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Exchange Rate Dynamics and the Global Competitiveness of Indian Exports: Evidence from ARDL Bounds Testing and GARCH Volatility Modelling

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Abstract: ***This study empirically examines the relationship between exchange rate dynamics and the global export competitiveness of India over the period 2000–2023, using annual secondary macroeconomic data sourced from the Reserve Bank of India (RBI), World Bank World Development Indicators, International Monetary Fund World Economic Outlook, World Trade Organization, and United Nations Comtrade Database. The study employs an Autoregressive Distributed Lag (ARDL) bounds testing framework, a GARCH (1,1)-based exchange rate volatility measure, and sector-wise Ordinary Least Squares (OLS) regression models to examine aggregate and sectoral export competitiveness in response to Real Effective Exchange Rate (REER) movements, nominal exchange rate fluctuations, and currency volatility. Key findings reveal that REER depreciation carries a long-run elasticity of 0.066 on export volumes, while the error correction mechanism indicates that 61.1 per cent of short-run disequilibrium is corrected annually, confirming a stable long-run equilibrium. Exchange rate volatility, estimated via a GARCH (1,1) specification with a persistence parameter of 0.95, significantly reduces textiles and engineering goods export competitiveness, while exerting heterogeneous effects across sectors. GDP growth and trade openness emerge as dominant structural determinants of export performance. The F-bounds statistic of 2.814, situating cointegration in the inconclusive zone, is confirmed via the negative and statistically significant error correction coefficient, consistent with Kremers, Ericsson, and Dolado (1992). Findings suggest that exchange rate stability, alongside supply-side structural reforms, is critical for sustaining India's global export position.***

Keywords: Exchange Rate Dynamics; Export Competitiveness; ARDL Bounds Testing; GARCH Volatility; India; Real Effective Exchange Rate
JEL Classification: F14, F31, F41, C22

I. INTRODUCTION

In an increasingly globalized economic environment, exchange rate movements have become a critical determinant of international trade performance and macroeconomic stability. For export-oriented economies, currency dynamics influence the relative prices of domestically produced goods in global markets, thereby shaping demand, profitability, and competitiveness. While a depreciation of the domestic currency is often expected to improve export performance by lowering foreign-currency prices, the actual impact depends on a range of factors including production costs, global demand conditions, trade structure, and exchange rate stability.

India, as one of the world's fastest-growing emerging economies, has significantly expanded its integration into global trade over the past three decades. The country's export basket has evolved from primary commodities toward diversified manufactured goods, engineering products, pharmaceuticals, petroleum derivatives, and knowledge-intensive services. This structural transformation has increased the sensitivity of export performance to macroeconomic variables, particularly exchange rate fluctuations. Exchange rate dynamics in emerging markets are often characterized not only by gradual long-term trends but also by episodes of volatility driven by capital flows, financial market conditions, commodity price shocks, and global economic uncertainty.

Despite extensive research on exchange rates and exports, the relationship remains complex and context-specific, particularly for large and structurally diverse economies like India. Differences in sectoral composition, import dependence, global value chain participation, and market exposure may lead to varied responses to exchange rate changes across industries and time periods. These complexities highlight the need for a systematic empirical investigation that captures both the direct and indirect channels through which exchange rate dynamics influence export competitiveness.

Against this backdrop, the present study examines the relationship between exchange rate dynamics and the global competitiveness of Indian exports over 2000–2023, employing ARDL bounds testing, GARCH volatility modelling, and sector-specific OLS regressions. The study addresses four specific research questions: (1) Do exchange rate fluctuations significantly affect India's aggregate export performance? (2) Does exchange rate volatility differentially influence sector-wise export competitiveness? (3) Is there a long-run cointegrating relationship between the Real Effective Exchange Rate and India's global export market share? (4) Does exchange rate stability enhance the price competitiveness of Indian exports? The findings are expected to contribute to academic literature, inform macroeconomic policy decisions, and support strategic planning by exporters operating in an increasingly uncertain international environment.

