

HOW FINTECH TRANSFORM THE RELATIONSHIP IN BETWEEN FINANCING CONSTRAINTS AND CORPORATE LIQUIDITY? EVIDENCE FROM PAKISTAN

Mehak Ali¹, Dr Muhammad Kashif Saif²

¹PhD Scholar, Department of Business Administration, NCBA&E Lahore, Sub campus Multan, Punjab, Pakistan.

²Assistant Professor, Department of Business Administration, NCBA&E Lahore, Sub campus Multan, Punjab, Pakistan

¹mehakali122310311@ncbaemultan.edu.pk, ²kashif.fuu@gmail.com

Corresponding Author: *

Mehak Ali

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ABSTRACT

In underdeveloped nations' businesses face significant challenges when they need to understand cash flow and manage financial constraints. Researchers who study developing nations find financing restrictions more credible because these markets exhibit reduced activity in corporate bonds and commercial papers and restricted equity market regulation. The rapid growth of financial technology i.e. Fintech in Pakistan has a significant impact on businesses. So, the purpose of this study is to examine the relationship between FinTech, financing constraints, and corporate liquidity using the data of Pakistani manufacturing companies listed on the PSX in between 2013 and 2024. For the analysis of data, it gathered from different sources i.e. Findex database, State bank of Pakistan, PSX firms reports, research surveys, and research reports by different organizations. Hence, by using SPSS for the data analysis we found that financing constraints had an adverse impact on a firm's liquidity. It means that when firms face greater financing constraints, their liquidity management worsens. However, the negative effect of financing constraints on company liquidity will be lessened by financial technology (Fintech), which will also have favorable external impacts.

Keywords: Financing constraints, Liquidity, Fintech, Pecking Order Theory, Trade-offs Theory.

INTRODUCTION

The economic performance of low and lower-middle-income nations experiences severe constraints due to financial constraints which affect various aspects. Underdeveloped nations' businesses face significant challenges when they need to understand cash flow and manage financial constraints. Researchers who study developing nations find financing restrictions more credible because these markets exhibit reduced activity in corporate bonds and commercial papers and restricted equity market regulation. Baños-Caballero et al., (2014) discovered that corporations when addressing financial constraints incline to have lower working capital compared to companies without such constraints. The imperfect market

theory states that external funding costs businesses more than internal funds so external financing represents a poor alternative. Working capital investments present increased risks to organizations which face resource limitations. Small businesses that lack sufficient resources can increase their inventory levels by using accounts payable. Businesses facing challenges in obtaining external funding do not receive cost advantages from paying suppliers in cash for their inventory. Organizations without financial constraints experience a different situation than their constrained counterparts. Customers that purchase inventory directly from a supplier receive a discount if they have the funds. Organizations have unlimited access to obtaining

bank loans when they need financial support. Vendors who accept cash payments provide discounts which go beyond their standard interest charges. Businesses which face financial constraints and those which do not require different amounts of working capital. The active pursuit of ideal working capital levels remains difficult for businesses operating in developing markets due to operational and financial constraints together with strategic factors (Chauhan & Banerjee, 2017).

Brealey and Myers (2003) identify liquidity valuation as one of the ten unresolved financial problems. Businesses move toward cash even though it generates no nominal interest and its real interest rate remains negative because the market lacks a complete explanation for this behavior. Information technology advancements and computerized management accounting systems have simplified both financial transactions and cash management processes. The use of credit cards and smartphones allows customers to complete payment transactions. Organizations have the ability to track both their cash movements and inventory levels and worldwide sales activity through virtual real-time systems. Working capital represents the essential financial resource businesses require to maintain their daily operations. Businesses control their short-term assets through four main categories: cash holdings and marketable securities combined with inventory and receivables. The company's liquidity together with its short-term financial stability becomes apparent through its working capital statement (Wasiuzzaman, 2015). In developing countries such as Pakistan businesses must focus on liquidity management because market instability and economic uncertainty create major risks. Businesses maintain sufficient cash reserves which establish a security buffer to handle unexpected situations. The latest studies show that businesses maintain excess funds because of agency motivations along with transaction expense minimization and precautionary motives (Chen et al., 2015; Pinkowitz et al., 2016). In the Pakistani context, where businesses confront substantial macroeconomic risks and funding constraints, precautionary motives are especially pertinent. He proposed that businesses in emerging markets typically have more cash on hand to protect against future cash flow issues and possible credit constraints (Demir & Ersan, 2017).

