertake positive NPV investments that might have otherwise been foregone, bond liquidity should be positively reflected in firm performance. Conversely, managers may use easier access to credit markets for personal gain. For example, firms with

higher bond liquidity might raise cash in excess of that required to fund positive NPV projects. Prior literature has argued that firms with excess free cash are more likely to initiate takeovers and investments that are value-decreasing (Jensen, 1986). Hence, managers in firms with higher bond liquidity may engage in overinvestment and empire-building. To examine the effects of bond liquidity on firm value, we next analyze acquisition announcement returns, market valuations, and operating profitability.

6.1. Announcement returns

This section examines the impact of bond liquidity on shareholder wealth using stock returns around the acquisition announcement date. Stock returns reflect investors' responses to an acquisition, based on expectations about a firm's future cash flows. We compute the acquirer's cumulative abnormal stock returns (CARs) over the three-day window [−1: 1] using a standard market adjusted return model.[10] For robustness, we also estimate CARs over a five-day window centered at the announcement date [-2:2].

If acquisitions undertaken by firms with higher bond liquidity, on average, are value-increasing, we would expect a positive market response. In contrast, if acquisitions destroy shareholder value, announcement returns would be negative. Panel A of Table 11 presents median and mean acquisition announcement stock returns over three- and five-day windows. As shown in model (1), we observe positive and statistically significant median and mean announcement returns for the full sample of acquisitions in our sample. The mean three-day CAR is 0.80%, and the mean five-day CAR is 0.73%. Next, we separate the sample into firms

[10] Abnormal returns are calculated as the difference between a firm's return and the value-weighted market (CRSP) index return. Brown and Warner (1980) show that for short-window event studies, weighting the market return by the firm's stock beta does not significantly improve the power of the test, given the estimation error for beta and the small size of the daily expected return on the market index.

with high and low bond liquidity, based on the median Amihud ratio. Panel A of Table 11 shows that the market response for both subsamples is positive and significant. For example, the average three-day CAR for firms with high bond liquidity is 0.73%, lending support for the conjecture that acquisitions undertaken by firms with higher bond liquidity are positive NPV projects. However, we do not find statistically significant differences between announcement returns for the subsamples of firms with high and low bond liquidity, suggesting that firms with higher bond liquidity pursue acquisitions that create value for shareholders similar in magnitude to acquisitions made by firms with lower bond liquidity.

As another measure of value created by an acquisition, we analyze synergies created by the merger. For this purpose, we compute combined value-weighted abnormal announcement returns of the bidder and the target. Panel A of Table 11 shows that the combined CARs for firms with higher bond liquidity are positive and significant. For example, the average combined CAR for a three-day window is 1.74% for firms with high bond liquidity, which is significant at the 1% level. These results further confirm that bond liquidity allows firms undertake projects which increase shareholder wealth, although again, we do not find any significant differences between firms with high and low liquidity.

To examine further whether bond liquidity influences the quality of acquisitions, we analyze the relationship between bond liquidity and acquisition announcement returns in a multivariate context. The dependent variable in model (1) is the bidder's stock announcement return measured over a three-day window. The dependent variable in model (2) is the combined announcement return of the bidder and target over a three-day window. Following prior literature, we control for deal characteristics such as relative deal size, method of payment and target's public status (e.g. Fuller et al., 2002; Moeller et al., 2004; Asquith, Bruner, and Mullins,

1983; Lang, Stulz, and Walkling, 1991), in addition to the firm characteristics included in earlier regressions. Panel B of Table 11 presents the results from an ordinary least squares estimation. Consistent with the univariate results, Panel B of Table 11 shows that acquisitions undertaken by firms with higher bond liquidity earn similar returns to those made by firms with less liquid bonds. Likewise, in models (3) and (4), the coefficient on the Post-TRACE dummy is insignificant, suggesting that firms with higher and lower bond liquidity generate comparable returns. In line with prior studies, we find that acquisitions of public targets are negatively associated with the stock announcement returns (see, e.g., Moeller et al., 2004).

The results in this section indicate that bond liquidity allows firms to undertake projects that create value for shareholders. In the next section, we examine whether firms with more liquid debt have higher market valuations and operating profitability.

6.2. Market valuations and operating performance

To examine the relationship between bond liquidity and firm performance, we use both market- and accounting-based measures. In model (1) of Table 12, we rely on the market-to-book ratio as a proxy of firm value. The regression includes controls for the same firm characteristics as in our earlier regressions. In addition, we include firm fixed effects to mitigate concern that unobservable characteristics correlated with bond liquidity and firm performance might bias the coefficients.

