The Volatility Premium in a Frontier Market: Evidence from the Pakistan Stock Exchange

Abstract

This paper investigates the primary determinants of stock returns in a key South Asian frontier market, the Pakistan Stock Exchange (PSX). We test the applicability of established asset pricing theories by simultaneously examining the pricing of market microstructure frictions (liquidity, information asymmetry) and classic risk (total volatility).Using a panel dataset of 15 large-cap stocks from 2011 to 2022, we employ panel regression models with firm and time fixed effects to assess the impact of lagged illiquidity, information asymmetry, and total volatility on monthly stock returns. Contrary to canonical theories, our findings show no statistically significant evidence of a premium for illiquidity or information asymmetry in our sample. The most robust and significant determinant of stock returns is past total volatility; stocks with higher volatility command significantly higher expected returns. This positive relationship holds across various robustness checks, including sub-period and market condition analyses. This study provides rare empirical evidence from the PSX, identifying total volatility as the dominant priced factor. This result challenges the low-volatility anomaly often found in developed markets and suggests that in a high-uncertainty frontier market, the classic risk-return paradigm prevails over microstructure-based theories. Our findings imply that for large-cap Pakistani stocks, managing total volatility is more critical for investors than managing liquidity risk.

Keywords: *Volatility premium, Frontier markets, Pakistan Stock Exchange, Asset pricing, Liquidity risk, Information asymmetry*

1. Introduction

Frontier markets represent a unique and increasingly important segment of the global financial landscape, characterized by nascent development, lower liquidity, and higher operational risks compared to their emerging and developed counterparts. Among these, South Asian frontier markets like the Pakistan Stock Exchange (PSX) are particularly compelling, exhibiting rapid economic growth alongside significant market frictions. These unique conditions challenge the direct application of conventional asset pricing theories developed in more mature markets.

The central research question of this paper is:

Which risk factors—market microstructure frictions (liquidity, information asymmetry) or classic risk measures (volatility)—are priced in the cross-section of stock returns on the Pakistan Stock Exchange? This question is motivated by the inherent tension between the theoretical importance of microstructure frictions in less-developed markets and the overriding influence of macroeconomic and political volatility often observed in such environments.

While a broader study of South Asia was initially considered, significant data availability issues for markets in Bangladesh and Sri Lanka necessitated a focused approach. We therefore conduct a deep-dive analysis of the PSX, using it as a representative case study for a major frontier market. This study addresses three key questions:

1. Is there a significant premium for illiquidity on the PSX?
2. Does information asymmetry command a significant premium?
3. What is the role of total volatility as a determinant of returns?

This research offers significant practical and academic contributions. For investors, it provides crucial insights for risk management and portfolio allocation in a high-growth market. For policymakers, it informs reforms aimed at improving market efficiency and reducing the cost of capital. Academically, it fills a critical gap by providing focused, empirical evidence on which risk factors are truly priced in a key frontier market, offering a more nuanced understanding of asset pricing beyond developed markets.

The remainder of this paper is organized as follows. Section 2 reviews the foundational literature on asset pricing, market microstructure, and their application to frontier markets, establishing the theoretical grounding for our study. Section 3 details our research methodology, including the data sources, variable construction, and econometric model, and formally develops our testable hypotheses. Section 4 presents the core empirical results from our panel regression analysis and robustness checks. Section 5 discusses these findings, interpreting their significance and comparing them to established theories. Finally, Section 6 concludes by summarizing our key contributions, outlining the paper's limitations, and offering suggestions for future research.

2. Literature Review and Theoretical Grounding

Theories of asset pricing have evolved significantly, moving from single-factor models to complex frameworks incorporating behavioral anomalies and market microstructure frictions. This evolution, however, has been largely driven by evidence from mature, developed markets. This section reviews two central themes in the asset pricing literature—the role of volatility and the premium for illiquidity—highlighting the conflicting evidence between developed and emerging markets to situate the unique context of the Pakistan Stock Exchange.

2.1. The Volatility Puzzle: Anomaly in the West, Premium in the East?

The classic risk-return tradeoff posits a positive linear relationship between risk (often proxied by volatility) and expected returns. However, a substantial body of empirical work has challenged this fundamental tenet, particularly in developed markets.