FinTech consists of enterprises which use technology to provide services across consumer banking as well as financial research along with

payments and retail and institutional investing and equity financing and remittances and personal finance and lending and banking infrastructure (Skan et al., 2014). Pakistan is a growing nation, and they view technological progression as a key component of their progress. According to Rizvi (2018), given the country's high teen population, rising internet and smartphone penetration, growing consumer preference for e-commerce and digital transactions, and financial systems' ability to absorb innovation, Pakistan has the potential to be a significant area for Fintech growth. The anxiety about hidden consequences together with the dangers of creative technology use makes people reluctant to embrace new technological solutions. The financial technology revolution affects all social and economic development facets through its widespread influence. FinTech supports a number of macroeconomic goals, including financial inclusion (Lyons et al., 2022), a prosperous economy (Awais et al., 2023), and economic growth (Narayan, 2019). In the realm of microeconomics, FinTech improves corporate investment efficiency (Huang, 2022), decreases bank credit risk (Cheng & Qu, 2020), increases bank efficiency (Lee et al., 2021), expands corporate financing channels, and eases financing constraints (Beck et al., 2018).

Our research focuses on two primary topics which investigate how financing restrictions affect corporate liquidity as well as the role that FinTech plays in connecting financing constraints with corporate liquidity. We analyzed Pakistan's manufacturing sector as the third-largest economic sector of the country to achieve this research goal. The industry plays an essential role in advancing the local community alongside boosting Pakistan's overall economic development. The finance ministry of Pakistan's government has identified particular industries which possess substantial capital resources and accessible credit facilities. These sectors include Textile, Cement, Chemical, Automobile Assembler, Food and Personal Care Products, Engineering, Pharmaceuticals, Sugar and Allied Industries, Paper and Board, Glass and Ceramics, Fertilizer, Synthetic & Rayon, Vanaspati & Allied Industries and Tobacco and other related segments (as listed in PSX). The process of transforming raw resources into finished products enables manufacturing companies to provide better value to their customers. The transformation of raw materials into finished goods depends on a continuous financial stream that remains stable

throughout the entire process. Hence, in order to know how FinTech transform the relationship in between financing constraints and corporate liquidity we use a panel data of 187 Pakistani manufacturing listed firms over the period 2013-2024, whose annual reports easily available on PSX and SECP website. The potential contribution of this study is that it will be essential for the management of manufacturing firms because it observed that how much intensity of financial constraints is present in manufacturing firms, how differently financial constraints levels affect corporate liquidity behavior of manufacturing firms and how manufacturing firms mitigate the effect of financing constraints by the adoption of Fintech so that liquidity issues can easily be managed. The research fills the knowledge gap about how FinTech influences business liquidity. This topic represents a novel subject area because it remains unstudied while providing practical value for both theoretical research and business behavior guidance purposes.

1. Literature Review:

1.1 Theoretical Framework:

Modigliani and Miller (1958) introduced the MM theorem which demonstrated that enterprises could use different financing methods without affecting their overall cost. The firm does not possess an ideal capital structure and there are no restrictions on financing options. The results depend on the perfect capital market hypothesis which stands as their fundamental assumption. The MM theorem's foundational assumptions proved to be both excessively strict and unrealistic.