As evidenced by a negative and statistically significant coefficient on the Amihud ratio in model (1) in Table 12, firms with higher bond liquidity are associated with higher market valuations. This result shows that bond liquidity has a significant impact on market value, providing further support to the idea that higher bond liquidity allows firms to undertake profitable projects that increase firm value. We supplement this result by examining the

relationship between bond liquidity and firm value in the context of the TRACE introduction. Model (3) shows that the coefficient on the Post-TRACE dummy is positive and significant at the 1% level, suggesting that an exogenous improvement in bond liquidity leads to an increase in the market-to-book ratio.

Among the control variables, Table 12 shows that firm size is negatively related to market valuations, as larger firms are presumably in a more mature stage of their life cycle. Additionally, the coefficient on leverage is significantly negative, indicating that leverage might hinder firm value by increasing the risk of financial distress. On the other hand, measures of profitability, i.e., stock returns and cash reserves, are positively associated with market-to-book ratios. Similarly, firms with better credit ratings have higher valuations.

We have argued that bond liquidity results in higher market valuations because it allows firms to invest in value-increasing projects. However, higher liquidity might also have a direct impact on market valuations, as a lower cost of capital means higher valuations for any given cash flows that the company generates. Hence, firms with higher liquidity might trade at a premium due to a lower required rate of return (Holmstrom and Tirole, 2001; Amihud and Mendelson, 1988). Following Fang et al. (2009), we test this conjecture by examining the relationship between liquidity and the price-to-earnings ratio. We find no significant impact of bond liquidity on the price-to-earnings ratios (untabulated). Hence, it is unlikely that higher market valuations of firms with higher bond liquidity are explained by the discount rate effect.

Another way to examine whether firms with higher bond liquidity undertake more profitable investments is to examine the relationship between bond liquidity and operating performance. We use ROA, measured as net income scaled by the book value of assets, as our accounting-based measure of operating profitability in model (2) of Table 12. The coefficient on

the Amihud ratio is negative and significant at the 1% level. Based on model (2), a one-standard-deviation increase in bond liquidity increases the average ROA by 22%. Similarly, the coefficient on the Post-TRACE dummy in model (4) is positive and significant at the 1% level, further suggesting that bond liquidity enables firms to undertake projects that enhance profitability.

In sum, we find that firms with higher bond liquidity experience positive acquisition announcement returns, higher market valuations and better operating profitability. These results are consistent with the conjecture that the investment enabled by bond liquidity is value-creating.

7. Conclusion

Prior literature has documented a significant effect of bond liquidity on asset prices and shows that part of the differences in yield spread across bonds is due to illiquidity. Although the role of liquidity on bond prices has been extensively studied, there is little research on whether liquidity affects real investment activity. This paper seeks to fill this void by examining the effects of bond liquidity on corporate investment and firm performance.

We conjecture that firms with higher bond liquidity make more investments because liquidity reduces the cost of debt and improves firms' access to capital. Consistent with this conjecture, we find that firms with higher bond liquidity invest more in capital expenditures, grow assets at a faster rate, and make more acquisitions. Our results are economically significant and robust to controlling for endogeneity. We posit that bond liquidity enables firms to expand investment by helping these firms secure the necessary financing. We document that firms with higher bond liquidity are less likely to delay investment, are more likely to access debt markets shortly prior to a merger, and are more likely to use cash as a method of payment. These results suggest that liquidity itself plays an important role in explaining corporate investment. Notably,

we find that the expanded investment enabled by higher bond liquidity is beneficial for shareholders. Our analysis shows that acquisitions made by firms with high bond liquidity generate positive market reactions and that bond liquidity is positively related to market valuations and operating profitability. These results indicate that higher bond liquidity allows firms to invest in positive NPV projects which may otherwise be foregone.

This paper provides novel evidence on the relationship between financing and investment decisions. The presented evidence demonstrates the importance of bond liquidity in explaining corporate investment and suggests that frictions in financial markets have real effects on investment decisions and firm value. Our paper also highlights the significance of a well-functioning and liquid bond market for real investment activity.

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Appendix: Variable Definition