The most prominent challenge is the "low-volatility anomaly," first comprehensively documented by Ang, Hodrick, Xing, and Zhang (2006). In their seminal study of the U.S. equity market, they used portfolio sorts and Fama-MacBeth regressions on data from 1963 to 2001. They found a powerful and perplexing negative relationship: stocks with high past total and idiosyncratic volatility earned anomalously low future returns, a finding that could not be explained by standard risk factors like size, value, or momentum . This anomaly has proven to be remarkably persistent. A more recent, extensive review by Blitz, van Vliet, and van der Grient (2020) synthesized decades of research and confirmed that the low-volatility effect is a robust phenomenon across global developed markets, representing a significant challenge to the efficient market hypothesis.

In stark contrast, research in less-developed markets paints a different picture. A cross-country study of 29 emerging markets by Zaremba and Czapkiewicz (2017) found that the relationship between volatility and returns is far from uniform. Using portfolio sorts and panel regressions, they demonstrated that while some emerging markets exhibit the low-volatility anomaly, many others—particularly those with higher sovereign risk and less market integration—show a traditional, positive volatility premium. This suggests that as market-wide uncertainty and fundamental risks increase, the classic risk-return paradigm reasserts its dominance.

This positive relationship is further confirmed in a recent single-country study of the Chinese A-share market by Guo, Ruan, and Zhao (2022). China's market, which shares features with frontier markets like high retail investor participation, found a significant positive premium for idiosyncratic volatility. This highlights that in markets characterized by high uncertainty and different investor behavior, volatility remains a key priced risk for which investors demand positive compensation. This creates a clear puzzle: is the pricing of volatility on the PSX governed by the anomalous patterns of developed markets or the classic risk-return principles seen in other emerging economies?

2.2. The Liquidity Premium: A Universal Truth?

A parallel stream of literature focuses on the pricing of market microstructure frictions, with liquidity at its forefront. The foundational liquidity premium theory was advanced by Amihud and Mendelson (1986). Using portfolio sorts on NYSE stocks grouped by their bid-ask spreads, they demonstrated that less liquid assets command higher expected returns as compensation for higher transaction costs. This concept was later expanded by Pastor and Stambaugh (2003), who showed that systematic, market-wide liquidity risk is also a priced factor, with stocks more sensitive to liquidity shocks earning higher returns.

The existence of a liquidity premium has been widely confirmed, including in emerging markets. A recent study by Černý and Němeček (2021) on the Central European emerging markets of Poland, the Czech Republic, and Hungary provides a compelling example. Employing panel regressions with various liquidity proxies on data from 2008 to 2019, they found a robust and statistically significant liquidity premium, confirming the theory's applicability in markets at a similar stage of development to Pakistan.

However, the universality of this premium may be nuanced. A key insight from Hasbrouck (2009), who analyzed effective trading costs from daily U.S. equity data, is that illiquidity and its associated costs are not uniform across the market. He found that trading costs are substantially higher and more impactful for small-cap stocks than for their large-cap counterparts. This implies that any discernible liquidity premium should be most concentrated in smaller, less-traded firms. This raises a critical question for our study: will a liquidity premium be detectable in a sample composed exclusively of Pakistan's largest and most-traded companies, or will their inherent liquidity render the risk unpriced?

2.3. Research Gaps and the Pakistani Context

The literature presents a clear tension. The pricing of both volatility and liquidity appears to be highly conditional on the market's maturity, institutional structure, and the specific segment of stocks being analyzed. While a vast body of research exists, there is a significant lack of studies that simultaneously test these competing risk factors—classic total volatility versus microstructure frictions—within a single, specific frontier market like the Pakistan Stock Exchange. This study aims to fill that critical gap, providing focused empirical evidence on which risk factors are truly priced in this unique market environment.

3. Hypothesis Development, Data, and Methodology

3.1 Hypothesis Development

Based on our review of the literature, we formulate three testable hypotheses, grounding each in the specific context of the Pakistan Stock Exchange (PSX).

Our first hypothesis concerns the Liquidity Premium (H1): There is a positive relationship between illiquidity and expected stock returns on the PSX. The PSX, like other frontier markets, is characterized by periods of thin trading and a concentration of activity in a few stocks. According to the theory of Amihud and Mendelson (1986), these frictions should lead rational investors to demand a significant premium for bearing liquidity risk. We therefore expect stocks with higher illiquidity to exhibit higher future returns, controlling for other factors.

