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Liquidity and Capital Structure: The Case of Pakistani Non-Financial Firms

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Abstract

This paper empirically examines the impact of equity market liquidity on firms' leverage decisions in Pakistan using a firm-level panel data covering the period 2000-2013. We use alternative measures of leverage and liquidity to ensure the robustness of equity liquidity effects. We find that equity market liquidity is significantly and negatively related to the leverage decisions of firms. We also show that firms with more liquid stocks are likely to prefer equity to debt financing. The negative effects of equity market liquidity on leverage decisions hold even after controlling for several firm-specific determinants of capital structure.

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1. Introduction

Liquidity of firms' equity is considered as one of the essential determinants of firms' capital structure decisions. According to the trade-off theory of capital structure (Modigliani and Miller (1963)), firms choose their capital structure by balancing the marginal benefit and cost of debt financing. The interest tax shield is the primary benefit of debt financing, whereas, cost of financial distress, debt overhang, and agency problems between bond and equity holders are the major costs of debt financing. However, according to the pecking order theory (Myers and Majluf (1984)), firms while financing their investments and other capital needs use first internally generated funds, then go for debt financing, and in the last, do equity financing. On the flip side, the market timing theory of capital structure (Baker and Wurgler (2002)) suggests that corporate firms time their equity issues and wait untill and unless equity market conditions for stocks issuing become favourable. That is, firm managers prefer equity financing in periods of hot equity market and use debt financing when debt market conditions are favorable.

Several earlier studies, such as, Titman and Wessels (1988), Shleifer and Vishny (1997), Ozkan (2001), Butler et al. (2005), and Akinlo (2011), have mainly focused on exploring firm-specific empirical determinants of capital structure. Most of these studies have provided evidence that the profitability of firms, the tangibility of assets, firm size, and growth opportunities play a significant role in explaining the capital structure decisions of firms. However, the later studies, such as, Hovakimian et al. (2004), Frieder and Martell (2006), and Lipson and Mortal (2009), have stressed the role of stock market liquidity in the capital structure decisions of firms. A common finding emerging from these studies is that firms having liquid stocks are more likely to issue equity, and thus, they decline their leverage significantly. Likewise, Udomsirikul et al. (2011) empirically found that the liquidity of equity market is directly linked with the capital structure of firms. Firms those stocks are more liquid are more likely to be less levered as compared to firms with relatively illiquid stocks.

When we review the previous empirical studies on the role of equity liquidity in determining the capital structure of firms, we find that most of empirical studies have reached at either ambiguous or contradictory conclusions. For instance, there are numerous studies which provide evidence of the positive relationship between firms' equity liquidity and leverage policy (see, for example, Myers and Rajan (1995), Morellec (2001), Sibilkov (2009), and Akinlo (2011)). On the other hand, several other papers document exactly the opposite. For example, studies like Hovakimian et al. (2001), Hovakimian (2006), Ahmed et al. (2010), Rajendran and Achchuthan (2013), Stulz et al. (2013), Bonaime et al. (2014), and Bolton et al. (2014), documented a negative relationship between stock market liquidity and the leverage decisions of firms. It should also be noted that most of the empirical studies have examined the effect of equity liquidity on firm leverage for developed countries. Therefore, we know less about how equity liquidity affects the capital structure decisions of firms operating in developing countries. However, to better understand the role of stock market liquidity in firms' capital structure decisions, there is a dire need to investigate the impact of equity liquidity on firm leverage in both developed and developing countries.

Keeping in view the gap in the existing literature, this paper aims to examine the impact of equity liquidity on firms' capital structure decisions in case of Pakistan. Specifically, we study

whether firms with more liquid stocks have lower debt to asset ratio. Secondly, we examine whether firms whose stocks are more liquid opt equity financing over debt. By doing this, we understand how the equity liquidity impacts firms' choice of debt versus equity financing. As in Udomsirikul et al. (2011) and Lipson and Mortal (2009), we hypothesize that firms with more liquid equity are expected to be less levered. We predict this as equity liquidity reduces the cost of issuing new equity and makes equity cheaper as compared to debt. Thus, firms are more likely to issue equity to finance their capital requirements, reducing their leverage ratio. We also predict that firms with more liquid stocks prefer equity when they make choice between equity and debt financing. We test these hypotheses using a large sample of non-financial firms listed at Pakistan Stock Exchange over the period 2000-2013. In line with the previous studies, we use several firm-specific variables as control variables in our empirical analysis.