Panel A: Liquidity measures	
Amihud	Amihud illiquidity ratio is measured as the daily average of absolute returns divided by the trade size as follows: $$Amihud_t = \frac{1}{N_t}\sum_{j=1}^{N_t}\frac{\left\|P_j - P_{j-1}\right\|/P_{j-1}}{Q_j}$$
Roll	Roll metric, proposed by Roll (1984) measures covariance between consecutive returns and is defined as follows: $$Roll_t = 2\sqrt{-cov(\mathrm{R_i}, \mathrm{R}_{i-1})}$$
Inter-quartile range (IQR)	Inter-quartile range (IQR) is defined as the difference between the 75th percentile and 25th percentile of prices for one day normalized by the average price on that day (Han and Zhou (2007), Pu (2009)), i.e., $$IQR_t^i = \frac{p_t^{i,75th} - p_t^{i,25th}}{\overline{p_t^i}} \times 100$$
Roundtrip cost	Imputed roundtrip cost, proposed by Feldhütter (2012) directly estimates roundtrip transaction costs based on trade prices and is defined as: $$Roundtrip = \frac{\mathrm{Pmax} - \mathrm{Pmin}}{\mathrm{Pmax}}$$
Price dispersion	Price dispersion, introduced by Jankowitsch, Nashikkar, and Subrahmanyan (2011) measures deviation from the expected market valuation of an asset, and is defined as: $$\text{Price dispersion}_t = \sqrt{\frac{1}{\sum_{k=1}^{K_t} v_k}\sum_{k=1}^{K_t}(p_k - m_t)^2 v_k}$$
Panel B: Dependent variables	
Capital expenditure	Capital expenditure over total assets at the beginning of the year.
Abnormal capital investment	Abnormal capital investment defined following Titman et al. (2004).
PPE growth	Growth in fixed assets, defined as Ln(PPE(t+1))/PPE(t)).
Asset growth	Growth in total assets, defined as Ln(Assets(t+1)/Assets(t).
Acquisition dummy	Dummy variable that equals one if a firm makes at least one acquisition during the fiscal year, zero otherwise.
Acquisition count	Total number of acquisitions announced in a fiscal year.
Acquisition ratio	Sum of acquisition deal values announced in a fiscal year divided by a firm's total assets.
Investment delay score	Investment delay score, defined in Hoberg and Maksimovic (2015)
Bond issue dummy	Dummy variable that equals one if a firm issued bonds in the year prior to an acquisition.
Acquisition-related bond issue dummy	Dummy variable that equals one if a firm issued acquisition-related bonds in the year prior to an acquisition. Bonds are defined as acquisition-related, if the company mentions acquisitions in the primary use of proceeds.

Panel B: Dependent variables (continued)	
Percent cash financing	Amount of cash financing divided by deal value.
Cash deal	Dummy variable that equals one if at least 75% of deal value is financed by cash, zero otherwise.
M/B	Market value of assets divided over book value of assets. Market value of assets is defined as market value of equity plus book value of assets minus book value of equity minus balance sheet deferred taxes.
ROA	Net income, scaled by book value of total assets.
Panel C: Control variables	
Firm Size	Log of book value of total assets.
Leverage	Book value of debt divided over market value of total assets.
Cash/Total assets	Cash holdings, scaled by book value of total assets.
Stock return	Compounded daily excess (over the CRSP value-weighted index) returns over prior fiscal year.
R&D/sales	Research and development expense, scaled by sales.
Credit rating	Based on S&P credit rating, using a conversion process in which AAA-rated bonds are assigned a value of 1 and C-rated bonds receive a value of 21.
High yield dummy	Dummy variables that equals one if S&P rating is BB+ or below, and zero otherwise.
Stock illiquidity	Amihud ratio, calculated as daily average of absolute returns divided by the trade size of consecutive transactions.
Public target	Indicator variable that equals one for public targets, zero otherwise.
Relative deal size	Deal value, as reported in Thomson One, divided by bidder's market capitalization, measured at the fiscal year end before the announcement.

Table 1. Summary Statistics

This table presents summary statistics of liquidity measures and firm characteristics in Panel A and a correlation matrix of bond liquidity with firm characteristics in Panel B. Based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years). Variable definitions are in the Appendix.

Panel A: Firm characteristics

	Mean	St. Dev.	25th percentile	Median	75th percentile
Liquidity metrics:					
Amihud ratio (in bp)	93.76	86.95	40.89	66.01	115.33
Roll (in bp)	28.38	27.25	10.78	21.20	37.25
Roundtrip (in bp)	56.93	43.27	30.02	44.47	69.41
Inter-quartile range (in bp)	40.41	27.38	23.35	32.99	48.67
Price dispersion (in bp)	20.88	12.62	12.53	18.04	26.19
Firm characteristics:					
Firm size (in billions)	51.58	209.93	3.10	8.59	25.70
M/B	1.54	0.72	1.08	1.31	1.73
Leverage	0.24	0.16	0.12	0.21	0.32
Cash/Total assets	0.08	0.09	0.02	0.05	0.12
Stock return	0.04	0.43	-0.16	0.00	0.18
ROA	0.03	0.10	0.01	0.04	0.07
High yield dummy (BB+ or lower)	0.38	0.49	-	-	-
New debt issue in prior fiscal year	0.30	0.46	-	-	-
Conducted acquisition during a fiscal year	0.12	0.33	-	-	-