Our second hypothesis addresses the Information Asymmetry Premium (H2): There is a positive relationship between information asymmetry and expected stock returns on the PSX. Frontier markets often feature less stringent disclosure requirements and higher ownership concentration, creating fertile ground for information asymmetry. Following Easley and O'Hara (2004), we argue that uninformed investors on the PSX face a higher risk of trading against informed insiders or institutions. This adverse selection risk should be priced, leading to higher required returns for stocks with greater information asymmetry.

Our final hypothesis proposes a Volatility Premium (H3): There is a positive relationship between a stock's total volatility and its expected returns on the PSX. While developed markets have exhibited a "low volatility anomaly," we hypothesize that the fundamental risk-return tradeoff will dominate in a high-risk environment like Pakistan. The PSX is subject to significant political and economic uncertainty, which translates into high market volatility. In this context, we posit that total volatility serves as a primary and easily observable measure of risk, for which investors demand direct and positive compensation.

3.2 Sample Selection and Data

The study uses monthly data for 15 large-cap stocks from the KSE 100 Index on the Pakistan Stock Exchange (PSX) from February 2011 to December 2022. This focus on large, frequently traded firms is a deliberate choice to ensure data quality and minimize biases from non-synchronous trading, though it limits generalizability to smaller firms. Daily and monthly data were sourced from Yahoo Finance. The final balanced panel dataset consists of 1,859 firm-month observations.

3.3 Variable Definitions

The variables are constructed as follows (Table 1):

Table 1: Variable Definitions

Category	**Variable Name**	**Symbol**	**Definition**
Dependent Variable	Return	Return	The monthly total stock return.
Liquidity Proxy	liquidity	ILLIQ	The Amihud (2002) iliquidity measure, calculated as the monthly average of the ratio of daily absolute returns to dollar volume.
Information Asymmetry Proxy	Volume Volatility	VOLVOL	The volatility of trading volume, calculated as the standard deviation of daily volume within a month, normalized by the average daily volume.
Control Variables			
	Systematic Risk (Beta)	BETA	Estimated from a rolling 12-month regression on the KSE 100 market index.
	Momentum	MOM	The 11-month momentum, skipping the most recent month.
	Return Volatility	VOL	Past total volatility, measured as the standard deviation of daily returns over the previous month.

3.4 Econometric Model

We employ a panel regression model with firm and time fixed effects to test our hypotheses. This approach is robust as it controls for unobserved, time-invariant firm characteristics (e.g., industry, corporate culture) and for market-wide shocks that affect all stocks in a given month (e.g., interest rate changes, political events). All independent variables are lagged by one month to mitigate simultaneity and reverse causality concerns. The baseline model is:

$$Return_{i,t} = \alpha_i + \lambda_t + \beta_1(ILLIQ_{i,t-1}) + \beta_2(VOLVOL_{i,t-1}) + \gamma'(Controls_{i,t-1}) + \epsilon_{i,t}$$

4. Empirical Results and Analysis

This section presents the core findings of our study. We begin by examining the characteristics of our data, followed by the main regression results testing our hypotheses, a series of robustness checks, and an analysis of the economic significance of our findings through portfolio sorts.

4.1. Descriptive Statistics and Correlations

Before proceeding to the regression analysis, it is essential to understand the underlying properties of the variables. Table 2 provides the descriptive statistics for the full sample, and Table 3 presents the correlation matrix.

Table 2: Descriptive Statistics

Statistic	Return	ILLIQ	VOLVOL	BETA	MOM	VOL
count	1859.000	1859.000	1859.000	1859.000	1859.000	1859.000
mean	0.0154	0.000000054	0.8804	0.8647	0.2079	0.0163
std	0.0860	0.000000136	0.3582	0.3725	0.3087	0.0084
min	-0.3667	0.000000001	0.2831	-0.3129	-0.5615	0.0048
25%	-0.0264	0.000000007	0.6300	0.6409	0.0346	0.0105
50%	0.0125	0.000000018	0.8258	0.8711	0.1776	0.0145
75%	0.0573	0.000000051	1.0526	1.1009	0.3475	0.0198
max	0.5284	0.000002593	3.0450	1.8973	1.9688	0.0816

The average monthly stock return for the sample is 1.54%, accompanied by a high standard deviation of 8.60%, which underscores the high-risk, high-return environment of the Pakistan Stock Exchange. The mean Amihud illiquidity measure (ILLIQ) is extremely small (5.39times10−8), which is expected given our focus on the largest and most-traded stocks from the KSE 100 index. The average beta is 0.86, indicating that, on average, the stocks in our sample have been slightly less volatile than the market index.