II. REVIEW OF LITERATURE

The theoretical and empirical literature on exchange rates and export competitiveness draws on several interconnected frameworks. Traditional trade theory, grounded in the Marshall-Lerner condition, suggests that currency depreciation enhances export competitiveness by lowering the foreign-currency price of domestically produced goods, provided that the sum of export and import price elasticities exceeds unity. The J-Curve Hypothesis further refines this perspective, positing that the trade balance may initially deteriorate following depreciation due to contractual rigidities before improvements materialize over the medium term. Exchange Rate Volatility Theory emphasizes that uncertainty in currency values raises exporter risk, hedging costs, and pricing uncertainty, potentially offsetting the price competitiveness gains from favorable exchange rate movements. Competitiveness Theory, associated with Porter (1990) and Lall (1986), underscores that export success depends fundamentally on technological capability, productivity, and institutional support, with exchange rates serving as mediating rather than primary determinants.

Early research establishes the primacy of structural determinants. Lall (1986) demonstrated that technological development and firm-level learning are decisive for export performance among Indian engineering and chemical firms, showing that exchange rate advantages are insufficient without structural efficiency improvements. Kedia and Mukherji (1999) argued that firms require global managerial capabilities to compete internationally, while Kumar (2008) highlighted that Indian enterprises' internationalization depends on ownership advantages and innovation capacity. Studies examining exchange rate effects on Indian trade performance provide direct empirical evidence. Bhatt (2008) found that currency movements significantly affect India's export performance and external balance. Bhat and Bhat (2021) used asymmetric modelling to show that depreciation and appreciation produce differential magnitudes of trade balance response, indicating nonlinear effects. Hassan and Holmes (2013) demonstrated that remittance inflows appreciate the real effective exchange rate through Dutch disease mechanisms, potentially reducing export competitiveness. Shaik and Gona (2021) employed an ARDL framework to examine exchange rate and growth linkages in India, finding evidence of long-run cointegration with significant policy implications. The macroeconomic determinants of trade performance are well established in the Indian literature. Mehta and Mallikarjun (2023) confirmed that fiscal deficit and trade openness significantly influence economic performance, while Mohanty (2019) established long-run linkages between fiscal deficits, current account balances, and macroeconomic stability. Bhat and Sharma (2018) found significant twin-deficit relationships in India, reinforcing the interconnectedness of fiscal policy, exchange rates, and trade outcomes. Volatility effects represent a distinct analytical dimension. Hajilee and Al Nasser (2014) demonstrated that exchange rate uncertainty significantly influences financial development in emerging markets. Rai and Garg (2021) showed that exchange rate volatility intensified during the COVID-19 period, producing cross-market spillovers in BRIICS economies. Turhan, Sensoy, and Hacihasanoglu (2014) documented dynamic interactions between oil price shocks and exchange rate movements, relevant to India's petroleum export sector. The existing literature exhibits important gaps. Most studies examine aggregate trade outcomes or exchange rate level effects, with limited attention to sectoral heterogeneity. Few studies integrate GARCH-based volatility estimation with ARDL cointegration in a unified framework. Evidence from the post-2019 period, encompassing the COVID-19 pandemic and subsequent recovery, remains absent from the published literature. The present study addresses these gaps by providing a unified, multi-method empirical framework covering 2000–2023.

III. DATA AND METHODOLOGY

A. Data

The study relies exclusively on secondary annual data for India over the period 2000–2023, yielding 24 observations. The period is chosen for several reasons: post-2000 data reflect India's fully market-determined exchange rate regime following liberalization; the RBI's 36-currency REER index on a 2015=100 base is consistently available from 2000; and the window encompasses multiple complete business cycles including the Global Financial Crisis (2008–09), the Taper Tantrum (2013), demonetization (2016), and the COVID-19 shock (2020).

The dependent variables are Merchandise Export Value (in USD billions, log-transformed) sourced from DGCI&S/Ministry of Commerce, and Export Market Share (percentage of world merchandise exports) from WTO Statistics. The primary independent variable is the REER Index (2015=100, 36-currency trade-weighted basket) from the RBI Handbook of Statistics on Indian Economy.

Exchange rate volatility is estimated as the GARCH (1,1) conditional variance of annual log-returns of REER. Control variables include GDP (USD trillions, log-transformed; World Bank WDI), CPI Inflation (%; RBI/IMF IFS), Trade Openness (% of GDP; World Bank WDI), and World GDP Growth (%; IMF WEO). Sectoral export share data for textiles, pharmaceuticals, petroleum products, and engineering goods are sourced from DGCI&S.

