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The Impact of Exchange-Rate Volatility on Firm-Level Market Capitalization in Emerging Markets: A Pooled Mean-Group ARDL Analysis

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Abstract:

This paper investigates how exchange rate volatility affects firm-level market capitalization in six emerging markets (Brazil, India, South Africa, Saudi Arabia, Hong Kong, and Qatar, using monthly data from January 2010 to December 2023. It aims to analyze both the long-run and short-run effects. This study models the volatility using GARCH (1,1), and the relationship is estimated with the PMG-ARDL estimator. The results indicate a significant and asymmetric response. Export-oriented firms face initial negative shocks and partially recover in the long run. Conversely, import-dependent firms experience more pronounced and persistent losses. The long-run elasticity for exporters is -0,189, versus -0,351 for importers. The results hold up well against GMM-System checks and other volatility proxies. Policy implications include market development, hedging, and surveillance.

Keywords: Exchange Rate Volatility, Firm Value, Market Capitalization, Emerging Markets, GARCH, PMG-ARDL Estimator.

1. INTRODUCTION:

In the current era characterized by deepening globalization and strong financial integration, the currency markets and international capital flows play a crucial role as central determinants in both corporate performance and economic stability. This integration has been a two-sided coin for emerging market economies (EMEs). While it has unlocked access to global capital, facilitated trade, and spurred economic growth, it has simultaneously exposed them to a new dimension of macroeconomic vulnerability: exchange rate risk. Exchange rate fluctuations, once a minor issue, now represent one of the most critical and pervasive macroeconomic variables influencing firm performance, investment decisions, and ultimately, shareholder value [1]. As reflected in its market capitalization, a firm's value can be directly and indirectly impacted through a myriad of transmission channels, including its export revenues, import costs, the burden of servicing foreign currency-denominated debt, and the ever-shifting sands of investor sentiment.

Understanding this relationship has become increasingly urgent in light of major global economic events. The 2008 global financial crisis, the European sovereign debt crisis, the 2014–2016 commodity price downturn, and the disruptions caused by the COVID-19 pandemic all underscore the central role of exchange rate volatility as a key source of uncertainty. While firms in developed economies often rely on deep and sophisticated derivative markets to hedge their currency exposures, their counterparts in emerging markets face more limited options.

Higher transaction costs, regulatory frictions, and less-developed financial infrastructures serve to magnify the valuation impact of exchange rate shocks, leaving firms more vulnerable to the vicissitudes of global financial

markets [2], [3]. This inherent vulnerability, often termed the "Original sin" of emerging markets—the inability to borrow abroad in their currency—creates a structural fragility that warrants rigorous academic inquiry.

Despite the extensive and expanding literature on the link between exchange rates and firm value, several critical gaps remain, which this study seeks to address.

The question of the study:

Understanding the speed of adjustment and the path to a new long-run equilibrium is essential for corporate risk managers and policymakers. How quickly, and to what extent, do firms recover from an exchange rate shock?

Hypothesis:

- **H1:** The Exchange Rate volatility negatively and significantly affects firm value over the long run.
- **H2:** The impact of Exchange Rate volatility varies across sectors; it has a more significant negative effect on firms that rely on imports versus those that focus on exports.
- **H3:** pegged exchange rate regimes mitigate the short-term impact but do not eliminate long-term economic exposure.

The Objectives of the study:

- This study aims to investigate how the diversity of exchange rate regimes (hard pegs, managed flow, and free float) affects both the nature and the immediacy of the exchange rate volatility transmission. The research also highlights the methodological risks associated with these types of exchange rate regimes in a single panel dataset.

- The study also focuses on sectoral heterogeneity in emerging markets' response to currency shocks.
- The study seeks to distinguish between the long-run effects and the short-run effects, and the long-run equilibrium exchange rate volatility.

The importance of the study:

- **Filling a knowledge gap in the literature**: most earlier studies combined countries with heterogeneous exchange rate regimes into unified samples, which could produce misleading results. This study emphasizes the importance of distinguishing between these regimes to comprehend the transmission mechanism of exchange rate volatility.
- **Highlighting sectoral heterogeneity**: This study emphasizes the varying responses of different industries to currency shocks (e.g., import-dependent sectors versus export-oriented sectors), thus helping to clarify the asymmetric effects of exchange rate volatility.
- **Dynamic Temporal Analysis**: by making a distinction between the immediate long-run effects and the short-run equilibrium, the study offers profound comprehension of the firm's gradual adjustment using strategies such as hedging and pricing

Methodology:

We assemble a balanced monthly panel dataset of 180 non-financial firms from six pivotal emerging markets: Brazil, South Africa, Hong Kong, India, Qatar, and Saudi Arabia, spanning January 2010 to December 2023. This sample is deliberately constructed to encompass a diverse range of exchange rate regimes—including floating (Brazil, South Africa), managed floating (India), and hard pegs (Hong Kong, Qatar, Saudi

Arabia)—allowing for a more insightful analysis of regime-specific effects.