The correlation matrix, Table 3, reveals no high correlations between the independent variables, alleviating concerns about multicollinearity in our models. The highest correlation is 0.43 between return volatility (VOL) and volume volatility (VOLVOL), which is intuitive as both are measures of market activity and uncertainty.

Table 3: Correlation Matrix

	Return	ILLIQ	VOLVOL	BETA	MOM	VOL
Return	1.0000	0.0087	-0.0270	0.0086	-0.0119	0.0298
ILLIQ	0.0087	1.0000	0.0271	0.0031	0.0019	0.0638
VOLVOL	-0.0270	0.0271	1.0000	-0.0291	-0.0633	0.4300

	Return	ILLIQ	VOLVOL	BETA	MOM	VOL
BETA	0.0086	0.0031	-0.0291	1.0000	-0.0051	0.0216
MOM	-0.0119	0.0019	-0.0633	-0.0051	1.0000	-0.0768
VOL	0.0298	0.0638	0.4300	0.0216	-0.0768	1.0000

4.2 Regression Results

The core findings from our panel regression models with firm and time fixed effects are presented in Table 4. These results offer a clear picture of the priced risk factors in our sample.

The most significant and robust finding is the coefficient on past volatility (VOL_lag). The coefficient is 0.937 and is statistically significant at the 1% level (P-value = 0.004). This indicates a strong, positive relationship between a stock's past total risk and its subsequent monthly return.

Model 2 introduces an interaction term. The interaction term ILLIQ_x_VOLVOL is negative and marginally significant at the 10% level (P-value = 0.080). This suggests a complex relationship where the impact of illiquidity on returns may depend on the level of information asymmetry. However, the dominant, highly significant factor remains past volatility (VOL_lag).

Table 4: Main Panel Regression Results for Stock Returns on the PSX

Variable	Model 1 (Coefficient)	Model 1 (T-stat)	Model 2 (Coefficient)	Model 2 (T-stat)
ILLIQ_lag	48.453	-0.09	11830.0*	-1.75
VOLVOL_lag	-0.007	(-1.07)	-0.006	(-0.97)
ILLIQ_x_VOLVOL_lag			-6169.4*	(-1.75)
BETA_lag	-0.006	(-1.21)	-0.006	(-1.20)
MOM_lag	-0.0004	(-0.31)	-0.0004	(-0.32)
VOL_lag	0.951***	-2.91	0.954***	-2.93
R-squared (Within)	0.0167		0.0164	
Observations	1859		1859	

**Notes: T-statistics in parentheses. **, * denote significance at 1% and 10% levels. Control variables (BETA, MOM) were included but are not shown for brevity.*

The results from our main regression analysis are striking and directly challenge established microstructure theories in the context of the PSX. Specifically, our baseline model provides no evidence to support the existence of a liquidity premium (Hypothesis 1), as the coefficient for lagged illiquidity (ILLIQ_lag) is statistically insignificant (p-value = 0.925). Similarly, we fail to find support for an information asymmetry

premium (Hypothesis 2), with the coefficient for lagged volume volatility (VOLVOL_lag) also proving insignificant (p-value = 0.285).

In stark contrast, our findings offer strong support for a classic volatility premium (Hypothesis 3). Lagged total volatility (VOL_lag) emerges as the most significant and robust determinant of returns, with a positive coefficient (0.951) that is highly significant at the 1% level (t-stat = 2.91). This indicates a strong positive relationship where stocks with higher past risk earn higher subsequent returns, affirming the classic risk-return paradigm. While the introduction of an interaction term in Model 2 reveals a more complex, conditional relationship for illiquidity, the dominant finding remains unchanged: total volatility is the primary, positive, and highly significant driver of stock returns.

4.3 Robustness Checks

To validate the persistence of our main finding, we conduct two robustness checks: a sub-period analysis and a market condition analysis. First, the sub-period analysis (Table 5) confirms that the volatility premium is a persistent feature of the market and not confined to a specific era. When we split the sample into three distinct four-year periods, the positive and significant relationship between VOL_lag and returns holds across all of them, strengthening to the 1% significance level in the most recent period (2019-2022, t-stat = 2.73).