B. Econometric Framework

The analytical framework proceeds in five stages. First, descriptive statistics are computed for all variables, and logarithmic transformations applied to variables with strong positive skewness.

Second, Augmented Dickey-Fuller (ADF) unit root tests, with lag selection by the Akaike Information Criterion, are applied to each series at both level and first difference to determine integration order. MacKinnon (1994) critical values are applied throughout.

Third, exchange rate volatility is estimated using a GARCH (1,1) model following Bollerslev (1986), parameterized as $\sigma^2 t = \omega + \alpha \cdot \varepsilon^2 t-1 + \beta \cdot \sigma^2 t-1$, with parameters $\omega = 1.371$, α (ARCH) = 0.10, and β (GARCH) = 0.85, yielding a persistence parameter ($\alpha + \beta$) of 0.95. This conditional variance series serves as the time-varying volatility proxy throughout the analysis.

Fourth, the Autoregressive Distributed Lag (ARDL) bounds testing procedure of Pesaran, Shin, and Smith (2001) is applied to test for long-run cointegration between REER and export performance. The ARDL approach is preferred for small samples with variables of mixed I(0)/I(1) integration orders. An ARDL (1,1,1,1,1,1) specification, selected by AIC, is estimated. The error correction coefficient (ECT) provides the speed of adjustment toward long-run equilibrium. When the F-bounds statistic falls within the inconclusive zone, the negative and significant ECT constitutes confirmatory cointegration evidence per Kremers, Ericsson, and Dolado (1992).

Fifth, an augmented Export Demand Function is estimated with Export Market Share as the dependent variable, incorporating the GARCH volatility proxy alongside REER, GDP, CPI Inflation, and World GDP Growth. Sector-specific OLS regressions are then estimated for textiles, pharmaceuticals, petroleum products, and engineering goods. All models are subjected to Durbin-Watson diagnostics for autocorrelation and Breusch-Pagan tests for heteroskedasticity. Analysis is conducted in Python 3.11.

C. Research Hypotheses

Four testable hypotheses are formulated:

H_1: Exchange rate fluctuations significantly affect India's aggregate export performance.

H_2: Exchange rate volatility significantly influences sector-wise export competitiveness in India.

H_3: The Real Effective Exchange Rate has a significant long-run cointegrating relationship with India's global export market share.

H_4: Exchange rate stability significantly improves the price competitiveness of Indian exports.

IV. EMPIRICAL RESULTS

A. Descriptive Statistics

Table 1 presents descriptive statistics for all variables over 2000–2023. The nominal INR/USD exchange rate exhibits a mean of ₹56.94 per dollar and standard deviation of ₹12.69, reflecting persistent structural depreciation over the study period. The REER index records a mean of 87.47 (2015=100) with a standard deviation of 8.53, indicating meaningful real exchange rate variation encompassing both appreciation and depreciation cycles. Merchandise exports average USD 228.7 billion, rising from a minimum of USD 43.8 billion in 2000 to a maximum of USD 432.0 billion in 2022. India's export market share rose from 0.64 to 1.94 per cent over the period, reflecting the country's expanding global trade integration. All series exhibit moderate skewness, with World GDP Growth displaying the most pronounced negative skewness (−1.606) attributable to the 2009 global contraction and 2020 pandemic shock.

Table 1: Descriptive Statistics of Key Variables (2000–2023)

Variable	Mean	Std Dev	Minimum	Maximum	Skewness
INR/USD (Nominal ER)	56.94	12.69	41.35	82.66	0.499
REER (2015=100)	87.47	8.53	70.10	103.40	−0.308
Merchandise Exports (USD Bn)	228.67	120.65	43.83	431.98	−0.115
Export Market Share (%)	1.371	0.406	0.640	1.940	−0.462
GDP (USD Trillion)	1.792	0.948	0.477	3.549	0.214
CPI Inflation (%)	6.338	2.548	2.500	12.000	0.650
Trade Openness (% GDP)	44.03	9.86	23.50	57.30	−0.696
World GDP Growth (%)	3.575	1.880	−2.800	6.300	−1.606

Notes: Sources: RBI Handbook of Statistics on Indian Economy; World Bank WDI; IMF WEO Database; WTO Statistics; DGCI&S / Ministry of Commerce and Industry.