We move beyond simple historical volatility measures by deriving a firm-level exposure criterion using a GARCH (1,1) model. This approach is superior as it captures the well-documented phenomena of volatility clustering and time-varying conditional volatility, providing a more accurate and dynamic measure of perceived currency risk.

We employ the Pooled Mean-Group (PMG) estimator within a Panel Autoregressive Distributed Lag (Panel-ARDL) framework, as developed by Peseran, Shin, & Smith [4]. This methodology is exceptionally well-suited to our research question. It allows short-run coefficients, error variances, and adjustment speeds to differ across countries—capturing short-term heterogeneity—while constraining the long-run coefficients to be equal, based on the premise that common technological and arbitrage conditions should lead to a homogeneous long-run equilibrium. This provides a formal mechanism to disentangle the crucial short- and long-run elasticities.

2. Literature review:

Exchange rate volatility affects firm value through several well-established channels. It influences export revenues, import costs, and the burden of foreign-currency debt. It also shapes investor sentiment and market capitalization. Theoretical perspectives from international finance and corporate valuation help clarify these transmission mechanisms.

2.1. transmission channels:

Exchange rate volatility affects firm value through two primary channels: the cash flow channel and the discount rate channel.

2.1.1. The Cash Flow Channel:

Increased volatility can negatively impact expected cash flows by disrupting operations and strategic planning. Firms may become reluctant to undertake long-term investment projects, particularly those involving foreign markets, due to the difficulty of forecasting revenues and costs [5]. It can also lead to higher operational costs as firms may need to hold larger precautionary cash balances or diversify supply chains to mitigate risk, both of which are costly endeavors. For firms with market power, the ability to pass through cost changes to customers may be limited in a volatile environment, squeezing profit margins.

2.1.2. The Discount Rate (Cost of Capital) Channel:

Financial Channel: Financial theory, particularly the Capital Asset Pricing Model (CAPM) and its international variants, posits that the value of an asset is determined by its systematic, non-diversifiable risk. If exchange rate risk is systematic—if it is correlated with the broader market portfolio—then investors will demand a higher expected return (a higher discount rate) to compensate for bearing this risk. (Dumas, 1992) have argued that exchange rate volatility is a price risk factor. Therefore, firms with higher exposure to this volatility will face a higher cost of capital, which, all else being equal, leads to a lower market valuation. This effect is likely to be more pronounced in EMEs, where currency risk is often perceived as being more systematic and correlated with other macroeconomic risks (e.g., political instability, sovereign default risk). [6]

2.2. Empirical Literature:

The empirical literature examining the relationship between exchange rate exposure and firm
value is vast and multifaceted. The findings have often been mixed, leading to what is famously known as the exchange rate exposure puzzle. To highlight the evolution of thought and to place our study contribution in context, the literature is critically organized and synthesized topically.

2.2.1. The Genesis: Early Studies and the Exposure Puzzle:

The seminal work in this area began in the late 1980s and early 1990s. Using a simple two-factor model (a market return and the change in an exchange rate index), early studies predominantly found surprisingly weak or statistically insignificant evidence of the exchange rate exposure for a majority of firms, even for large multinational corporations (MNCs) that were presumed to be highly exposed. Jorion 1990, in a landmark study of 287 U.S. MNCs, found that only about 5% of the firms in his sample exhibited statistically significant exchange rate exposure. This unexpected result gave rise to the "exposure puzzle" [7]. Several explanations were proposed. First, firms may be actively and effectively using financial derivatives (forwards, futures, options, swaps) to hedge their exposures, neutralizing the impact on their stock returns. Second, firms may have natural hedges through their operational structure; for instance, an exporter might source inputs from the same foreign country, creating a natural offset between revenues and costs.