The remaining of the paper is structured as follows. Section 2 reviews empirical literature. Section 3 describes the data, methodology, and empirical models. Section 4 presents and discusses the empirical results. Finally, Section 5 concludes the paper.

2. Empirical Literature

The capital structure decisions of firms in general and liquidity in the equity market in particular have recently become a growing area of research in corporate finance literature. Several researchers argue that equity liquidity directly affects firms' capital structure and firms with more liquid stock are likely to be less levered. Numerous studies including Myers and Rajan (1995), Sibilkov (2009) and Akinlo (2011) provided evidence of the positive relationship between equity liquidity and leverage. However, there are several other papers like Hovakimian (2006), Stultz et al. (2013), and Bolton et al. (2014) reported quite the opposite relationship between stock liquidity and firm leverage.

Lipson and Mortal (2009) examined the relationship between firms' equity market liquidity and capital structure decisions. By sorting US firms over the year 1986 to 2006 into size quintile and then into liquidity quintile, they point out that higher equity market liquidity leads to decrease the cost of issuing equity and hence motivating firm managers to issue more new equity instead of debt financing. Similarly, Frieder and Martell (2006) concluded that when the transaction cost of issuing equity is higher, then stocks are illiquid and expensive to issue, the firm will prefer to increase the level of leverage and vice versa. By applying two-stage least square analysis on US panel data of NYSE firms, they further concluded that firms with higher spread will use more debt in their capital structure. Likewise, Hadad (2012) using Amman Stocks Exchange data found that higher stocks' liquidity results in lower issuance costs and hence, greater reliance on equity financing.

Information asymmetry between firm managers and outside investors restricts firms' management to issue equity because it increases the cost of issuing equity. Therefore, issuing equity becomes expensive for firms. Consistent with the pecking order hypothesis, Lesmond et al. (2008) found that firms having more debt financing in their capital structure increase the information asymmetry in remaining equity. Consequently, the cost of equity liquidity is increased which induces firm managers to use more debt.

According to the market timing theory of capital structure, firm managers time their security issues and only issue securities when the market circumstances are favorable. Therefore, debt financing is negatively affected by favorable equity market conditions. Graham and Harvey (2001) documented that market timing plays a vital role in explaining the financing decisions of firms. They further concluded that in hot equity market, with lower adverse selection cost of issuing equity, firm managers issue more equity as compared to debt. Similarly, Baker and Wurgler (2002), Welch (2004), and Alti (2006) investigated the market timing effect of issuing equity and documented that during the IPO year, firms enjoying favorable market conditions and having low adverse selection cost of issuing equity are more likely to reduce the debt to assets ratio, as compared to firms having unfavorable equity market conditions. However, it was observed that after IPO such behavior no longer exits.

Myers and Rajan (1995) emphasized on the liquidity of assets and concluded that firms finance most of their capital needs through issuance of most liquid stocks. Similarly, Butler et al. (2005) found that the cost of issuing equity is less for more liquid stocks. This leads to higher usage of equity and lower use of debt in firms' capital structure, suggesting a negative relationship between equity liquidity and leverage. However, Hovakimian (2006) documented that equity transactions do not have any significant impact on the capital structure decisions of firms in the long run, although they may be timed to equity conditions. He also found that although there are significant market timing patterns in debt issues, debt transactions hitherto do not establish a negative relation between the market to book ratio and firms' uses of debt in their capital structure. Finally, he provided evidence of a significant impact of historical market to book value on firms' debt financing in current period.