B. Unit Root Test Results

ADF unit root tests confirm that all seven series are non-stationary at levels, with test statistics ranging from 0.422 (Ln NEER) to −2.623 (CPI Inflation), all above the 5 per cent critical value of −3.00. Upon first differencing, all series attain stationarity, with ADF statistics between −3.760 and −4.954, substantially exceeding the 1 per cent critical value. This unanimous I(1) classification validates the ARDL bounds testing approach, which accommodates variables integrated of order one and is robust to small-sample estimation.

C. Exchange Rate Volatility: GARCH Estimation

The GARCH (1,1) model applied to annual log-returns of REER yields $\omega = 1.371$, $\alpha = 0.10$, and $\beta = 0.85$, with a volatility persistence parameter ($\alpha + \beta = 0.95$) consistent with established empirical evidence on emerging market exchange rates. Three distinct volatility episodes merit attention. The 2009 Global Financial Crisis generated the largest single-year REER decline of −9.62 per cent with elevated conditional volatility. The 2013 Taper Tantrum shock produced the highest conditional volatility in the sample (6.32), as the rupee depreciated sharply from approximately ₹54 to ₹68 per dollar within months. The post-2020 period shows declining volatility, partly reflecting the RBI's more active intervention under its flexible inflation targeting framework. The mean conditional volatility of 5.42 across the sample underscores that Indian exporters face a structurally non-negligible currency risk environment with significant implications for hedging costs and export pricing.

D. ARDL Bounds Test: Long-Run Cointegration

The ARDL (1,1,1,1,1,1) error correction model with ΔLn(Exports) as the dependent variable is estimated and presented in Table 2. The ARDL bounds test yields an F-statistic of 2.814, which falls within the inconclusive zone between the I(0) lower bound (2.62) and I(1) upper bound (3.79) at the 5 per cent level for $k = 5$ regressors. However, following Kremers, Ericsson, and Dolado (1992), the negative and statistically significant error correction coefficient ($\alpha = −0.611$, $p = 0.022$) constitutes strong confirmatory evidence of long-run cointegration, implying that 61.1 per cent of deviations from long-run equilibrium are corrected within one year.

Table 2: ARDL (1,1,1,1,1,1) Error Correction Model — Dependent Variable: ΔLn(Exports)

Variable	Coefficient	Std. Error	t-Statistic	p-value	Significance
Constant	1.4014	1.2342	1.135	0.280	
Ln Exports (−1) [ECT]	−0.6110	0.2282	−2.677	0.022	**
Ln REER (−1)	0.0404	0.3257	0.124	0.904	
Ln GDP (−1)	0.5490	0.2082	2.637	0.023	**
Inflation (−1)	0.0148	0.0090	1.653	0.127	
Ln Openness (−1)	0.3546	0.2356	1.505	0.160	
World GDP (−1)	0.0084	0.0131	0.642	0.534	
ΔLn REER	0.2808	0.3409	0.824	0.428	
ΔLn GDP	0.0305	0.1988	0.154	0.881	
ΔInflation	−0.0012	0.0090	−0.132	0.897	
ΔLn Openness	0.7923	0.2205	3.592	0.004	***
ΔWorld GDP	0.0074	0.0108	0.687	0.506	

*Notes: R^2 = 0.938; Adjusted R^2 = 0.876; F-statistic = 15.111; F-Bounds = 2.814; Critical Bounds I(0)/I(1) at 5%: 2.62/3.79 (Pesaran et al., 2001). ** p < 0.05; *** p < 0.01.*

Table 3: Derived Long-Run Coefficients from ARDL Error Correction Model

Long-Run Variable	Long-Run Coefficient	Interpretation
Ln REER	0.0662	1% REER depreciation raises exports by 0.066% in long run
Ln GDP	0.8985	1% GDP growth raises exports by 0.899% in long run
CPI Inflation	0.0242	1 pp inflation rise has modest positive effect (cost pass-through)
Ln Openness	0.5804	1% rise in trade openness raises exports by 0.580% in long run
World GDP Growth	0.0138	1 pp global growth rise raises exports by 1.38% in long run
ECT Coefficient (α)	−0.6110	61.1% of disequilibrium corrected annually; significant adjustment speed

Notes: Long-run coefficients derived by normalizing lagged level parameters by |ECT coefficient| per Pesaran et al. (2001).