Third, the exposure might be non-linear or time-varying, which simple linear models fail to

capture. Subsequent research, such as that by (Söhnke & Gordon, 2005), confirmed this puzzle on a massive international scale. Analyzing over 7,000 non-financial firms from 37 countries, they found weak evidence that exchange rate exposure is a systematically priced risk factor, concluding that, for most firms, currency risk appears to be largely diversifiable or effectively hedged. However, a crucial caveat of these early studies is their predominant focus on developed markets, where deep hedging markets and stable macroeconomic policies are the norm [8].

2.2.2. Shifting Focus: Evidence from Emerging Markets:

Recognizing the limitations of a developed-market focus, a later wave of research turned its
attention to emerging markets, where the theoretical preconditions for significant exposure are
more likely to hold. In EMEs, hedging markets are often thin and costly, corporate governance may be weaker, and exchange rate movements are frequently more violent and correlated with other systemic crises. The evidence from this strand of literature is far more compelling. (Dominguez& Tesar,2006) analyzed firms in several Latin American and Asian countries and found significantly higher and more prevalent exchange rate exposure compared to their developed-country counterparts [9]. They attributed this to higher macroeconomic volatility and less-developed financial infrastructure. (Kamil, 2008), studying non-financial firms in Latin America, not only confirmed significant exposure but also highlighted important non-linearities and asymmetries, particularly for export-oriented firms. These studies suggest that the exposure puzzle may be largely a developed-market phenomenon and that in the more volatile context of EMEs, exchange rate risk is a first-order concern for firm valuation. Our study builds directly on this EME-focused literature by employing a more diverse sample and a more advanced econometric technique.

2.2.3. Unpacking Heterogeneity: Sectoral and Firm-Specific Analysis:

Realizing that firm-level exposure is not uniform, researchers began to investigate its determinants. This research explored how industry characteristics, firm size, and international activity influence the magnitude of exposure.

(Martin, Brunner, & Himmel, 1998) found that in Germany, exposure was significantly higher for firms in more export-intensive sectors [10]. Similarly, (Allayannis & Ofek, 2001) showed that the use of foreign currency derivatives significantly reduced a firm's exchange rate exposure, providing direct evidence for the hedging explanation of the puzzle [11]. Other studies found that larger firms and those with a greater degree of internationalization (e.g., foreign sales or assets) tend to have more significant, though not always negative, exposure. However, much of this work still falls short in systematically analyzing the crucial dichotomy between export-oriented and import-dependent firms, especially within the EME context. Our study explicitly addresses this by splitting the sample into these two theoretically distinct groups, allowing for a direct test of the asymmetric effects of volatility on firms at different points in the value chain.

2.2.4. The Role of the Exchange Rate Regime:

The institutional context, particularly the de facto exchange rate regime, is a critical but often overlooked factor. (Parsleym & Popper, 2006) argued that the choice of exchange rate regime could influence firms' incentives to hedge. In a pegged regime, firms might perceive currency risk as low and thus under-hedge, making them extremely vulnerable to a sudden devaluation. Conversely, in a floating regime, the constant volatility might encourage more systematic and sophisticated risk management [12].

(Ilzetzki, Reinhart, & Rogoff, 2019) provided a comprehensive de facto classification of exchange rate regimes, which has enabled more nuanced research. Studies using this data have begun to explore how regime type mediates the impact of currency shocks. For example, firms in pegged regimes might experience lower day-to-day volatility but face a higher "crash risk" [13]. Our paper contributes to this burgeoning area by using a sample that spans the regime spectrum and formally testing whether the dynamic response of firm value to volatility differs between floating, managed, and pegged systems.

2.2.5. Methodological Evolution and Our Study's Positioning:

The methodology employed in this field has evolved significantly. Early OLS models gave
way to GARCH models to capture time-varying volatility, as in (Koutmos & Martin, 2003) [14]. Later, Vector Autoregression (VAR) models were used to account for feedback effects. More recently, panel data techniques have become the standard, moving from simple Fixed Effects models to more sophisticated approaches like GMM (Generalized Method of Moments) to address endogeneity concerns.

Our study stands at the current frontier of this methodological evolution by employing the Panel PMG-ARDL approach. This technique offers several distinct advantages over its predecessors. First, unlike basic panel models, it is robust to whether the underlying variables are stationary I(0) or integrated of order one I(1), or a mix of both, which is common in macroeconomic panels. Second, it explicitly models dynamics, allowing for the crucial separation of short-run and long-run effects. Third, the PMG estimator provides a perfect theoretical compromise for our research question: it allows for country-specific short-run heterogeneity while imposing a plausible long-run homogeneity,

thereby increasing the efficiency of the long-run estimates. By combining this advanced methodology with a carefully constructed dataset and a focus on heterogeneity, our study aims to provide a uniquely comprehensive and reliable answer to a long-standing question in international finance.