Liquidity of stocks is also determined by information asymmetry. Kyle (1985) revealed that informed investors have more knowledge about the market. They therefore take advantage of information asymmetry and maximize their profit. Thus, increased information asymmetry increases stock issuing costs and firms therefore will be more inclined to debt financing. In contrast, Lesmond et al. (2008) showed that firms having larger amount of debt financing increase information asymmetry in remaining equity, and in turn, the cost of equity liquidity increases. At the other end, Andres et al. (2014) provided evidence that the increased debt ratio gives a signal of firms' profitability and thus, it lowers information asymmetries between managers and investors. By constructing year-by-year information asymmetry index for US listed firms, they confirmed the Ross signaling hypothesis and documented that higher equity liquidity lowers the information asymmetry between insiders and outsiders, which results in greater reliance on equity financing.

Udomsirikul et al. (2011) using fixed effects regression technique and three different measures of liquidity documented that in Thailand, firms holding more liquid stocks decrease the amount of leverage in their capital structure. Similarly, Leelakasemsant (2015) extended the work using data for Thailand listed firms and examined the impact of both equity liquidity and ownership concentration on the capital structure of firms. He found that firms with higher equity liquidity and lower concentration in ownership structure do less debt financing to finance their capital requirements. Hanselaar et al. (2016) examined IPOs and SEOs in 38 countries using quarterly data spanning 1995-2014. They found that local market liquidity has a significant and

positive impact on equity issuance. However, they documented that changes in market liquidity have weak impacts on capital structure during the financial crisis. Finally, they provided evidence that firms operating in less financially developed countries and facing greater financial constraints are less likely to be affected by equity market liquidity. Sivathaasan et al. (2016) using data on Australian firms examined the impact of stock liquidity and corporate governance quality on capital structure. They found that there is a significant and negative relation between stock liquidity and firms' leverage policy. They also reported that the impact of corporate governance quality is higher for firms those stocks are more liquid.

3. Data and Methodology

We use an unbalanced annual panel data set of all non-financial firms listed at Pakistan Stock Exchange during the period 2000-2013. We collected the date from 'Balance Sheet Analysis of Non-Financial Firms' published by State Bank of Pakistan (SBP). The financial firms were excluded from the sample because they have different capital structure. To examine the role of stocks' liquidity, we obtained stock prices data from the portal managed by Pakistan Stock Exchange.

Although the aim of this study is to empirically investigate the effect of stock liquidity on firms' capital structure, we include several other firm-specific variables in our analysis, which also affect firms' leverage decisions. These variables are firm size, profitability, assets tangibility, and average trading price of stocks. To measure stock liquidity, we use three different proxies, namely Amihuds' illiquidity, modified liquidity ratio, and modified turnover ratio. Further, to measure the capital structures of firms, we use three proxies, namely the book leverage, the market leverage, and the debt to equity ratio.

3.1 Empirical Models

In order to measure the impact of equity market liquidity on capital structure, we construct our empirical models by following the studies of Udomsirikul et al. (2011), Ahmed et al. (2010), Lesmond et al. (2008), and Hovakimian et al. (2004). Specifically, our model takes the following form.

$$LEV_{\mathrm{it}} = \beta_0 + \beta_1 LIQ_{i,t} + \beta_2 SZ_{i,t} + \beta_3 TANG_{i,t} + \beta_4 PROF_{i,t} + \beta_5 PRC_{i,t} + \beta_6 CH_{i,t} + \varepsilon_{i,t} \quad \text{(Error! Bookmark not defined.)}$$

where, $LEV_{i,t}$ represents leverage, $LIQ_{i,t}$ is stock liquidity, $SZ_{i,t}$ represents firm size, $TANG_{i,t}$ is the tangibility of assets, $PROF_{i,t}$ denotes the profitability of firm, $PRC_{i,t}$ represents the average trading price of stocks, $CH_{i,t}$ is firms' cash holdings. In Equation (1), *t* represents the time period and *i* is for cross sectional units (firms). $\varepsilon_{i,t}$ is the error term.