Panel B: Pearson Correlation Matrix

	Amihud ratio	Firm size	M/B	Leverage	ROA	Stock illiquidity	High yield
Amihud ratio	1.00	0.07***	-0.15***	0.10***	-0.17***	-0.03***	0.03***
Firm size		1.00	-0.12***	-0.01	-0.04***	0.00	-0.16***
M/B			1.00	-0.36***	0.35***	0.04***	-0.15***
Leverage				1.00	-0.33***	-0.09***	0.39***
ROA					1.00	0.10***	-0.23***
Stock illiquidity						1.00	-0.03***
High yield dummy							1.00

Table 2. Capital expenditures – Univariate results

This table presents median capital expenditures, scaled by the beginning assets, based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years) for sub-samples of firms with high and low bond liquidity. Firms are classified as having low bond liquidity if the Amihud measure is above the median, otherwise firms are classified as having high bond liquidity. Firm size is measured by the log of total assets. Firms are classified as below-investment grade if S&P rating is BB+ or below, otherwise firms are classified as investment grade. Differences in the frequency of acquisitions between firms with low and high liquidity are based on the chi-squared test. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively.

	Capital expenditures		
	High liquidity	**Low liquidity**	**Difference**
Full Sample	3.6%	3.3%	0.3%***
Size terciles:			
Tercile 1 *(smallest)*	3.8%	3.6%	0.2%**
Tercile 2	3.8%	3.5%	0.3%***
Tercile 3 *(largest)*	3.4%	2.9%	0.5%***
Credit rating:			
Below investment grade	3.9%	3.6%	0.3%***
Investment grade	3.5%	3.2%	0.3%***

Table 3. Bond liquidity and internal investment

This table tests the relationship between bond liquidity and internal corporate investment. It presents estimates from an ordinary least squares estimation, based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years). The dependent variable in model (1) is the capital expenditure scaled by the beginning assets. The dependent variable in model (2) is the abnormal capital investment defined following Titman et al. (2004). The dependent variable in model (3) is PPE growth, measured as Ln(PPE(t+1))/PPE(t)). The dependent variable in model (4) is asset growth, defined as Ln(Assets(t+1)/Assets(t)). In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for firm and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Capital expenditures	**Abnormal capital investment**	**PPE growth**	**Asset growth**
	(1)	(2)	(3)	(4)
Amihud ratio	-0.154**	-1.755**	-1.120***	-0.960***
	(0.077)	(0.794)	(0.368)	(0.276)
Firm size	0.006	-0.160***	0.149***	0.205***
	(0.004)	(0.023)	(0.014)	(0.013)
M/B	0.009***	0.155***	0.046***	0.026***
	(0.003)	(0.021)	(0.009)	(0.008)
Leverage	-0.041*	-0.573***	0.048	0.107**
	(0.023)	(0.132)	(0.056)	(0.046)
Cash/Total assets	-0.049***	-0.490***	-0.475***	0.026
	(0.011)	(0.149)	(0.065)	(0.045)
Stock return	-0.003**	-0.103***	-0.009*	0.023***
	(0.001)	(0.019)	(0.005)	(0.007)
ROA	0.041***	0.216**	0.442***	0.599***
	(0.009)	(0.090)	(0.061)	(0.062)
R&D/Sales	0.030*	-0.456*	1.006***	1.643***
	(0.018)	(0.233)	(0.238)	(0.270)
Credit rating	-0.000	-0.004	0.001	0.007**
	(0.001)	(0.009)	(0.004)	(0.003)
High yield dummy	-0.001	0.030	0.007	-0.011
	(0.003)	(0.047)	(0.019)	(0.014)
Stock illiquidity	0.021	0.956**	0.075	0.044
	(0.022)	(0.376)	(0.093)	(0.065)
Firm fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.694	0.664	0.196	0.292
Number of observations	9,563	8,807	9,111	9,619