3. Data and Econometric Methodology:

3.1.Sample Selection and Data Sources:

The empirical analysis is based on a balanced panel dataset of 180 non-financial firms across
six major emerging markets: Brazil, South Africa, Hong Kong, India, Qatar, and Saudi Arabia. The sample period covers 168 monthly observations from January 2010 to December 2023. This time frame is chosen to capture the post-global financial crisis period, which has been characterized by significant shifts in capital flows, commodity price cycles, and varying monetary policy stances across the globe.

The selection of these six countries was deliberate, aiming to create a rich and heterogeneous sample. They represent a diverse mix of geographical regions (Latin America, Africa, Asia, Middle East), economic structures (commodity exporters like Brazil and Saudi Arabia vs. service-oriented economies like Hong Kong), and, most importantly, de facto exchange rate regimes.

According to the classification by (Ilzetzki, Reinhart, & Rogoff, 2019) [15], our sample includes free-floating regimes (Brazil, South Africa), a managed float (India), and hard pegs to the U.S. dollar (Hong Kong, Qatar, Saudi Arabia).

For each country, firms were selected from the main equity index (e.g., Ibovespa in Brazil, JSE Top-40 in South Africa, Nifty-50 in India). We began with a larger sample and then applied several filtering criteria. We excluded all financial firms (banks, insurance companies, etc.), because their business models and

balance sheets are uniquely sensitive to interest rate and currency movements in ways that differ fundamentally from non-financial firms, and they are subject to distinct regulatory frameworks (e.g., regulatory capital buffers). We further excluded firms with incomplete data for the key variables over the sample period to ensure a balanced panel, which is a requirement for the PMG-ARDL methodology. After this filtering process, 30 non-financial firms per country remained, resulting in a sample of 180 firms and 30,240 firm-month observations (180 firms * 168 months). Firm-level data, including monthly market capitalization and sectoral classification, were sourced from the Bloomberg Terminal and Thomson Reuters Data Stream. Macroeconomic data, including monthly bilateral USD exchange rates, Consumer Price Index (CPI), and central bank policy interest rates, were obtained from the International Monetary Fund's (IMF) International Financial Statistics (IFS) database. Data on Brent crude oil prices (a proxy for global economic shocks) and domestic GDP were sourced from the World Bank Development Indicators and the Federal Reserve Economic Data (FRED) database. As GDP data is typically available at a quarterly frequency, we employed the Chow-Lin procedure (C. Chow & An-loh, 1997) to interpolate it to a monthly frequency, using related monthly indicators (like industrial production) to ensure a high-quality interpolation and avoid data loss [16].

3.2. Econometric methodology:

3.2.1. Variable Definitions and Construction:

- **Dependent Variable: Market Capitalization (MV):** The dependent variable is the firm-level market capitalization, measured in U.S. dollars. We use USD as the common numeraire to ensure comparability across countries and to directly capture the impact of bilateral exchange rate changes against the world's primary reserve currency. The

variable is transformed into its natural logarithm (log-MV) to mitigate heteroskedasticity issues and interpret the coefficients as elasticities.

- **Key Regressor: Exchange Rate Volatility (EXVOL):** Our primary variable of interest is the exchange rate volatility. Accurately measuring expected volatility is crucial. Instead of relying on a simple historical standard deviation, we model volatility using a Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model. Specifically, we fit a GARCH (1,1) model to the daily returns of the bilateral USD exchange rate for each country's currency. The GARCH (1,1) model is specified as:
    - Return Equation: $r_t = \mu + \varepsilon_t$
    - Variance Equation: $\sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2$.

where σ_t^2 is the conditional variance (volatility) at time t, ω is a constant, $\alpha\varepsilon_{t-1}^2$ is the ARCH term (representing news about volatility from the previous period), and $\beta\sigma_{t-1}^2$is the GARCH term (representing old news about volatility). This model is highly effective at capturing the well-documented features of financial time series, such as volatility clustering (periods of high volatility followed by high volatility). We then aggregate the daily conditional standard deviations (σ_t) to a monthly frequency to generate our EXVOL measure. This provides a dynamic, forward-looking measure of currency risk.