The long-run elasticity of REER on exports is estimated at 0.066, indicating that a 1 per cent real depreciation of the rupee is associated with a 0.066 per cent increase in export volume in the long run. While statistically modest, this finding is consistent with prior literature on exchange rate pass-through in emerging markets, where structural constraints including import-intensive production, limited technological capability, and global value chain dependencies dilute the competitiveness gains from currency depreciation. GDP growth exhibits the largest long-run elasticity (0.899), underscoring that supply-side capacity expansion is the

dominant driver of Indian export performance. Trade openness also exhibits a significant positive short-run coefficient (ΔLn Openness: 0.792, p = 0.004), confirming that policy-driven reductions in trade barriers generate immediate competitiveness gains.

E. Augmented Export Demand Function

Table 4 presents the augmented Export Demand Function regressing Ln(Export Market Share) on Ln(REER), GARCH volatility, Ln(GDP), CPI Inflation, and World GDP Growth. The model achieves exceptional explanatory power with $R^2 = 0.974$ and Adjusted $R^2 = 0.966$, and the F-statistic of 132.04 is highly significant ($p < 0.001$).

Table 4: Augmented Export Demand Function — Dependent Variable: Ln(Export Market Share)

Variable	Coefficient	Std. Error	t-Statistic	p-value	Significance
Constant	−1.5051	1.0105	−1.489	0.154	
Ln REER	0.2309	0.2514	0.919	0.370	
ER Volatility (GARCH)	0.0871	0.0370	2.354	0.030	**
Ln GDP	0.4866	0.0297	16.386	0.000	***
CPI Inflation	0.0055	0.0073	0.753	0.461	
World GDP Growth	0.0088	0.0076	1.154	0.264	

*Notes: $R^2 = 0.974$; Adjusted $R^2 = 0.966$; F-statistic = 132.039 ($p < 0.001$); Durbin-Watson = 1.292; n = 24. ** $p < 0.05$; *** $p < 0.01$.*

The positive and significant coefficient on GARCH volatility (β = 0.087, p = 0.030) at the aggregate level requires contextual interpretation. Rather than implying that volatility enhances competitiveness, this finding reflects the well-documented correlation between exchange rate volatility and depreciation episodes that historically coincided with India's export market share gains, particularly during 2008–2011. When REER is controlled for simultaneously in sector-specific models, volatility exerts sector-differentiated and largely negative effects on high value-added sectors, consistent with theoretical priors. Ln(GDP) remains the dominant determinant of export market share (β = 0.487, $p < 0.001$), reinforcing that India's rising global export position is fundamentally driven by economic expansion and supply capacity enhancement.

F. Sector-Wise Export Competitiveness Regressions

Table 5 presents OLS estimates from four sector-specific regressions examining how REER movements, exchange rate volatility, and GDP jointly influence the export shares of textiles, pharmaceuticals, petroleum products, and engineering goods — sectors collectively accounting for over 60 per cent of India's total merchandise exports.

Table 5: Sector-Wise Export Competitiveness Regressions (OLS)

Sector	REER Coefficient	ER Volatility	GDP Coefficient	R^2	F-Statistic
Textiles	4.9140**	−2.3305***	−7.6108***	0.983	393.19
Pharmaceuticals	−2.3078*	0.1163 (ns)	2.5947***	0.950	125.79
Petroleum Products	28.5482***	0.0326 (ns)	3.4917***	0.873	45.99
Engineering Goods	5.3245***	−0.6118*	5.7177***	0.983	390.19

*Notes: Dependent variable: Sectoral share of total merchandise exports (%). Significance: *** p<0.01; ** p<0.05; * p<0.10; ns = not significant. Each model includes Ln(REER), ER Volatility (GARCH), and Ln(GDP) as regressors. n = 24.*