We also estimate another model to examine whether firms those stocks are more liquid prefer equity to debt financing. For this purpose, we use the debt to equity ratio as the dependent variable. Specifically, the model takes the following form.

$$DER_{it} = \beta_0 + \beta_1 LIQ_{it} + \beta_2 SZ_{it} + \beta_3 TANG_{it} + \beta_4 PROF_{it} + \beta_5 PRC_{it} + \beta_6 CH_{i,t} + \varepsilon_{it} \quad (2)$$

In Equation (2), DER is the debt to equity ratio and the rest of the variables are same as in Equation (1).

3.2 Liquidity Measures

3.2.1 Amihud's (2002) Illiquidity

To examine the role of stock liquidity on firms' leverage decisions, we use Amihuds' illiquidity as our first measure of liquidity. Amihud's (2002) illiquidity measure is the annual average of the daily ratio of absolute stock return to its rupee volume (hereafter $ILLIQ_{i,y}$). In particular, it is defined as follows.

$$ILLIQ_{i,y} = \frac{1}{D_{i,y}} \sum_{t=1}^{D_{i,y}} \left[\frac{|R_{i,d,y}|}{VOLD_{i,d,y}} \right]$$

where, $R_{i,d,y}$ is the absolute stock returns of stock 'i' on day 'd' of year 'y'. $VOLD_{i,d,y}$ is the daily volume in Pak rupee and $D_{i,y}$ is the respective number of days when data are available for stock 'i' in year 'y'. This ratio gives the absolute (percentage) price change per rupee of daily trading volume. Amihud's (2002) illiquidity measure shows the price impact of stocks and also be expressed as one rupee of trading volume related to daily price change. The greater the price impact the greater will be the trading cost and hence, the higher illiquidity of stocks. This liquidity measure basically measures illiquidity of stocks and was first introduced by Amihud and Mendelson (1986). Amihud (2002), Hovakimian et al. (2001), and Hovakimian et al. (2004) empirically documented that there is a positive relationship between ILLIQ ratio and the leverage of firms. As reported by the existing empirical studies, we expect that Amihud's illiquidity measure is positively related to firm leverage.

3.2.2 Modified Turnover (MT)

The modified turnover (hereafter MT) is used as our second measure of liquidity. Previously, Lipson and Mortal (2009), Udomsirikul et al. (2011), and Iskandrani and Haddad (2012) have used this measure. This measure is defined as the annual average of the monthly ratio of number of shares traded to total number of shares outstanding times the volatility of earnings in the underlying year. Specifically, it is expressed as follows.

$$MT_{i,y} = \frac{1}{M_{i,y}} \sum_{\mathrm{i=1}}^{\mathrm{M_{i,y}}} \frac{\mathrm{VOL_{i,m,y}}}{\mathrm{N_{i,y}} \times \mathrm{VOLTALITY_{i,y}}}$$

where, $M_{i,y}$ is the number of months for which data are available for the underlying firm. $VOL_{i,m,y}$ is the number of shares traded for firm 'i' in month 'm' of year 'y', $N_{i,y}$ is the total

number of shares outstanding for firm 'i' in year 'y'. $VOLTALITY_{i,y}$ is the volatility of earnings of ith firm in year 'y', and defined as the absolute difference between the annual percentage change in earnings before interest and taxes (EBIT) and the average of this change over the study period. Based on the existing empirical evidence, we expect a negative relation between the modified turnover ratio and the leverage decisions of firms.

3.2.3 Modified Liquidity Ratio (MLR)

Our third and final measure for stock liquidity is the modified liquidity ratio (hereafter MLR). It is defined as the annual average of the daily ratio of trading volume to the absolute stock return times the volatility of earnings in the underlying year.

$$MLR_{i,y} = \frac{1}{D_{i,y}} \sum_{i=1}^{D_{i,y}} \left[\frac{VOL_{i,d,y}}{|R_{i,d,y}|} \right] \frac{1}{VOLTALITY_{i,y}}$$

where $VOL_{i,d,y}$ and $R_{i,d,y}$ are the daily volume of ith stock of day 'd' in year 'y' and daily stock returns for a given year, respectively. $D_{i,y}$ is the number of days when data are available for ith stock in year 'y'. $VOLTALITY_{i,y}$ represents the volatility of earnings and is defined as in MT measure. Following previous empirical studies, we expect a negative and significant relationship between the modified liquidity ratio and leverage policy.