- **Control Variables (X_{it})**: To isolate the impact of exchange rate volatility, we include a set of standard control variables identified in the literature as key determinants of firm value:
    - **Domestic CPI Inflation (INF):** Controls for the domestic macroeconomic environment and purchasing power erosion. High and volatile inflation can create uncertainty and negatively impact firm valuation.

- **Policy Interest Rate (INT):** The central bank's policy rate. It serves as a proxy for the stance of monetary policy and the cost of domestic borrowing. Higher interest rates typically have a dampening effect on firm value.
- **Brent Oil Price (OIL):** Included as a proxy for global economic conditions and commodity price shocks. Its effect is expected to be heterogeneous across countries (positive for oil exporters, negative for oil importers). We use the Brent price log.
- **Domestic GDP Growth (GDP):** Controls for the business cycle and the overall health of the domestic economy. Higher GDP growth is expected to be positively correlated with firm value.

3.3. The Panel ARDL Approach:

To model the dynamic relationship between exchange rate volatility and firm value, we employ the Panel Autoregressive Distributed Lag (ARDL) framework. The general ARDL (p,q) model can be written as:

$$Y_{it} = \sum_{j=1}^{p} \lambda_{ij} Y_{i,t-j} + \sum_{j=0}^{q} \delta X_{i,t-j} + u_i + \varepsilon_{it}$$

Where, Y_{it} : is the dependent variable (log-MV), $X_{i,t-j}$: represents the vector of regressors (EXVOL and controls), u_i : represents firm-specific fixed effects, and λ and δ are the coefficients. This model is highly flexible but can be re-parameterized into an Error Correction Model (ECM) representation, which more clearly distinguishes between short-run and long-run effects:

$$\Delta Y_{it} = \varphi_i \left(Y_{i,t-1} - \theta'_i X_{i,t-1}\right) + \sum_{j=1}^{p-1} \lambda_{ij}^{*} \Delta Y_{i,t-1} + \sum_{j=0}^{q-1} \delta_{ij}^{*} \Delta X_{i,t-j} + \mu_i + \varepsilon_{it}$$

In this ECM form :

- θ'_i is the vector of long-run coefficients.
- φ_i is the error correction coefficient, which measures the speed of adjustment back to the long-run equilibrium. It must be negative ($\varphi_i < 0$) and statistically significant for a stable long-term relationship.
- λ^*_{ij} and δ^*_{ij} are the short-run dynamic coefficients.

(Peseran, Shin, & Smith, 1999) proposed three estimators for dynamic panel models:

- **Pooled Mean Group (PMG):** Constrains the long-run coefficients (θ) to be identical across groups (countries in our case) but allows the short-run coefficients (λ^*, δ^*) and the speed of adjustment (φ_i) to be heterogeneous.
- **Mean Group (MG):** Estimates separate ARDL models for each group and then averages the coefficients. It allows for full heterogeneity in both short-run and long-run coefficients.
- **Dynamic Fixed Effects (DFE):** This method trains all coefficients (long-run, short-run, and speed of adjustment) to be identical across groups, effectively pooling the data. [17]

Our choice is the PMG estimator. The rationale is that while short-run dynamics may differ across countries due to varying institutional frameworks, business cycles, and policy responses, the long-run equilibrium relationship between volatility and value is likely to be homogeneous, driven by common underlying economic principles like arbitrage and technology. If the long-run homogeneity assumption holds, the PMG estimator is more efficient and consistent than the MG estimator.

3.4. Pre-estimation Diagnostics:

Before proceeding with the PMG-ARDL estimation, we conduct a series of essential diagnostic tests:

- **Panel Unit Root Tests**: While the ARDL framework does not require variables to be stationary, none of the variables must be integrated of order two, I (2). We employ both the Levin-Lin-Chu (LLC) test, which assumes a common unit root process, and the Im-Pesaran-Shin (IPS) test, which allows for individual unit root processes, to confirm that our variables are either I (0) or I (1).
- **Panel Cointegration Test**: To ensure that a stable long-run relationship exists among the variables, we use the Pedroni panel cointegration test. Rejection of the null hypothesis of no cointegration provides evidence for a long-run equilibrium.
- **Hausman Test**: To empirically validate our choice of the PMG estimator over the less restrictive MG estimator, we perform a Hausman test. The null hypothesis is that the long-run coefficients from PMG and MG are not systematically different. A failure to reject the null (i.e., a high p-value) supports using the more efficient PMG estimator.
- **Cross-Sectional Dependence:** In panel data, especially with macroeconomic variables, shocks in one country can spill over to others, creating cross-sectional dependence. To address this, which can lead to inefficient estimates, we compute standard errors that are robust to both heteroskedasticity and cross-sectional dependence using the Driscoll-Kraay (1998) methodology [18].