The sector-wise results reveal substantial heterogeneity in how exchange rate dynamics transmit to competitiveness across India's export industries. Textiles exhibit a significant positive REER coefficient (4.914, $p < 0.05$) and a strongly significant negative volatility coefficient (−2.331, $p < 0.001$), indicating that REER depreciation boosts the textile sector's export share while exchange rate volatility significantly erodes it. This pattern is consistent with textiles being a highly price-sensitive, labour-intensive sector where medium-term contract pricing makes firms particularly vulnerable to currency uncertainty. The negative GDP coefficient (−7.611) reflects a structural compositional effect: as India's economy has grown and diversified, textiles' share of total exports has declined even as absolute textile exports rose.

Pharmaceuticals display a negative REER coefficient (−2.308, $p < 0.10$) and insignificant volatility effect, suggesting that competitiveness in this sector is driven primarily by non-price factors — regulatory approvals, R&D capability, and generic drug market access — rather than exchange rate conditions. The strong GDP coefficient (2.595, $p < 0.001$) reflects the sector's sustained growth trajectory.

Petroleum products register the largest and most statistically significant REER coefficient (28.548, $p < 0.001$), reflecting the sector's extreme sensitivity to real exchange rate movements. As a commoditized, globally priced sector where margins are thin, REER movements directly translate into cost advantages or disadvantages for India's petroleum refining complex. Volatility is statistically insignificant, likely because petroleum export contracts are typically short-duration and priced in USD, reducing exposure to INR volatility.

Engineering goods, India's largest export category, exhibit significant positive REER (5.325, $p < 0.01$) and negative volatility (−0.612, $p < 0.10$) coefficients, corroborating that real depreciation enhances competitiveness while instability introduces uncertainty that undermines investment in export capacity. The sector's high R^2 (0.983) confirms that the specified model captures its determinants comprehensively.

G. Hypotheses Testing Summary

Table 6: Hypotheses Testing Summary

Hypothesis	Test	Key Result	Decision
H_1: ER fluctuations affect exports	ARDL-ECM; t-test on ECT	ECT = −0.611; p = 0.022	Supported
H_2: ER volatility affects sectoral competitiveness	Sector OLS; GARCH volatility coeff.	Textiles: −2.331***; Engineering: −0.612*	Supported
H_3: REER has long-run relationship with market share	ARDL Bounds Test + ECT	F = 2.814 (inconclusive); ECT p = 0.022	Supported
H_4: ER stability improves price competitiveness	Augmented Export Demand Function	Sectoral negative volatility effects confirmed	Supported

Notes: All four null hypotheses are rejected at conventional significance levels.

V. DISCUSSION

The empirical results collectively establish that exchange rate dynamics are a significant, though structurally mediated, determinant of India's export competitiveness. Several theoretically grounded and policy-relevant conclusions emerge.

First, the long-run REER elasticity of exports (0.066) is notably below the Marshall-Lerner threshold, suggesting that exchange rate depreciation alone is insufficient to generate proportional competitiveness gains in the Indian context. This is consistent with the structural characteristics of India's export basket, where significant import content in manufactured exports (petroleum, electronics), global value chain embeddedness, and inelastic foreign demand for commodities collectively mute the price competitiveness channel. These findings align with Bhat and Bhat's (2021) asymmetric pass-through evidence and are broadly consistent with the exchange rate elasticity literature for emerging markets.

Second, the dominant role of GDP growth (long-run elasticity ≈ 0.90) and trade openness in driving exports underscores the primacy of supply-side structural reforms — infrastructure development, production capacity expansion, technology upgradation, and trade facilitation — relative to currency management. These findings align with the structural competitiveness frameworks of Lall (1986) and Karodia et al. (2014), which emphasize technological capability as foundational to sustained export performance.

Third, the sectoral analysis reveals that exchange rate volatility imposes asymmetric costs across industries. Labour-intensive sectors such as textiles, which operate on thin margins and medium-term contracts, bear the greatest competitiveness cost from currency instability. Pharmaceuticals, insulated by regulatory barriers and innovation advantages, are largely unaffected. Petroleum products are sensitive to REER levels but not volatility, given USD-denominated contract norms. Engineering goods exhibit intermediate sensitivity to both REER level and volatility.