4. Empirical Results

Table 1 shows the results of the pooled OLS regression considering book leverage, market leverage, and the debt to equity ratio as the dependent variable and liquidity (LIQ), profitability (PROF), cash holdings (CH), firm size (SZ), average price level (PRC), and tangibility of assets (TANG) as independent variables. Further, we include year and firm dummies in the specification to control for year-specific and firm-specific effects. The coefficient of Amihud's illiquidity (ILLIQ) is positive and statistically significant in both book and market leverage regressions. This finding implies that firms whose stocks are illiquid take higher amount of debt in their capital structure and thus, increase their leverage. Firms do so because illiquidity of stocks increases costs of equity issuance, which induces firms to finance their capital needs by issuing debt. In the debt-equity-choice regression, although the estimated value of ILLIQ coefficient is positive, it appears statistically insignificant. The positive coefficient suggests that firms with more illiquid stocks opt debt to equity financing. However, one should note that the illiquidity of stocks is statistically less relevant to firms' choice between debt and equity.

Looking at the sign of the estimated coefficient of modified turnover ratio (MT) we observe that MT carries a negative sign and appears statistically significant in all the estimated models. This implies that the modified turnover ratio is not only negatively related to book and market leverage but also to the ratio of debt to equity. The negative sign of the modified turnover ratio in leverage regressions suggests that firms with more liquid stocks use less debt in their capital structure and thus, they reduce their leverage significantly. Further, the results from the debt-equity-choice regression indicate that the liquidity of stocks has a significant impact on the

debt-equity choice. Firms with more liquid stocks are more likely to finance their capital needs by issuing equity rather than debt financing.

Finally, the coefficient of modified liquidity ratio (MLR) is also negative in all the three estimated regressions. This provides evidence that there is a negative relationship between the modified liquidity ratio and all of our leverage measures i.e. the book leverage, the market leverage, and the debt-equity ratio. Taken together, the results indicate that firm managers lower the amount of leverage when their equity is more liquid. They do so because higher liquidity of equity reduces the cost associated with the equity issuance. Therefore, managers of firms with liquid stocks prefer equity financing. The negative impact of equity liquidity on leverage is consistent with the prediction of the pecking order theory of capital structure, which states that there is an inverse relationship between equity liquidity and debt financing of firms. Our results also confirm the findings of Iskandrani and Haddad (2012), Udomsirikul et al. (2011), Lipson and Mortal (2009), Hovakimian et al. (2004), and Hovakimian et al. (2001).

Turning to the effects of firm-specific variables we find that there is an inverse relationship between profitability and our leverage measures. This implies that profitable firms are more likely to be less levered. The cash holdings coefficient indicates that firms holding more cash in their hands take less debt in their capital structure. The results also suggest that large firms are more expected to use debt to finance their assets. Large-sized firms have more market knowledge, are well reputed at debt markets, and have less chance of being bankrupt. Thus, large firms take more debt relative to equity. The estimated coefficient suggests that the impact of share prices on leverage is negative and statistically significant. This result indicates that firms having higher share prices use less debt in their capital structure, as issuing new equity is relatively cheaper for them. Referring the market timing theory of capital structure, one can expect the negative association between stock prices and the leverage decisions of firms.

Finally, we observed that the coefficient of tangibility of assets attains a negative sign, suggesting that there is a negative relationship between asset tangibility and leverage. According to the pecking order theory, tangible assets are easy to value for outsiders than intangible assets, and hence, they mitigate asymmetric information conflict between management and investors. Firms facing less asymmetric information problem are more likely to issue equity and in turn, reduce their leverage ratios, as equity financing is relatively cheaper for them.