This comprehensive and rigorous econometric strategy ensures that our results are robust and our inferences are reliable.

4. Finding and discussion:

The empirical results are presented beginning with the baseline findings for the full sample, followed by an analysis of sectoral and regime-based heterogeneity, and concluding with a series of robustness checks.

4.1. Baseline Findings:

Table 1 reports the PMG estimates for the full panel of 180 firms. The results provide strong evidence of a negative and statistically significant relationship between the exchange rate volatility and firm market capitalisation.

-Long-Run Effects: The estimated long-run elasticity of market capitalisation (MV) with respect to exchange rate volatility (EXVOL) is -0.273. This coefficient is statistically significant at the 1% level, with a t-statistic of -4.18. This core result implies that, in the long run, a 1 percentage point increase in sustained exchange rate volatility is associated with a 0.273% decrease in firm value, holding all other factors constant. This finding is economically significant and provides strong support for the theoretical proposition that currency risk is a negatively priced factor in emerging markets.

Table 1. Long-run Coefficients (PMG Estimates)

variable	Coefficient	t-statistic
Exchange Rate Volatility (EXVOL)	-0.273	-4.18
Constant	Included	N/A

-Short-Run Dynamics and Speed of Adjustment: In the short run, the contemporaneous effect of a shock to EXVOL is -0.112, also significant at the 1% level (t = -3.05). This indicates that the

immediate impact of a spike in volatility is a sharp decline in firm value. However, the cumulative effect of the lagged short-run coefficients becomes statistically insignificant after approximately six months, suggesting a partial reversal or stabilization after the initial shock.

Crucially, the error-correction coefficient (φ), which measures the speed of adjustment back to the long-run equilibrium, is also highly significant and correctly signed. The estimated coefficients range from -0.31 (for Brazil) to -0.47 (for Saudi Arabia), with a panel-wide average of approximately -0.38. This implies that, on average, about 38% of any deviation from the long-run equilibrium is corrected within one month. This translates to a half-life of a shock of just under two months, indicating a relatively rapid adjustment process where deviations are fully corrected within a 3-4 month period. The significance of the error-correction term provides strong evidence of a stable, long-run cointegrating relationship.

Regarding the control variables, their long-run coefficients are largely consistent with economic theory. GDP growth has a significant positive effect on firm value, while higher policy interest rates (INT) have a significant negative effect.

Table 2. Short-run dynamics and Error Correction

Country	Error Correction (φ)	Short-run EXVOL impact
Brazil	-0.31	-0.152
South-Africa	-0.33	-0.140
India	-0.35	-0.135
Hong Kong	-0.42	-0.090
Qatar	-0.44	-0.082
Saudi Arabia	-0.47	-0.087

4.2. Sectoral Heterogeneity Analysis:

To investigate the asymmetric impact of volatility, we split the sample into two groups based on their primary business model: export-oriented firms (including mining and chemicals sectors) and import-dependent firms (including retail and telecommunications). We then re-estimate the PMG-ARDL model for each sub-sample. The results, reported in Table 3, reveal marked asymmetry.

- **Import-Dependent Firms:** For this group, the long-run coefficient of EXVOL is -0.351, highly significant at the 1% level ($p < 0.01$). This effect is substantially larger in magnitude than the baseline estimate. It suggests that firms reliant on imports are particularly vulnerable to currency volatility, as it directly increases their input costs and squeezes profit margins, an effect they are often unable to pass on to consumers fully.
- **Export-Oriented Firms**: For exporters, the long-run coefficient is -0.189, significant at the 5% level ($p < 0.05$). While still negative, this coefficient is significantly smaller than that for import-dependent firms. This supports the hypothesis of a "natural Hedge", where revenues denominated in foreign currency partially offset the negative valuation effects of volatility. The fact that the coefficient remains negative and significant indicates that this hedge is incomplete, likely due to factors such as invoicing in domestic currency (as is common in India) or the negative impact of uncertainty on investment decisions.

This finding is a key contribution of our paper, demonstrating empirically that the cost-side effects of volatility (affecting importers) dominate the potential revenue-side gains or hedges for exporters in the long run.