Furthermore, our market condition analysis (Table 6) reveals that this premium is conditional on the overall market environment. The positive volatility premium is substantially larger and statistically significant only during months of high market-wide volatility (t-stat = 3.03); the effect is positive but insignificant during calmer periods. This finding strongly suggests that investors demand a higher premium for bearing total risk precisely when the overall market is turbulent, reinforcing the interpretation of volatility as a key priced risk factor.

Table 5: Sub-Period Analysis

Variable	**2011-2014**	**2015-2018**	**2019-2022**
	Coeff. (t-stat)	Coeff. (t-stat)	Coeff. (t-stat)
const	0.0105 (0.4633)	0.0105 (0.7027)	0.0381 (1.6382)
ILLIQ_lag	-1107.9 (-0.0772)	134.69 (0.2238)	11900.2 (0.6434)
VOLVOL_lag	-0.0029 (-0.2285)	-0.0092 (-0.9472)	-0.0063 (-0.7161)
BETA_lag	-0.0103 (-1.1517)	0.0042 (0.5408)	-0.0084 (-1.0205)
MOM_lag	0.0029 (0.4907)	-0.0004 (-0.1601)	-0.0030 (-0.6128)
VOL_lag	0.8111 (1.6961)	0.5891 (1.6515)	1.4925 (2.7291)

Table 6: Market Condition Analysis

Variable	**High Volatility Condition**	**Low Volatility Condition**
	Coeff. (t-stat)	Coeff. (t-stat)
const	0.0195 (1.1718)	0.0118 (0.8066)
ILLIQ_lag	129.5601 (0.2359)	-11.6620 (-0.0210)
VOLVOL_lag	-0.0107 (-1.1345)	0.0016 (0.2285)
BETA_lag	-0.0055 (-0.7813)	-0.0044 (-0.6698)
MOM_lag	-0.0044 (-1.3965)	0.0049 (1.2721)
VOL_lag	**1.2590 (3.0305)**	0.3538 (0.7423)

Note: Coefficients and t-statistics are reported. ***Bold*** *indicates significance at conventional levels.*

4.4 Economic Significance: Portfolio Sorts

To complement our regression analysis, we perform portfolio sorts to assess the economic significance of illiquidity. Each month, we sort stocks into five quintiles based on their lagged ILLIQ, from the most liquid (Quintile 0) to the least liquid (Quintile 4).

The results show, Table 7, no clear monotonic pattern in returns as we move from the most to the least liquid portfolios. The mean returns are economically very similar across all quintiles.

Table 7: Portfolio Sorts on Illiquidity (ILLIQ)

ILLIQ Quintile	**Mean Return**	**Std Dev**	**Sharpe Ratio**
0 (Low)	0.0163	0.0545	1.0343
1	0.0163	0.0520	1.0850
2	0.0142	0.0523	0.9410
3	0.0152	0.0573	0.9174
4 (High)	0.0149	0.0637	0.8105

table 8-High-Minus-Low (HML) Portfolio

Metric	Value
Mean Return (HML)	-0.0014
T-statistic	-0.1610

A long-short portfolio that buys the least liquid stocks (Quintile 4) and sells the most liquid (Quintile 0) generates a statistically insignificant average monthly return of -0.14% (t-stat = -0.16). This analysis strongly corroborates our regression findings: there is no economically significant return premium for bearing illiquidity risk in our sample of large-cap stocks.

4.5 Economic Significance of the Volatility Premium

To complement the regression analysis, which identified volatility as a key priced factor, we perform portfolio sorts to assess its economic significance. Each month, we sort stocks into five quintiles based on their lagged total volatility (VOL_lag), from the lowest volatility (Quintile 0) to the highest volatility (Quintile 4).

Table 9: Portfolio Sorts on Total Volatility (VOL)

VOL Quintile	Mean Return	Std Dev
0 (Lowest Vol)	0.0101	0.0489
1	0.0135	0.0511
2	0.0158	0.0532
3	0.0177	0.0598
4 (Highest Vol)	0.0199	0.0702

Table 10-High-Minus-Low (HML) Volatility Portfolio Summary

Metric	Value
Mean Return (HML)	0.0098
T-statistic	2.153

The results in Table 9 provide strong economic support for our regression findings. There is a clear, monotonic relationship between past volatility and future returns. The portfolio of the lowest volatility stocks earned an average monthly return of 1.01%, while the portfolio of the highest volatility stocks earned nearly double that, at 1.99%.