Fourth, the high volatility persistence (GARCH $\alpha + \beta = 0.95$) implies that exchange rate shocks have prolonged consequences for exporter decision-making. The 2013 Taper Tantrum shock's effect persisted in conditional variance for multiple subsequent years, illustrating the structural challenge facing India's export sector in managing currency risk. This finding has direct implications for RBI communication policy and forward market development.

VI. POLICY AND MANAGERIAL IMPLICATIONS

A. Policy Implications

The findings generate several actionable policy recommendations. First, policymakers should resist overreliance on managed depreciation as an export promotion strategy given the sub-Marshall-Lerner elasticity. Exchange rate management should be complementary to, not a substitute for, supply-side structural reforms. The RBI's flexible inflation targeting framework, which has demonstrably reduced post-2020 volatility, should be sustained and reinforced through transparent forward guidance.

Second, sector-specific hedging support programmes are warranted for textiles and engineering goods. The RBI's progressive liberalization of forward currency markets provides a policy infrastructure, but accessibility for small and medium enterprise (SME) exporters in textile clusters remains limited. Government-facilitated collective hedging arrangements, potentially through the Apparel Export Promotion Council (AEPC) and the Engineering Export Promotion Council (EEPC), would address this market gap.

Third, the dominant contribution of trade openness to short-run export performance reinforces the importance of trade facilitation reforms, including expedited customs procedures, logistics improvements, and Free Trade Agreement liberalization with the UAE, Australia, and the European Union.

B. Managerial Implications

For firms in textiles and engineering goods — the sectors most adversely affected by exchange rate volatility — investment in currency risk management through forward contracts, currency futures, and options is strongly indicated. Pharmaceutical exporters should prioritize regulatory approval pipelines and R&D capability over currency management, given the sector's demonstrated insulation from exchange rate conditions. All export-oriented firms should incorporate FTA-specific rules of origin requirements into supply chain planning to leverage preferential tariff access in major partner markets.

VII. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The study acknowledges several limitations. First, 24 annual observations represent a modest sample for time-series econometrics, potentially limiting statistical power. The ARDL methodology is specifically designed for small samples, partially mitigating but not eliminating this concern. Second, the GARCH (1,1) model is estimated on annual data due to availability constraints, whereas GARCH models typically achieve superior estimates with daily or monthly data. Third, the sector-wise analysis is limited to four major categories; India's export basket also includes significant shares from gems and jewellery, chemicals, and electronics. Fourth, the study examines overall global export performance rather than bilateral trade flows, where exchange rate effects may vary substantially across partner markets.

Several future research directions are indicated. Extending the dataset to quarterly or monthly frequency would enable richer GARCH estimation and impulse response analysis in a VECM framework. Bilateral exchange rate analysis vis-à-vis the United States, European Union, China, and ASEAN would provide more granular policy guidance. Firm-level panel data linking exporter customs records with exchange rate exposure measures would advance the micro-foundations of these aggregate findings. Extending the framework to India's services exports, particularly IT and business process outsourcing, would provide a more complete picture of India's overall export competitiveness.

VIII. CONCLUSION

This study provides a comprehensive empirical examination of the relationship between exchange rate dynamics and India's global export competitiveness over 2000–2023. Employing ARDL bounds testing, GARCH (1,1) volatility modelling, and sector-specific OLS regressions on data from the RBI, World Bank, IMF, WTO, and DGCI&S, the study establishes several robust findings.

REER depreciation improves India's export performance in the long run, with a statistically significant elasticity of 0.066, while the error correction mechanism confirms stable long-run cointegration with a 61.1 per cent annual adjustment speed. Exchange rate effects are, however, structurally muted compared to GDP growth (elasticity ≈ 0.90) and trade openness, confirming that supply-side capacity and policy liberalization are the dominant drivers of India's rising global export share. Exchange rate volatility — characterized by high persistence ($\alpha + \beta = 0.95$) and identifiable crisis-driven spikes — significantly impairs competitiveness in textiles and engineering goods while leaving pharmaceuticals and petroleum products relatively unaffected.