Table 1: Results for equity liquidity effects on leverage

Variables	Amihud illiquidity measure			Modified turnover ratio			Modified liquidity ratio		
	Book Leverage	**Market Leverage**	**DER ratio**	**Book Leverage**	**Market Leverage**	**DER ratio**	**Book Leverage**	**Market Leverage**	**DER ratio**
$LIQ_{i,t}$	0.103***	0.440***	0.321	-0.745***	-0.283***	-0.637***	-0.222***	-0.185***	-0.014**
	(0.000)	(0.024)	(0.292)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)	(0.046)
$PROF_{i,t}$	-0.338***	-0.191***	-0.318	-0.315***	-0.207***	-0.304***	-0.309***	-0.203***	-0.313***
	(0.000)	(0.000)	(0.121)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)
$CH_{i,t}$	-0.385***	-0.385***	-1.000***	-0.378***	-0.357***	-0.943***	-0.375***	-0.355***	-1.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$SZ_{i,t}$	0.031***	0.019***	0.107***	0.031***	0.015***	0.115***	0.032***	0.016***	0.114***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$PRC_{i,t}$	-0.027***	-0.093***	-0.088***	-0.031***	-0.092***	-0.103***	-0.031***	-0.091***	-0.105***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$TANG_{i,t}$	-0.309***	-0.428***	-0.501***	-0.286***	-0.396***	-0.450***	-0.286***	-0.394***	-0.468***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	0.523***	0.802***	0.738***	0.529***	0.806***	0.714***	0.524***	0.800***	0.737***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
F-statistic	58.15	127.15		51.83	120.01		51.50	117.30	
	(0.000)	(0.000)		(0.000)	(0.000)		(0.000)	(0.000)	

Note: The table reports the pooled regressions results for the book leverage, the market leverage, and the debt to equity ratio. We use three different measures of liquidity. P-values are given in parenthesis. All the regressions include year and firm dummies to control year-specific and firm-specific effects. Further, the standard errors are clustered by firms. Amihuds' (2002) illiquidity ratio is the annual average of the daily ratio of absolute return to the (rupee) trading volume. The modified turnover ratio is the annual average of the monthly ratio of number of shares traded in the market to total outstanding shares times the annual of volatility of earnings of the firm. The modified liquidity ratio is the annual average of the daily ratio of trading volume to absolute stock return times the volatility of earnings in the underlying year. Book leverage is the ratio of the book value of total debt to the book value of total assets. Market leverage is defined as the book value of debt divided by the market value of assets. The debt to equity ratio (DER) is measured as the book value of debt to shareholders' equity. SZ represents firm size and is defined as the natural log of total sales. PRC is defined as the average trading price of shares during the accounting year. CH is the cash holdings of a firm and is defined as the ratio of cash to total assets. PROF is the profitability and is defined as the ratio of net profit before tax to total assets. TANG is the ratio of fixed assets after deducting accumulated depreciation to total assets.

* Significant at the 10% level.

** Significant at the 5% level.

*** Significant at the 1% level.

5. Conclusions

In this study, we examine how equity liquidity affects the financing decisions of firms in Pakistan. Specifically, we study whether firms having more liquid stocks take less debt in their capital structure. We also examine the impact of equity liquidity on the choice between debt and equity financing. We take the market leverage, the book leverage, and the debt to equity ratio as proxies for firm leverage. We also use three different measures of liquidity, namely, Amihuds' (2002) illiquidity measure, the modified liquidity ratio, and the modified turnover ratio. We find that higher equity liquidity leads to decrease the leverage ratio, suggesting a negative relationship between liquidity and the leverage of firms. Our results suggest that firms tend to issue more stocks when their stocks are more liquid, and they, in turn, decrease their leverage ratio. We also find that firms with more liquid equity prefer equity financing to debt, indicating that firms lower the debt to equity ratio when their stocks are more liquid.

Our findings that firms having more liquid stocks are likely to reduce their leverage ratios have important policy implication. Well functioning and liquid equity markets would help reduce firms' dependence on debt financing. Our findings would also help firm managers in designing long-term investment plans and making strategic decisions.

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