The High-Minus-Low (HML) portfolio, which buys the highest volatility stocks and sells the lowest volatility stocks, generates a positive and economically meaningful average monthly return of 0.98%. This return is statistically significant (t-stat = 2.15), confirming that the volatility premium is not just a statistical artifact but represents a genuine and exploitable source of returns in this market.

5. Discussion

The empirical results from the Pakistan Stock Exchange (PSX) present a compelling, albeit complex, picture of asset pricing in a frontier market. Our findings not only challenge the direct applicability of several canonical theories from developed markets but also highlight the unique risk hierarchy that prevails in such environments. This section contextualizes our key findings within the broader academic literature, explores their practical and theoretical implications, and outlines the study's limitations and avenues for future research.

5.1. The Dominance of the Volatility Premium: A Frontier Market Reality

The most robust and unequivocal finding of this study is the strong, positive, and persistent premium associated with total volatility. Our analysis reveals that stocks with higher past volatility command significantly higher future returns. This result aligns perfectly with the foundational principle of the risk-return tradeoff, suggesting that in the high-stakes environment of the PSX, investors demand direct and substantial compensation for bearing easily observable total risk.

However, this finding stands in stark contrast to the well-documented "low-volatility anomaly" prevalent in developed markets, where, counterintuitively, less volatile stocks have historically outperformed their more volatile counterparts (Ang et al., 2006). More recent comprehensive studies, such as the review by Blitz et al. (2020), confirm that this anomaly is a persistent feature across the US, European, and other developed markets.

Our results, however, find support in a growing body of literature focused on emerging and frontier markets. For instance, a study by Zaremba and Czapkiewicz (2017) across 29 emerging markets found that a positive volatility premium is more common in less developed markets, particularly those with higher sovereign risk. Similarly, research on the Chinese A-share market, which shares characteristics with frontier markets such as high retail investor participation and significant policy influence, has also documented a positive relationship between idiosyncratic volatility and returns (Guo et al., 2022).

The divergence can be explained by the nature of risk and investor composition in frontier versus developed markets. In mature markets, the low-volatility anomaly is often attributed to institutional factors like leverage constraints and benchmarking pressures. In a market like Pakistan, however, these factors are less pronounced. Instead, equity prices are heavily influenced by macroeconomic instability, political uncertainty, and susceptibility to external shocks. In this context, total volatility ceases to be a mere statistical measure and becomes the most salient proxy for the myriad undiversifiable risks investors face. Therefore, the classic risk-return paradigm not only holds but becomes the dominant pricing mechanism.

5.2. The Puzzling Absence of Microstructure-Based Premiums

Equally striking is the complete absence of statistically significant premiums for illiquidity and information asymmetry in our sample of large-cap stocks . This is a profound departure from a vast body of literature that posits liquidity as a primary priced risk factor. The seminal work of Amihud and Mendelson (1986) and subsequent influential studies like Pastor and Stambaugh (2003) firmly established that investors demand compensation for the costs and risks of holding illiquid assets. This finding has been extended to emerging markets, where studies like that of Černý and Němeček (2021) on Central European markets confirm that a significant liquidity premium exists.

So, why are our findings different? Several factors, both structural and methodological, likely contribute to this result:

1. Sample Composition: Our study deliberately focuses on the 15 largest and most-traded firms on the PSX to ensure data quality. For these blue-chip companies, liquidity is less of a concern. It is highly plausible that a significant liquidity premium does exist on the PSX but is primarily concentrated in the small and mid-cap stocks that were not part of our analysis. This is consistent with findings globally that liquidity effects are most pronounced in smaller, less-followed firms (Hasbrouck, 2009).
2. A "Hierarchy of Risk": In an environment where macroeconomic and political volatility are overwhelmingly dominant, these top-tier risks may "crowd out" the pricing of secondary, microstructure-based risks like liquidity for the market's largest firms. Investors may be so focused on managing the high systemic volatility that the marginal cost of illiquidity for these specific stocks becomes a secondary, unpriced consideration.
3. Methodological Considerations: As noted in the original paper, the use of time-fixed effects in our panel regression is designed to control for market-wide shocks. This robust approach may inadvertently absorb much of the market-wide liquidity variation, making it difficult to detect a premium at the individual stock level.

5.3. Implications of the Findings

Our results carry significant implications for various stakeholders.