The concept of trade-offs was initially introduced by Kraus and Litzenberger (1973) during a subsequent period. According to this hypothesis the value of a company increases because of the tax shield effect of debt when its debt ratio remains at a low level. A company experiences decreased value because of financial distress costs when it maintains a high level of debt which creates additional financing limitations. A company reaches its highest value point when it achieves the optimal debt-to-equity ratio.

The pecking order theory presented by Myers and Majluf (1984) states management understands firm valuation better than outside investors because of information asymmetry. Equity funding lowers the stock price; therefore, internal financing is less expensive than external financing. As a result, firms prefer funding from inside sources rather than from

debt and equity financing. Firm's dealing this challenging financial situation due to the disparity in between the internal and external finance expenses.

Financing constraints and corporate liquidity

Business liquidity management started its journey through The General Theory of Employment Interest and Money which John Keynes published in 1936. He proved that if capital markets were in ideal situation business organizations would eliminate their cash management responsibilities because lending activities would exist without any limitations. It is also made vibrant that financing constraints are seems to related with the managing of liquidity issues, and that market frictions are the only factor that makes it important. Prior studies have demonstrated the strong correlation between funding limitations and liquidity. Research conducted by Acharya et al. (2007) found that companies facing severe financial constraints tend to increase their cash reserve holdings. When businesses face limited funding, they allocate surplus funds toward debt reduction. García-Teruel et al. (2009) showed that superior accounting quality through accounting information quality reduces commercial cash reserves and boosts efficiency of financing contribution while minimizing adverse selection and information asymmetry costs. In line with Lee et al.'s (2023) perspective on uncertainty, businesses boost their cash reserves and those with significant financing limitations conserve more money when oil prices and geopolitical threats are uncertain. Fan et al. (2024) proposed a negative correlation between a firm's liquidity and financing limitations. Fintech, on the other hand, will minimize the negative effects of funding constraints on company liquidity and have positive external effects. The research conducted by Athar & Faraz, (2024) examined how different financial constraint indicators affected the proper working capital level through liquidity assessment which revealed that companies facing elevated financial constraint exposure maintain reduced optimal liquidity levels while experiencing increased operational liquidity difficulties. The management of liquidity stands as a vital element for firms facing financial constraints which want to make beneficial investments when such opportunities appear (Keynes, 1937). Businesses which possess unrestricted access to external funding find balance sheet liquidity lacks any meaningful value. The link between cash

sensitivity in cash flow and a company's tendency to retain profits from cash inflows emerges from financial restrictions (Almeida et al., 2004). As per the Arianpoor and Mohammadbeikzade (2025) financial restrictions changed how investment affected liquidity levels. Their research showed that these financial conditions reduced the connection between investment during the next year and firm stock liquidity which was measured using trading turnover index from the current year. The results of Liu et al., (2025) indicated that financial constraints lead to operational and efficiency degradation among smaller market capitalization firms and those with low liquidity and high leverage.

Hence, on the base of above literature the following hypothesis is proposed:

H₁: Financing constraints has the negative effect on Corporate Liquidity

1.2 Impact of Fintech

The advantages of FinTech consist of reduced expenses and accelerated operations along with broad reach which addresses the limitations of standard financial services. Present research shows that FinTech provides better corporate development along with bank-organizational information balance. FinTech operates alongside traditional financial institutions as demonstrated by the Cole et al., (2019) in its examination of United States crowdfunding data. The implementation of FinTech produces better financial access and cuts down on financing expenses. In the report by Fuster et al. (2018), Ant Financial and similar organizations utilized artificial intelligence together with big data analytics to generate smart loan choices which lowered costs for lenders while accelerating loan processing and reducing financial stress on small and medium-sized enterprises. Phan et al., (2020) used Indonesian data to prove that FinTech development hinders bank performance improvement especially affecting state-owned banks and high-value banks and established banks. Zhao et al., (2022) investigated the effects of FinTech on China's banking sector and its results were conflicting that is FinTech improved banks' capital sufficiency and management effectiveness while