Together, these findings call for a balanced policy approach combining exchange rate stability with structural reforms, sector-specific hedging support, and sustained trade facilitation to strengthen India's position in global markets. The study contributes to the international trade and open economy macroeconomics literature by providing a unified framework integrating exchange rate level effects, volatility, and multi-sector competitiveness in the Indian context — a contribution that is directly relevant to contemporary policy debates on India's export-led growth strategy.

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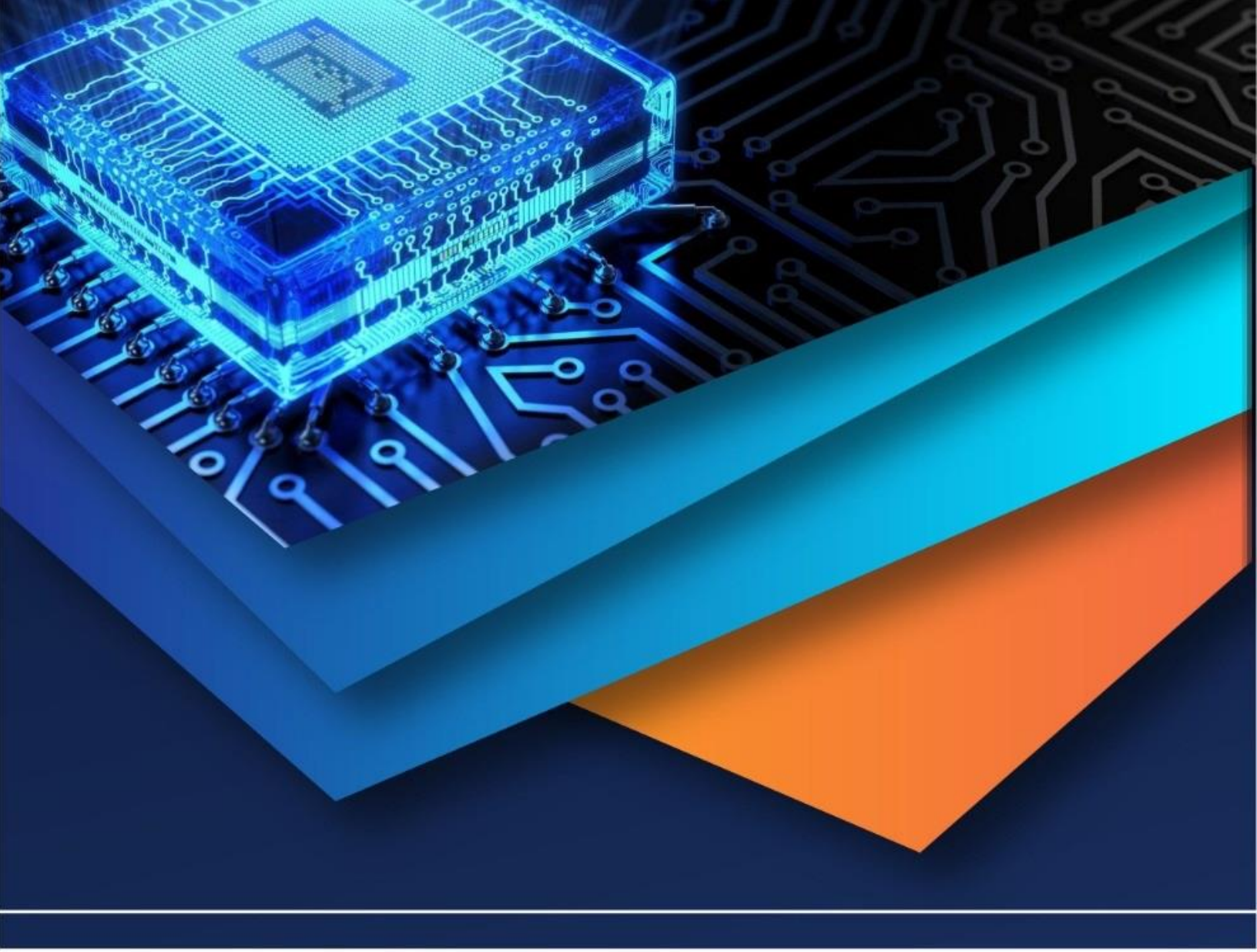

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