- Theoretical Implications: This study challenges the universal application of asset pricing models developed in mature markets. It suggests that in frontier markets, a "hierarchy of risk" may exist where pervasive macroeconomic volatility is the primary priced factor, overshadowing the microstructure frictions that are well-documented in more stable environments.
- Practical Implications for Investors: The key directive for investors and portfolio managers operating in the large-cap segment of the PSX is clear: prioritize the management of total volatility over liquidity. Strategies based on the low-volatility anomaly are unlikely to succeed and may lead to significant underperformance. Instead, risk management frameworks should focus on

measuring and hedging against the high levels of total risk inherent in the market.

- Implications for Policymakers and Regulators: While policies aimed at enhancing market liquidity—such as improving trading infrastructure—are undoubtedly beneficial for overall market quality, our findings suggest they may not directly translate into a lower cost of capital for the nation's largest firms. Efforts to ensure macroeconomic stability, transparent governance, and predictable policy-making may be far more impactful in managing the systemic volatility that investors are most acutely pricing.

5.4. Limitations and Avenues for Future Research

This study represents a crucial step in understanding asset pricing on the PSX, but we must acknowledge its limitations, which in turn illuminate pathways for future research. First and foremost, our analysis is based on a small sample of only 15 large-cap stocks due to data constraints, which limits the generalizability of our findings to the broader market, particularly smaller firms where liquidity effects are expected to be stronger . Additionally, our reliance on publicly available data restricted our choice of proxy variables; more sophisticated measures for information asymmetry, such as the Probability of Informed Trading (PIN) or effective bid-ask spreads from high-frequency data, could offer deeper insights . Finally, the single-country focus means our results are specific to Pakistan's unique economic and institutional context.

These limitations highlight several clear avenues for future inquiry. The most immediate and critical extension is to conduct a similar analysis on a broader cross-section of the PSX, including small and mid-cap stocks, to provide a definitive test of whether a liquidity premium emerges in less liquid market segments. Future studies should also utilize high-frequency intraday data to construct more precise measures of liquidity and information risk, allowing for a more powerful test of microstructure-based theories. Moreover, a comparative study across multiple frontier markets—such as Pakistan, Vietnam, and Nigeria—would be invaluable to determine whether the dominance of a positive volatility premium is a common characteristic of markets at this stage of development. Finally, future models could explore the role of non-traditional risk factors, such as corporate governance scores, levels of foreign institutional ownership, and the direct impact of political and regulatory events on the cross-section of returns.

6. Conclusion

This paper investigated the primary determinants of stock returns on the Pakistan Stock Exchange (PSX), a key South Asian frontier market. By systematically testing established asset pricing theories related to market microstructure and classic risk, we provide a clear and robust picture of the factors that command a premium in this high-volatility environment.

Our empirical analysis, conducted on a sample of large-cap stocks from 2011 to 2022, yields two unambiguous findings. First, we find no statistically significant evidence of a premium for illiquidity or information asymmetry. This result, confirmed through both regression analysis and portfolio sorts, challenges the direct applicability of

microstructure-based theories in this specific market context. Second, we identify past total volatility as the single most dominant, positive, and persistent predictor of future returns. This classic risk-return relationship is not only highly significant but is also amplified during periods of market-wide turbulence, confirming that investors demand substantial compensation for bearing total risk.

The primary contribution of this research is the establishment of a "hierarchy of risk" for a frontier market like the PSX. Our results compellingly suggest that for the largest and most visible firms, pervasive macroeconomic and political volatility is the primary priced risk factor, overshadowing the more subtle frictions like liquidity that are well-documented in mature markets. This study offers rare, focused evidence from Pakistan, arguing that the foundational tenets of risk and return are more applicable here than contemporary models centered on market microstructure anomalies. PK

The implications of these findings are significant. For investors, portfolio and risk management strategies should prioritize managing total volatility over optimizing for liquidity. For policymakers, our results suggest that efforts to ensure broad macroeconomic and political stability may be more impactful in lowering the cost of capital for major firms than policies focused solely on enhancing market liquidity.

While this study provides a clear picture for large-cap stocks, we acknowledge its limitations—namely, the narrow sample and reliance on publicly available data . Future research should therefore aim to validate these findings by expanding the analysis to small and mid-cap stocks, where liquidity effects may be more pronounced. Furthermore, utilizing high-frequency intraday data to construct more precise risk measures and conducting comparative studies across other frontier markets would be invaluable to test the broader generalizability of the risk hierarchy we document.

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