Table 3. **Robustness Checks Summary**

Specification	Long-run EXVOL Coefficient
Rolling Std Dev of EXVOL (12-month)	-0.265
GMM-System Estimator (Arellano-Bond)	-0.261
Excel COVID Period (2020M3-2020M12)	-0.270

4.3. Exchange Rate Regimes:

The following analysis considers whether the de facto exchange rate regime mediates the relationship. We group the countries into two categories: floating-regime countries (Brazil, South Africa, India) and managed/pegged-regime countries (Hong Kong, Qatar, Saudi Arabia).

The results show an interesting dynamic. Firms in floating-regime countries exhibit a much stronger and more immediate short-run response to volatility, with a contemporaneous coefficient of -0.152. In contrast, firms in managed/pegged regimes show a more muted short-run response of -0.087. This is intuitive: the very nature of a peg is to dampen immediate, high-frequency volatility. However, interestingly, the long-run coefficients for both groups converge and are not statistically different from each other or from the baseline estimate of -0.273.

This result supports the conjecture that while pegs can successfully anchor short-term expectations and reduce immediate price fluctuations, they do not eliminate the underlying economic exposure. Firms in pegged regimes remain vulnerable to long-term valuation effects, and this finding highlights the latent risks (e.g., “crash risk) associated with such regimes.

4.4. Robustness Checks:

To ensure the validity and reliability of our core findings, we conduct three additional robustness tests.

- **Alternative Volatility Proxy:** We replace our GARCH-based EXVOL measure with a simpler, more conventional proxy: a 12-month rolling standard deviation of monthly exchange rate returns. Re-estimating our baseline model with this alternative measure yields qualitatively identical results. The long-run coefficient remains negative and highly significant, confirming that our finding is not an artifact of our specific volatility measure.
- **Alternative Estimator (System-GMM):** To address potential concerns about the endogeneity of our regressors (i.e., firm value might also influence macroeconomic variables), we re-estimate the relationship using a different econometric technique: the two-step System-GMM estimator developed by (Arellano & Bond, 1991) and (Blundel & Bond, 1998) [19], [20]. This method is designed to handle endogenous regressors by using lagged levels and differences of the variables as instruments. The GMM results confirm a negative and significant long-run effect of -0.261 ($p < 0.05$), which is remarkably close to our baseline PMG estimate of -0.273.
- **Excluding the COVID-19 Period:** The COVID-19 pandemic represented an unprecedented global shock that could potentially bias our results. To test for this, we re-run our analysis excluding the period from March 2020 to December 2020. The results are not materially altered, with the long-run coefficient remaining stable and significant. This suggests that our findings capture a persistent structural relationship rather than being driven by a single outlier event.

Taken together, these results from the baseline model, the heterogeneity analysis, and the extensive robustness checks provide

a consistent and compelling narrative: exchange rate volatility has a significant, negative, and asymmetric impact on the market value of firms in emerging economies.

5. Discussion of Results:

The empirical findings presented in the previous section provide a fertile ground for a deeper
discussion, allowing us to connect the statistical results to the underlying economic theory and
to position them within the broader academic debate.

5.1. Synthesizing the Findings and Linking to Theory:

The overarching finding of a robust, negative relationship between exchange rate volatility and firm value provides strong empirical validation for the class of international asset pricing models (e.g., Adler & Dumas, 1983) that posit exchange rate risk as a systematic, priced factor [21]. The negative sign on the long-run coefficient (-0.273) is consistent with the hypothesis that investors, being risk-averse, demand a higher risk premium for holding stocks with greater exposure to currency uncertainty. This higher required rate of return translates directly into a lower market valuation, confirming the primacy of the discount rate channel of transmission.

The results on sectoral heterogeneity allow for a more granular interpretation that illuminates the interplay of the transmission channels. The substantially larger negative impact on import-dependent firms (-0.351) points to the powerful and persistent nature of the cash flow channel working through the cost side. These firms, particularly in sectors like retail and telecommunications, often have limited ability to immediately pass on higher input costs to consumers due to competitive pressures and price rigidities. This results in a direct and sustained

compression of their profit margins, which is then heavily discounted by the market.

Conversely, the more muted (though still negative) effect on export-oriented firms (-0.189) highlights the role of operational hedging. Their foreign currency-denominated revenues provide a natural hedge against domestic currency volatility, partially insulating their cash flows. However, the fact that the effect is not eliminated and remains negative is equally telling. It suggests that this natural hedge is imperfect. This could be due to several factors discussed in the literature: a mismatch in the timing of revenues and costs, invoicing in the local currency of the buyer or even the producer's own currency, or the simple fact that heightened uncertainty itself depresses investment and strategic growth opportunities, regardless of the direction of the currency move. This nuances the understanding of economic exposure, showing it to be a complex phenomenon even for seemingly well-positioned firms.

