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Corporate investment and stock liquidity: Evidence on the price impact of trade

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ABSTRACT

We document that corporate investment contributes to stock liquidity. This study demonstrates a positive relationship between abnormal corporate investment and stock liquidity in the cross-section. Moreover, stock liquidity improves more apparently for firms with financial constraints. Our robustness check confirms that the existing regularities cannot explain the current finding. This analysis suggests that corporate investment decreases the risk of a firm and that a change in the risk affects the behavior of a market maker, leading to an increase in stock liquidity.

1. Introduction

The recent corporate investment literature documents that optimal corporate investment changes the risk of a stock (Berk, Green, & Naik, 1999). Then how does a change in the risk of a stock affect stock liquidity? The market microstructure literature addresses that a change in the risk affects the pricing strategy of market makers, leading to a change in the price impact, i.e. stock liquidity (Kyle, 1985). In this analysis, we establish a link between corporate investment and stock liquidity by connecting this line of corporate investment study to the market microstructure literature. Specifically, we provide empirical evidence on the role of corporate investment in shaping stock liquidity and argue that the risk shift from corporate investment contributes to stock liquidity.

We motivate the current study as follows. In their seminal paper, Berk et al. (1999) argue that corporate investment decision can be evaluated in a real options context because the decision to invest converts growth options into assets in place. Thus, if growth opportunities are finite, corporate investment decision changes the ratio of growth options to assets in place, i.e. the asset risk of a firm, leading to a change in the risk of its stock. In other words, the risk of a stock relates to current and historical investment decisions of the firm. (Carlson, Fisher, & Giammarino, 2004) Specifically, optimal corporate investment decreases the risk of a stock, mostly its systematic part. Even when the new assets are risky, they are less risky than the options they replace. (Carlson, Fisher, & Giammarino, 2006).[1] This line of study contributes to the asset pricing literature by exploring the implications of corporate investment for the cross section and time series of expected returns. Berk et al. (1999) are among the first to construct a dynamic real options model by analyzing the risk change in the context of corporate investment. Carlson et al. (2004), Zhang (2005), Li, Livdan, and Zhang (2009), and Liu, Whited, and Zhang (2009) are in line with the model.

On the other hand, stock liquidity is endogenously determined. In particular, stock liquidity is governed by different trade motives such as private information (Kyle, 1985; Glosten & Milgrom, 1985) and liquidity (Admati & Pfleiderer, 1988). As both trade motives are subject to the risk of a stock, a change in the risk leads market makers to change the pricing strategy, affecting the price impact. Specifically, Kyle (1985) proposes that at the equilibrium, the risk of a stock shows a negative relationship with stock liquidity. Moreover, the recent liquidity literature provides evidence on a negative association between the systematic component of the risk and stock liquidity.[2] Taken together, regardless of the risk source or structure, a change in the risk of a stock negatively co-varies with stock liquidity.

[1] Our robustness analysis shows that higher corporate investment leads to lower return volatility, that is, lower risk. Therefore, corporate investment decreases the risk of a stock, which could be due to either idiosyncratic or systematic risk or both.

[2] Brunnermeier and Pedersen (2009) propose a differential effect of the market risk on high- and low-risk stocks while both Comerton-Forde et al. (2010) and Nagel (2012) empirically demonstrate that high-risk stocks are more prone to market-wide liquidity shocks.

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By combining these two lines of study, we can hypothesize that corporate investment affects stock liquidity through the pricing strategy of market makers. Specifically, we conjecture that optimal corporate investment improves stock liquidity by lowering the risk of a stock. To our best knowledge, this study is the first empirical analysis linking corporate investment to stock liquidity by emphasizing the risk shift from corporate investment.

To address this association, we develop a research design to capture the effect of an exogenous change in corporate investment on stock liquidity. Specifically, following Titman, Wei, and Xie (2005), we define corporate investment as the deviation from the prior three-year moving average corporate investment. This approach minimizes a firm-fixed effect by removing a persistent characteristic from a raw variable. Then, we employ abnormal corporate investment as an exogenous shock and investigate the cross-sectional relationship between abnormal corporate investment and subsequent stock liquidity. In the meantime, the literature addresses that there is the feedback effect of stock liquidity on corporate investment.[3] As a determinant of required returns (Acharya & Pedersen, 2005), stock liquidity expands the set of profitable investment opportunities and increases corporate investment. (Derrien & Kecskes, 2013: Becker-Blease & Paul, 2006). Therefore, we also investigate if our analysis is subject to the endogeneity issue.[4]

Our empirical analysis shows that corporate investment indeed contributes to stock liquidity. First, a portfolio analysis illustrates that stock liquidity is significantly high for firms with a high level of corporate investment. Specifically, we sort a universe of stocks based on past stock liquidity and abnormal corporate investment every year. After a fiscal year ends, firms with a high level of corporate investment exhibit a high level of stock liquidity while firms with a low level of corporate investment present a low level of stock liquidity for both corporate investment measures. To comply with the corporate investment literature, we employ two measures for corporate investment: capital expenditure and capital expenditure plus R&D.