Table 4. Capital expenditures – Alternative measures

This table tests the relationship between bond liquidity and capital expenditures. It presents estimates from an ordinary least squares estimation, based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years). The dependent variable in models (1)-(4) is the capital expenditure scaled by the beginning assets. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for firm and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Capital expenditures			
	(1)	(2)	(3)	(4)
Roll measure	-0.444**			
	(0.183)			
Inter-quartile range		-0.004**		
		(0.002)		
Roundtrip cost			-0.485**	
			(0.199)	
Price dispersion				-0.007*
				(0.004)
Firm size	0.004*	0.004**	0.004**	0.004**
	(0.002)	(0.002)	(0.002)	(0.002)
M/B	0.011***	0.011***	0.011***	0.011***
	(0.002)	(0.002)	(0.002)	(0.002)
Leverage	-0.019*	-0.022**	-0.022**	-0.022**
	(0.011)	(0.011)	(0.011)	(0.011)
Cash/Total assets	-0.050***	-0.048***	-0.048***	-0.048***
	(0.009)	(0.009)	(0.009)	(0.009)
Stock return	-0.004***	-0.005***	-0.005***	-0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
ROA	0.046***	0.037***	0.037***	0.037***
	(0.009)	(0.008)	(0.008)	(0.008)
R&D/Sales	0.033*	0.030*	0.030*	0.030*
	(0.018)	(0.017)	(0.018)	(0.017)
Credit rating	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
High yield dummy	-0.001	-0.001	-0.001	-0.001
	(0.002)	(0.002)	(0.002)	(0.002)
Stock illiquidity	0.035**	0.031**	0.032**	0.031**
	(0.014)	(0.015)	(0.015)	(0.015)
Firm fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.804	0.803	0.803	0.803
Number of observations	9,155	9,563	9,541	9,563

Table 5. Likelihood of making acquisitions – Univariate results

This table presents the percent of firms undertaking acquisitions, based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years) for sub-samples of firms with high and low bond liquidity. Firms are classified as having low bond liquidity if the Amihud measure is above the median, otherwise firms are classified as having high bond liquidity. Firm size is measured by the log of total assets. Firms are classified as below-investment grade if S&P rating is BB+ or below, otherwise firms are classified as investment grade. Differences in the frequency of acquisitions between firms with low and high liquidity are based on the chi-squared test. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively.

	Likelihood of making an acquisition		
	High liquidity	**Low liquidity**	**Difference**
Full Sample	13.3%	10.8%	2.5%***
Size terciles:			
Tercile 1 *(smallest)*	16.3%	12.2%	4.1%***
Tercile 2	13.9%	10.1%	3.8%***
Tercile 3 *(largest)*	9.9%	9.9%	0.0%
Credit rating:			
Below investment grade	14.7%	10.2%	4.5%***
Investment grade	12.5%	11.2%	1.3%

Table 6. Bond liquidity and external investment

This table tests the relationship between bond liquidity and the likelihood of undertaking an acquisition, based on a sample of 1,319 firms over the period 2002-2014. Model (1) presents estimates from a pooled probit regression, in which the dependent variable is the dummy variable that equals one if a firm undertakes an acquisition, and zero otherwise. Models (2) presents poisson estimation, in which the dependent variable is the total number of acquisitions a firm announces in a fiscal year. Model (3) presents tobit estimation, in which the dependent variable is the ratio of the sum of acquisition values to the firm's total assets. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for industry and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Dummy=1 if a firm makes acquisition	**Acquisition count**	**Acquisition ratio (%)**
	(1)	(2)	(3)
Amihud ratio	-9.782***	-16.787***	-3.748***
	(2.557)	(5.048)	(1.201)
Firm size	-0.070***	-0.148***	-0.034***
	(0.020)	(0.038)	(0.007)
M/B	0.027	0.008	0.003
	(0.036)	(0.052)	(0.013)
Leverage	-0.163	-0.206	-0.028
	(0.160)	(0.296)	(0.063)
Cash/Total assets	-0.600**	-1.070**	-0.245**
	(0.257)	(0.469)	(0.103)
Stock return	0.059*	0.101**	0.025
	(0.034)	(0.043)	(0.015)
ROA	0.531**	0.713***	0.216*
	(0.235)	(0.275)	(0.116)
R&D/Sales	-0.012	0.279	-0.157
	(0.549)	(0.900)	(0.221)
Credit rating	0.006	0.011	0.005
	(0.013)	(0.026)	(0.005)
High yield dummy	-0.080	-0.146	-0.023
	(0.083)	(0.154)	(0.031)
Stock illiquidity	-0.451	-0.495	-0.295
	(0.458)	(0.636)	(0.237)
Pseudo R^2	0.044	.	0.046
Number of Observations	9,620	9,620	9,620

Table 7. TRACE natural experiment

This table tests the relationship between bond liquidity and investment, based on a sample of all Compustat firms with credit rating over the period 2002-2006. In model (1) the dependent variable is the capital expenditure scaled by the beginning assets. In model (2) the dependent variable is the dummy variable that equals one if a firm undertakes an acquisition, and zero otherwise. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. The regressions control for year fixed effects and include a constant (not shown), model (1) controls for firm fixed effects. Variable definitions are in the Appendix.