The findings related to exchange rate regimes offer a dynamic perspective on risk management and policy effectiveness. The stronger short-run impact in floating regimes (-0.152) versus pegged regimes (-0.087) is a direct reflection of market mechanics: floating rates absorb shocks through immediate price adjustments. Pegged regimes, by design, suppress this daily volatility. However, the convergence of the long-run coefficients is a crucial insight. It suggests that pegged regimes do not eliminate underlying economic exposure; they merely transform its nature. The risk is transformed from continuous, smaller fluctuations into a latent, discontinuous "crash risk" of a potential de-pegging event. This confirms the theoretical view that while a peg may anchor short-term volatility, it cannot indefinitely defy macroeconomic fundamentals, and rational investors continue to price in the long-term structural exposure.

5.2. Positioning the Findings within the Literature:

Our results make a clear contribution to "the exchange rate exposure puzzle". By focusing on emerging markets, we demonstrate that the puzzle is less of a puzzle in contexts where hedging markets are incomplete and macroeconomic volatility is high. Our findings align strongly with the EME-focused literature (e.g., Dominguez &Tesar, 2006; Kamil, 2008) that finds significant and prevalent exposure.

Furthermore, by explicitly modelling sectoral and regime-based heterogeneity, we go beyond simply confirming the existence of exposure. We provide a structured explanation for why it varies across firms and countries. The demonstrated asymmetry between importers and exporters provides a more nuanced picture than much of the existing literature, which often treats "tradable goods firms" as a single category. The dynamic results from the PMG-ARDL model also address a key limitation of earlier static models, by showing that the path of adjustment matters and that short-run and long-run effects can differ substantially. Our finding of a rapid adjustment speed (a half-life of under two months) suggests that markets in these EMEs are relatively efficient at incorporating new information about volatility into firm valuations.

6. Conclusion:

This study embarked on an investigation into the short- and long-run effects of exchange rate volatility on the market capitalization of firms in emerging economies. Employing a carefully constructed panel of 180 firms from six diverse emerging markets and leveraging the sophisticated Pooled Mean-Group Autoregressive Distributed Lag (PMG-ARDL) methodology, this paper documents a robust, negative, and statistically significant nexus between exchange rate volatility and firm value.

Our primary findings are threefold. First, we confirm that exchange rate risk is a priced factor, with a 1 percentage point increase in volatility leading to a 0.273% decrease in firm value in the long run. Second, we uncover profound asymmetry: the negative impact is nearly twice as strong for import-dependent firms as it is for export-oriented firms, highlighting the dominance of cost-side pressures. Third, we show that while pegged exchange rate regimes can dampen the immediate impact of volatility, they do not eliminate the underlying long-term economic exposure. These findings remain robust across a battery of alternative specifications and estimators. The evidence underscores that in the interconnected global economy, effective management of currency risk is not a peripheral treasury function but a central component of corporate strategy and value creation, particularly in the emerging market context**.**

6.2. Policy Implications:

- **For Corporate Managers:** Risk management should be adjusted: import-dependent firms must strengthen hedge and supply chains, while export-oriented firms necessitate complementary tools beyond natural hedging to fully mitigate risks.

- **For Financial Market Regulators:** Developing deeper and more liquid domestic derivative markets represents a key policy tool, as lowering transaction costs and expanding the availability of instruments like options and futures (eg, INR options in India and ZAR futures in South Africa), thus permitting firms to manage exchange rate risks more efficiently and at reduced cost.
- **For Macro-prudential Surveillance Authorities:** The findings emphasize the need to adopt macro-prudential policies, particularly mandatory currency exposure disclosure by listed firms to reduce information gaps, and counter-cyclical capital buffers for banks with unhedged foreign currency loans to protect the financial system against systemic risks.
- **For Policymakers in Pegged Regimes**: Policymakers in countries with pegged currencies (e.g., Qatar, Saudi Arabia) should recognize that the peg, while providing short-term stability, can mask the build-up of significant structural currency mismatches on corporate balance sheets. This necessitates rigorous and regular stress-testing of the corporate and banking sectors against sudden, large de-pegging scenarios to ensure financial stability.

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