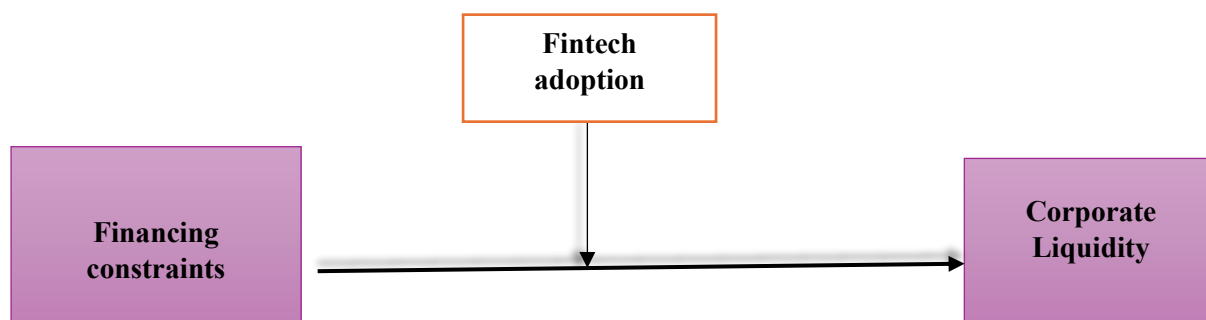
decreasing their profitability and asset quality. As per the point of view of Lee et al., (2023) the development of financial technology has reduced commercial banks' overall effectiveness, especially with regard to debt management. The efficiency of commercial banks has decreased as a result of the increase the cost associated with debt.

Based on the research of Fan et al., (2024) it is exerted that FinTech will either worsen or reduce the detrimental effects of financial constraints which limit company liquidity in Chinese A-share manufacturing firms during 2011–2020. Dhiaf et al., (2024) demonstrated that manufacturing techniques from FinTech companies outperform fourth industrial revolution methods when it comes to boosting efficiency. As posed by the research of Liu et al., (2025) it is concluded that fintech greatly accelerates the growth of upcoming businesses, although financial limitations have a moderating effect. Fintech has a greater impact on increasing industrial robot penetration rates in eastern China, according to the heterogeneity research. Ding et al., (2022) found that Fintech has been shown to improve credit evaluation processes and businesses' access to capital, particularly in growing industries with limited resources. Ming et al., (2025) established that fintech advancements which reduce information gaps between banks and businesses have transformed how large banks and small bank organizations provide loans. The study found large bank involvement together with fintech application usage decreases the financial challenges which SMEs experience. On the other hand, Liao et al., (2025) indicated that banks with reduced liquidity mismatch tend to have improved FinTech development which occurs through expanded loan business and enhanced risk control and increased non-interest revenue. The way FinTech will advance sustainable economic growth and social development will progressively become more transparent to everyone. (Awais et al., 2023; Tao et al., 2022).

Hence, on the base of above literature the following hypothesis is proposed:

H₂: FinTech reduces the adverse impact of financing constraints on corporate liquidity

1.3 Conceptual Framework



1.4 Empirical Model:

The model that was used to study the effect of regression model (Fazzari et al., 1987; Hubbard, 1998). Here the independent variable will be the financing constraints, the dependent variables will be corporate liquidity, while fintech will use as moderator.

$$CL = \beta_0 + \beta_1 KZ_{it} + \beta_2 FinTech_{it} + \beta_3 (KZ_{it} \times FinTech_{it}) + \varepsilon_1$$

Where:

- CL= Corporate Liquidity (Dependent variable)
- KZ= Financing constraints (Independent variable)
- Fintech = Moderator variable
- KZ × FinTech= Interaction term between the independent variable (KZ) and the moderator (FinTech) (this term tests moderation).