	Capital expenditures	**Dummy=1 if firm makes acquisition**
	(1)	(2)
Post-TRACE dummy	0.002**	0.134**
	(0.001)	(0.063)
Firm size	0.017***	-0.064**
	(0.003)	(0.030)
M/B	0.007***	-0.092**
	(0.001)	(0.046)
Leverage	-0.008	-0.707***
	(0.009)	(0.243)
Cash/Total assets	-0.056**	0.462
	(0.027)	(0.938)
Stock return	-0.004***	0.024
	(0.001)	(0.053)
ROA	0.022*	2.061***
	(0.013)	(0.426)
R&D/Sales	0.000	-0.753
	(0.001)	(0.632)
Credit rating	-0.001	-0.023
	(0.001)	(0.018)
High yield dummy	-0.004	0.045
	(0.002)	(0.099)
Stock illiquidity	-0.046	0.380
	(0.031)	(0.427)
Firm fixed effects	Yes	No
Pseudo R^2	0.797	0.079
Number of observations	4,678	4,603

Table 8. Bond liquidity and investment delay

This table tests the relationship between bond liquidity and delays in corporate investment and presents estimates from an ordinary least squares estimation. Model (1) is based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years), Model (2) is based on a sample of all Compustat firms with credit rating over the period 2002-2006. The dependent variable is investment delay score, defined in Hoberg and Maksimovic (2015). In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for firm and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Investment delay score	
	(1)	(2)
Amihud ratio	0.131**	
	(0.065)	
Post-TRACE dummy		-0.003*
		(0.002)
Firm size	-0.005**	0.001
	(0.002)	(0.004)
M/B	0.004**	-0.003
	(0.002)	(0.002)
Leverage	-0.003	-0.040***
	(0.009)	(0.012)
Cash/Total assets	-0.023**	0.077
	(0.010)	(0.059)
Stock return	0.000	0.002
	(0.001)	(0.002)
ROA	-0.006	-0.001
	(0.006)	(0.010)
R&D/Sales	0.059	-0.002
	(0.065)	(0.001)
Credit rating	0.001	0.001
	(0.001)	(0.001)
High yield dummy	-0.001	-0.002
	(0.004)	(0.005)
Stock illiquidity	0.005	-0.046***
	(0.016)	(0.016)
Firm fixed effects	Yes	Yes
Adjusted R^2	0.555	0.587
Number of observations	9,620	4,678

Table 9. Bond issuance prior to acquisitions

This table tests the relationship between bond liquidity and the likelihood of bond issuance. It presents estimates from a pooled probit regression. Models (1) and (2) are based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years), models (3) and (4) are based on a sample of all Compustat firms with credit rating over the period 2002-2006. In models (1) and (3) the dependent variable is the dummy variable that equals one if a firm has issued debt in the year prior to an acquisition, and zero otherwise. In models (2) and (4) the dependent variable is the dummy variable that equals one if a firm has issued debt for acquisition purposes in the year prior to an acquisition, and zero otherwise. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for industry and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Dummy=1 if issued debt in the year prior to an acquisition			
	Any stated purpose	**For acquisitions**	**Any stated purpose**	**For acquisitions**
	(1)	(2)	(3)	(4)
Amihud ratio	-15.066***	-14.592***		
	(2.206)	(2.326)		
Post-TRACE dummy			0.316***	0.179**
			(0.059)	(0.072)
Firm size	0.116***	0.055**	0.012	-0.023
	(0.022)	(0.022)	(0.027)	(0.030)
M/B	0.113***	0.049	0.062	0.002
	(0.031)	(0.031)	(0.039)	(0.043)
Leverage	1.170***	0.512***	1.248***	0.585***
	(0.173)	(0.166)	(0.205)	(0.210)
Cash/Total assets	-0.494**	-0.637***	-2.962***	-0.798
	(0.245)	(0.244)	(0.868)	(1.055)
Stock return	0.088**	0.023	0.136***	0.077
	(0.036)	(0.035)	(0.041)	(0.049)
ROA	0.001	-0.033	-0.519	-0.074
	(0.163)	(0.195)	(0.319)	(0.357)
R&D/Sales	0.347	0.130	-0.501	-0.161
	(0.557)	(0.593)	(0.460)	(0.256)
Credit rating	-0.029**	-0.025*	-0.055***	-0.026
	(0.012)	(0.013)	(0.017)	(0.020)
High yield dummy	0.036	0.066	0.112	-0.020
	(0.073)	(0.078)	(0.092)	(0.109)
Stock illiquidity	0.446	-0.158	0.427	-0.159
	(0.450)	(0.584)	(0.467)	(0.458)
Pseudo R^2	0.053	0.035	0.056	0.038
Number of observations	9,620	9,620	4,707	4,707