Second, the cross-sectional regression analysis confirms the role of corporate investment in shaping subsequent stock liquidity. In particular, when we run the Fama and MacBeth (1973) type yearly cross-sectional regression, abnormal corporate investment is positively associated with subsequent stock liquidity even after controlling for well-known determinants such as past stock liquidity and several stock characteristics. This result holds for both corporate investment measures. We observe that this pattern lasts for three months after a fiscal year ends while it gets statistically weaker beyond the horizon.

Furthermore, we examine whether financial constraints have an impact on the relationship between corporate investment and stock liquidity. Since Fazzari, Hubbard, and Petersen (1988) address the effect of financial constraints on corporate investment, many studies investigate the relationship between imperfect capital market and corporate investment.[5] As financial constraints prevent firms from financing all the desired investments, financially-constrained firms are less likely to respond to profitable investment opportunities, as shown in Kaplan and Zingales (1997). In other words, for the same level of corporate investment, investment opportunities are more likely to be profitable for financially-constrained firm than for financially-unconstrained firms other things equal. This intuition is consistent with a decreasing marginal productivity of investment opportunity. Therefore, we hypothesize that given any change in corporate investment, financially-constrained firms are likely to experience a greater risk shift and show a stronger effect on stock liquidity.[6]

Table 1
Descriptive statistics.
This table presents descriptive summary statistics for the data set. AMH is the logarithm of the Amihud (2002) daily liquidity measure which is an absolute daily return scaled by daily dollar trade volume measured over one month after the fiscal year ends. CAP (or CRD) is capital expenditure (plus R&D), scaled by beginning-of-year assets and subtracted from the prior three-year moving average capital expenditure (plus R&D). SIZE is the firm size defined as the logarithm of capitalization in the month that the fiscal year ends. PRC is the logarithm of a stock price in the month that the fiscal year ends. TNV is the average of the logarithm of daily turnover in the month that the fiscal year ends. VOL is the logarithm of the standard deviation of daily stock return in the month that the fiscal year ends. RET is a stock return in the fiscal year. CB is cash balance, scaled by beginning-of-year assets. The sample spans the year of 1971 to 2012.

	Mean	Std. dev.	1%	Median	99%
AMH	−16.579	2.624	−22.355	−16.587	−10.919
CAP	−0.012	0.197	−0.270	−0.005	0.220
CRD	−0.014	0.251	−0.349	−0.006	0.271
SIZE	11.986	1.751	8.767	11.801	16.717
PRC	2.569	0.963	0.048	2.659	4.466
TNV	−6.407	1.053	−9.102	−6.331	−4.150
VOL	−3.669	0.550	−4.949	−3.672	−2.329
RET	0.174	0.620	−0.678	0.072	2.383
CB	0.263	2.672	0.002	0.092	1.826

Our analysis shows that corporate investment indeed exhibits a stronger effect on stock liquidity for financially-constrained firms. Using two financial constraints measures such as the Kaplan and Zingales (1997; KZ) index and firm size, we sort a universe of stocks on financial constraints every year and analyze these two groups separately. The cross-sectional analysis shows that it is financially-constrained firms such as high KZ-index or small firms that drive the association between corporate investment and stock liquidity. Specifically, high KZ-index or small firms exhibit a significant effect of corporate investment on stock liquidity while low KZ-index or big firms show a weaker effect. After all, confirming the effect of market frictions on corporate investment, this analysis shows that financial constraints indeed interact with corporate investment in shaping stock liquidity.

In the robustness check, we explore an alternative explanation for the corporate investment-stock liquidity relationship. First, we examine whether optimal corporate investment indeed decreases the risk of a stock. Given that corporate investment relates to mostly the systematic risk of a stock, one might question the effect of corporate investment on total risk and therefore the implication for stock liquidity. However, our analysis confirms that corporate investment indeed reduces the total risk of a stock.[7] Second, we investigate the feedback effect of stock liquidity on corporate investment. Using the two-stage least square analysis (2SLS), we directly control for the endogeneity issue. The instrumental variable approach does not change the result of the original analysis. Third, we also control for net equity financing to see if equity financing explains the relationship between corporate investment and stock liquidity, as proposed by Eckbo, Masulis, and Norli (2000). Eckbo et al. (2000) argue that equity offering leads to an increase in stock liquidity, implying the effect of financing decision on stock liquidity. However, we find that corporate investment indeed improves stock liquidity, independent of equity financing. Overall, our robustness check confirms that corporate investment indeed contributes to stock liquidity.

Our study complements a growing study on the determinants of stock liquidity. The literature addresses several factors such as firm's characteristics (capitalization and stock price), trading activity (volume and information asymmetry), and market maker (funding liquidity). However, only a few studies explore the implication of firm's activity for stock liquidity. Among them are Eckbo et al. (2000) and Gopalan, Kadan, and Pevzner (2012). This study contributes to this line of research by discovering the role of corporate investment in shaping

[3] Bond, Edmans, and Goldstein (2012) provide an excellent survey on the feedback effect of stock market on the real economy.

[4] We thank the reviewer for pointing out this issue.

[5] See Hubbard (1998) and Stein (2003) for the classical corporate investment literature review.

[6] Whited and Wu (2006), Gomes et al. (2006), and Livdan, Shapriza, and Lu (2009) explain the relationship between financial constraints risk and stock returns.

[7] We thank the reviewer for pointing out this issue.

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