2. Research Methodology

In order to determine the effect of financing constraints on corporate liquidity in the presence of fintech as moderator this study employs quantitative research design for the panel data. Financial and other data extracted from the annual statements of listed Pakistani manufacturing firms that is available on the website of Pakistan stock exchange from 2013 to 2024. The sample representativeness improved through our data processing methods which included (1) excluding listed companies with incomplete data and (2) removing samples which did not have data for main variables. The sample's primary continuous variables underwent modifications for values less than 1% and values greater than 99% to minimize the effect of extreme data points. The final panel data consists of 1870 observations from 187 different companies.

3.1. Variables

In this study Corporate Liquidity (CL) was taken as Dependent variable. It is computed by dividing net assets by the natural logarithm of cash and its equivalents. Cash and equivalents are bank balances, marketable securities, and cash.

Financial limitations used as an independent variable in this study, and the KZ index—a proxy for financing constraints (KZ) was computed using Kaplan and Zingales (1997). More financial constraints are indicated by a higher index value.

$$KZ \text{ index} = -1.001909 \times \text{cashflow} / K + 0.2826389 \times Q + 3.139193 \times \text{debt} / k - 39.3678 \times \text{dividend} / k - 1.1314759 \times \text{cash} / K.$$

Also, Fintech taken as moderator variable. Financial technology refers to the application of technological solutions within the financial services sector. Noreen et al. (2022) suggested that the Fintech Findex database collects information by analyzing reports from PSX enterprises together with data from the State Bank of Pakistan and research surveys and different organizations. The electronic database searches depended on three primary keywords including Fintech along with financial technology and fintech practices. The State Bank of Pakistan website contained additional fintech-related materials and reports which were discovered through its search function. The assessment procedure included documents which were only available in English for analysis purposes. The analysis focused exclusively on businesses which obtained funding through Fintech sources to enhance liquidity while excluding every other business from consideration.

4. Results and Discussion

4.1. Descriptive statistics

Table 1:

| Variable | N | min | max | SD | mean |
|----------|------|--------|-------|-------|-------|
| CL | 1870 | -1.628 | 3.016 | 0.825 | 2.744 |
| KZ | 1870 | -4.245 | 5.143 | 0.632 | 1.421 |
| Fintech | 1870 | 3.452 | 6.721 | 2.467 | 5.328 |

Table 1 displays descriptive statistics for the dependent, independent, and moderator variables. The dependent variable, corporate liquidity (CL), has a standard deviation of 0.825 and a mean of 2.744, with values ranging from -1.628 to 3.016. This implies that CL generally has a modestly positive tendency and comparatively little variation throughout the sample. This study logarithmically modifies the original data since the mean value of CL is significantly higher than the median, showing the presence of clearly right-skewed features. The

financing constraints (KZ) variable functions as the dependent variable and contains a standard deviation of 0.632 and a mean value of 1.421 and spans from -4.245 to 5.143. The data shows strong dispersion because the minimum and maximum values have a wide range even though the standard deviation remains low. The moderator variable Fintech presents substantial variability since its mean value sits at 5.328 while its values span from 3.452 to 6.721 and it has a standard deviation of 2.467.

4.2. Correlations

Table 2: Correlation Matrix

| | CL | Fintech | KZ |
|---------|---------|-----------|----|
| CL | 1 | | |
| Fintech | 0.024** | 1 | |
| KZ | 0.032** | -0.293*** | 1 |

Coefficients marked with *, **, and *** indicate significance at the 10, 5 and 1% levels, respectively. Table 2 presents the Pearson correlation matrix which helps determine the initial assessment between three key variables. The analysis reveals that Fintech shows positive correlations with both financing constraints (KZ) and liquidity (CL) but FinTech demonstrates a strong negative relationship with financing constraints (KZ). The strong

relationship between dependent and independent variables does not lead to multicollinearity because multicollinearity happens when independent variables show strong correlations between each other according to Brooks (2008). The presence of multicollinearity becomes apparent when the correlation coefficient exceeds 0.80 or 0.90 according to Field (2013). The overall model does not experience any multicollinearity issues.