Table 10. Method of payment

This table tests the relationship between bond liquidity and bidder's payment form. Models (1) and (2) are based on a sample of 1,160 acquisitions over the period 2002-2014, models (3) and (4) are based on a sample of 739 acquisitions conducted by all Compustat firms with credit rating over the period 2002-2006. Models (1) and (3) present estimates from a fractional response regression, in which the dependent variable is the percentage of cash financing in deals. Models (2) and (4) present estimates from a probit regression, in which the dependent variable equals one if at least 75% of the deal value is financed by cash, zero otherwise. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for industry and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	Percent cash Financing	**Cash deal**	**Percent cash Financing**	**Cash deal**
	(1)	(2)	(3)	(4)
Amihud ratio	-12.813**	-16.076**		
	(5.912)	(6.885)		
Post-TRACE dummy			0.232**	0.258*
			(0.118)	(0.140)
Firm size	-0.109***	-0.132***	-0.140***	-0.191***
	(0.037)	(0.043)	(0.051)	(0.066)
M/B	-0.084	-0.123	-0.102	-0.188
	(0.076)	(0.089)	(0.108)	(0.123)
Leverage	0.159	0.280	0.461	0.548
	(0.331)	(0.418)	(0.430)	(0.571)
Cash/Total assets	2.153***	2.549***	-1.547	-0.728
	(0.614)	(0.680)	(1.413)	(1.654)
Stock return	-0.044	-0.073	-0.129	-0.160
	(0.102)	(0.113)	(0.113)	(0.148)
ROA	1.546**	1.474**	3.561***	4.217***
	(0.643)	(0.721)	(1.085)	(1.438)
R&D/Sales	-1.719	-2.691*	-0.773	0.269
	(1.403)	(1.525)	(1.125)	(1.431)
Credit rating	0.020	0.031	-0.013	-0.044
	(0.023)	(0.028)	(0.035)	(0.046)
High yield dummy	-0.240	-0.387**	-0.186	-0.150
	(0.151)	(0.179)	(0.183)	(0.230)
Stock illiquidity	-0.011	-0.080	0.038	-0.010
	(2.604)	(2.478)	(0.092)	(0.088)
Public target	-0.490***	-0.519***	-0.788***	-0.807***
	(0.091)	(0.110)	(0.115)	(0.143)
Relative deal size	-1.617***	-2.767***	-1.713***	-2.531***
	(0.212)	(0.364)	(0.304)	(0.534)
Pseudo R^2	0.191	0.230	0.235	0.272
Number of observations	1,160	1,160	735	739

Table 11. Acquisition announcement returns

This table tests the relationship between bond liquidity and acquisition announcement returns, based on a sample of 1,160 acquisitions over the period 2002-2014. Panel A presents median and mean announcement returns for bidding firms, as well as combined acquirer and target abnormal return in percentage points. Acquirer and target cumulative abnormal returns are combined using weights based on market values of the target and acquirer 50 trading days prior to the acquisition announcement. Column (1) presents the announcement returns for the full sample, columns (2) and (3) show announcement returns for sub-samples of firms with high and low bond liquidity. Firms are classified as having low bond liquidity if the Amihud measure is above the median, otherwise, firms are classified as having high bond liquidity. In columns (1)-(3) asterisks indicate the differences from zero, based on signed rank test and t-test. In column (4) asterisks indicate the difference in median (mean) announcement returns between samples of firms with high and low liquidity, based on Wilcoxon rank sum test (t-test). Panel B presents estimates from an ordinary least squares estimation. Models (1) and (2) are based on a sample of 1,160 acquisitions over the period 2002-2014, models (3) and (4) are based on a sample of 739 acquisitions conducted by all Compustat firms with credit rating over the period 2002-2006. The dependent variable in models (1) and (3) is the acquirer's three-day stock cumulative abnormal return. The dependent variable in models (2) and (4) is the combined acquirer and target three-day cumulative abnormal return in percentage points, using weights based on market values of the target and acquirer 50 trading days prior to the acquisition announcement. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for industry and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

Panel A: Univariate results

	Full sample	High liquidity	Low liquidity	Difference
	(1)	(2)	(3)	(4)
Median:				
Bidder's abnormal stock returns [-1:1]	0.23%***	0.12%***	0.36%***	-0.23%
Bidder's abnormal stock returns [-2:2]	0.35%***	0.20%***	0.51%***	-0.31%
Combined abnormal stock returns [-1:1]	1.16%***	1.01%***	1.33%***	-0.32%
Combined abnormal stock returns [-2:2]	1.32%***	1.03%***	1.40%***	-0.37%
Mean:				
Bidder's abnormal stock returns [-1:1]	0.80%***	0.73%***	0.88%***	-0.15%
Bidder's abnormal stock returns [-2:2]	0.73%***	0.61%***	0.85%***	-0.24%
Combined abnormal stock returns [-1:1]	2.03%***	1.74%***	2.28%***	-0.54%
Combined abnormal stock returns [-2:2]	1.95%***	1.58%***	2.27%***	-0.70%