4.3 OLS Regression Analysis

Table 3: Regression Analysis

| Variables | Model 1 | Model 2 | Model 3 |
|--------------|---------------------|---------------------|----------------------|
| | CL | CL | CL |
| KZ | 0.039*** (0.011) | 0.037*** (0.012) | 0.039*** (0.011) |
| Fintech | | -0.022 (0.079) | 0.064 (0.085) |
| KZ x Fintech | | | -0.023*** (0.006) |

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The results of Table 3 in Column (1) reveal that all three methodologies produce statistically positive coefficients which show financing restrictions (KZ)

cause liquidity (CL) reduction in enterprises. The data shows that converting assets into cash requires an extended period. Furthermore, it is evident that

hypothesis 1 is confirmed. However, Column (2) shows that there is no direct correlation between FinTech and corporate liquidity, as the coefficient of its impact on CF is not statistically significant. And, column (3) demonstrates that the interaction term regression coefficient and the financing constraints coefficient (KZ) are both substantially

positive (KZ x Fintech) is crucial and unfavorable when a fixed effects model is used to incorporate the interaction term between FinTech and finance constraints. This suggests that FinTech will lessen the detrimental effects of the financing constraints on corporate liquidity, supporting hypothesis 2.

4.4. Industry fixed effect consideration

Table 4 Industry fixed effect consideration

| Variables | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|--------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| | CL | CL | CL | CL | CL | CL |
| KZ | 0.045*** (0.010) | 0.045*** (0.010) | 0.045*** (0.010) | 0.045*** (0.010) | 0.045*** (0.010) | 0.045*** (0.010) |
| Fintech | | -0.021 (0.076) | 0.046 (0.078) | | -0.015 (0.076) | 0.037 (0.077) |
| KZ x Fintech | | | -0.016** (0.008) | | | -0.018** (0.008) |

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

The problem of excluding crucial industry-level variables which remain stable over time gets solved through industry fixed effects which remove industry-based effects. The estimation outcomes would become unreliable when these variables are excluded from the model. Table 4 produces conflicting results between its initial three columns which present the results of individual, time and industry fixed effects. The main regression result remains robust because every interaction term regression coefficient (KZ x Fintech) shows statistically significant negative values at the 5% level which matches the main regression result.

5. Conclusions

The literature that is now available is still unclear. Thus, we check in two stages: first, how financing limitations affect company liquidity, and subsequently, how financial technology affects it. As demonstrated by earlier research, we discovered that financing limitations had a negative effect on corporate liquidity, whether in the complete or classified sample. This means that the more financing constraints, the poorer the corporate liquidity (Fan et al., 2024; Athar and Faraz, 2024). Contrary to previous research findings, we also discovered that fintech has a positive effect and may offset the adverse consequences of financing constraints on the liquidity of businesses (Fan et al., 2024; Ding et al., 2022; Ming et al., (2025).

There are some real-world uses for our study as well. First, the evolution of financial technology has

impacted the growth of the conventional banking sector. The conventional banking sector, on the other hand, has taken advantage of the push to provide businesses with better and more convenient services and to completely raise the standards of financial services. Services including reducing loan thresholds, streamlining loan applications, and increasing loan coverage are meant to ease corporate financing constraints and foster business expansion. Second, in order for small and medium-sized financial technology businesses to grow swiftly and healthier and more efficient methods facilitate progress in society and the marketplace of their communities, local governments should give financial technology development top priority, foster and support these businesses, and offer the necessary direction and supervision.

There are some limitations in this study that is: smaller businesses and microenterprises should be the ones most impacted by the growth of FinTech. Due to difficulties with data availability, small and micro-enterprises were excluded from the sample selection procedure. To strengthen the link between FinTech and company liquidity, future studies might want to focus on extending the sample size. In addition, future research should inspect the additional effects created due to use of financial technology (Fintech) on the corporate liquidity. We also concentrate on the interaction between financial technology, financing constraints, and corporate liquidity. And sample contains Pakistani

manufacturing firms in future researchers should consider firms of other geographical area.

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