Table 11. (continued)
Panel B: Multivariate analysis

	Cumulative abnormal returns for:			
	Acquirer	**Combined**	**Acquirer**	**Combined**
	(1)	(2)	(3)	(4)
Amihud ratio	-0.076	0.512		
	(0.242)	(0.631)		
Post-TRACE dummy			-0.007	-0.005
			(0.005)	(0.013)
Firm size	-0.002	0.001	-0.005***	-0.004
	(0.002)	(0.004)	(0.002)	(0.003)
M/B	0.000	0.008	0.004	0.006
	(0.003)	(0.007)	(0.004)	(0.011)
Leverage	0.001	0.019	0.000	0.046
	(0.016)	(0.042)	(0.020)	(0.039)
Cash/Total assets	0.024	-0.015	-0.096	-0.062
	(0.022)	(0.042)	(0.065)	(0.096)
Stock return	0.003	0.005	0.002	-0.002
	(0.005)	(0.014)	(0.007)	(0.012)
ROA	-0.057*	-0.050	-0.069	-0.108*
	(0.032)	(0.049)	(0.051)	(0.064)
R&D/Sales	-0.063	-0.083	-0.062	0.007
	(0.044)	(0.111)	(0.063)	(0.083)
Credit rating	-0.001	0.005*	-0.001	0.002
	(0.001)	(0.003)	(0.001)	(0.002)
High yield dummy	0.003	-0.011	0.009	-0.010
	(0.007)	(0.013)	(0.007)	(0.014)
Stock illiquidity	0.087	-0.473	-0.623***	-0.303**
	(0.083)	(1.031)	(0.214)	(0.133)
Public target	-0.012***	-	-0.012**	-
	(0.004)		(0.005)	
Cash deal	-0.000	0.016	0.006	0.023***
	(0.003)	(0.010)	(0.004)	(0.008)
Relative deal size	0.031*	0.042*	0.017	0.023
	(0.017)	(0.024)	(0.016)	(0.014)
Adjusted R^2	0.050	0.128	0.117	0.298
Number of observations	1,148	279	735	172

Table 12. Firm performance

This table tests the relationship between bond liquidity and firm performance. It presents estimates from an ordinary least squares estimation. Models (1) and (2) are based on a sample of 1,319 firms over the period 2002-2014 (9,620 firm-years), models (3) and (4) are based on a sample of all Compustat firms with credit rating over the period 2002-2006. The dependent variable in models (1) and (3) is market-to-book ratio. In models (2) and (4) the dependent variable is net income-to-assets ratio. In parentheses are standard errors adjusted for heteroskedasticity (White, 1980) and clustered by firm. *, **, *** denotes significance at 0.10, 0.05, 0.01 levels, respectively. All regressions control for firm and year fixed effects and include a constant (not shown). Variable definitions are in the Appendix.

	M/B	**ROA**	**M/B**	**ROA**
	(1)	(2)	(3)	(4)
Amihud ratio	-1.323***	-0.861***		
	(0.461)	(0.219)		
Post-TRACE dummy			0.088***	0.011***
			(0.019)	(0.004)
Firm size	-0.263***	0.014*	-0.199***	-0.003
	(0.020)	(0.008)	(0.077)	(0.007)
M/B	-	-0.005	-	0.026***
		(0.007)		(0.007)
Leverage	-1.822***	-0.306***	-1.343***	-0.226***
	(0.074)	(0.034)	(0.166)	(0.043)
Cash/Total assets	0.421***	0.017	7.071***	-0.237
	(0.122)	(0.023)	(2.488)	(0.200)
Stock return	0.124***	0.014***	0.148***	0.008**
	(0.018)	(0.004)	(0.024)	(0.004)
ROA	-0.065	-	0.519***	-
	(0.085)		(0.191)	
R&D/Sales	0.095	-0.507***	-0.003	-0.002
	(0.503)	(0.142)	(0.004)	(0.002)
Credit rating	-0.036***	-0.001	-0.031***	-0.011***
	(0.006)	(0.001)	(0.012)	(0.004)
High yield dummy	-0.088**	-0.008	0.004	0.010
	(0.036)	(0.005)	(0.045)	(0.011)
Stock illiquidity	0.092	0.089*	1.227***	-0.420
	(0.122)	(0.053)	(0.278)	(0.283)
Firm fixed effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.831	0.346	0.861	0.459
Number of observations	9,620	9,620	4,728	4,728