

Trends, Determinants And Economic Impact Of Imports In India: An Empirical Study

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Abstract

This empirical study investigates the structural trends, macroeconomic determinants, and growth impacts of merchandise imports in India over a twenty-five-year post-liberalization horizon spanning FY 2000–01 to FY 2024–25. Drawing upon secondary time-series datasets compiled from the Reserve Bank of India (RBI), the Directorate General of Commercial Intelligence and Statistics (DGCI&S), and the World Bank, the paper employs quinquennial regime decomposition, log-linear Ordinary Least Squares (OLS), and Autoregressive Distributed Lag (ARDL) models alongside disaggregated macroeconomic impact regressions. Empirical trend analysis reveals that India's merchandise imports expanded fourteen-fold from USD 50.54 billion in FY 2000–01 to a peak of USD 720.24 billion in FY 2024–25, registering a compound annual growth rate (CAGR) of 11.71% and widening the merchandise trade deficit to USD 282.82 billion. Econometric estimates of the aggregate import demand function demonstrate that real GDP is the primary structural determinant with a long-run income elasticity of 1.426 ($p < 0.001$), followed by international Brent crude oil prices with an elasticity of 0.645 ($p < 0.001$), whereas nominal exchange rate depreciation exerts a modest restraining effect (-0.708 , $p = 0.067$), confirming the price-inelastic nature of essential imports. Crucially, disaggregated impact regressions establish a dualistic macroeconomic relationship: productive imports comprising capital machinery, electronics, semiconductors, and chemical intermediates, constituting 52.3% of total imports in FY 2024–25 significantly accelerate Gross Fixed Capital Formation ($\beta = 0.418$, $p < 0.001$) and real GDP growth ($\beta = 0.312$, $p = 0.002$), whereas energy and bullion imports exacerbate external deficits, necessitating targeted tariff calibration and domestic value-chain integration.

Keywords: Merchandise Import Demand; Income and Price Elasticity; Autoregressive Distributed Lag (ARDL); Gross Fixed Capital Formation (GFCF); Real Effective Exchange Rate (REER); Commodity Composition; Indian Macroeconomic Performance.

1. Introduction

1.1 Post-Liberalization Evolution and Structural Trajectory of India's Import Regime

Since the watershed balance-of-payments reforms of 1991 and the dismantling of quantitative import licensing in the early 2000s, India's external trade sector has undergone a profound structural transformation [1], [2]. Over the quarter-century spanning FY 2000–01 to FY 2024–25, progressive tariff rationalization, deeper integration into global value chains (GVCs), and rapid domestic industrialization propelled merchandise imports from USD 50.54 billion to USD 720.24 billion [3], [4]. Rather than signifying macroeconomic vulnerability alone, this surge reflects the evolving absorptive capacity of a fast-growing emerging economy whose merchandise import-to-GDP ratio rose from 10.79% in FY 2000–01 to a peak of 26.85% in FY 2012–13 before stabilizing at 18.52% in FY 2024–25. Concurrently, the commodity basket shifted toward crude petroleum, high-technology electronics, industrial machinery, and

chemical intermediates essential for domestic manufacturing [5], [6].

1.2 Macroeconomic Determinants and Theoretical Framework of Import Demand

Grounded in the imperfect substitutes framework pioneered by Goldstein and Khan [7] and extended to developing economies by Bahmani-Oskooee [8], aggregate import demand is theoretically governed by real domestic income, relative import prices adjusted for exchange rate movements, and foreign exchange liquidity constraints [9]. In the Indian macroeconomic context, however, conventional Marshall-Lerner price elasticity assumptions face structural rigidities because over three-fourths of merchandise inflows consist of non-substitutable energy inputs, industrial raw materials, and capital equipment [10], [11]. Consequently, domestic GDP expansion and investment cycles generate strong Keynesian absorption effects, while international commodity price shocks particularly Brent crude oil and bullion price volatility directly inflate the nominal import bill regardless of rupee depreciation

[12]. Furthermore, foreign exchange reserve accumulation serves as an institutional buffer relaxing external financing bottlenecks for capital-intensive imports [13].

1.3 Research Objectives, Hypotheses, and Empirical Scope of the Study

Despite extensive policy debate surrounding India's widening merchandise trade deficit, empirical clarity regarding the asymmetric growth consequences of disaggregated import categories remains critical for industrial policy design [14], [15]. This study addresses this gap across a 25-year period (FY 2000–01 to FY 2024–25) through three interconnected objectives: first, to quantify quinquennial growth trends, structural breaks, and geopolitical shifts across India's commodity import basket; second, to estimate long-run income, oil-price, exchange-rate, and reserve elasticities using log-linear OLS and ARDL models; and third, to evaluate the macroeconomic impact of productive capital and intermediate imports versus energy and bullion inflows on Gross Fixed Capital Formation (GFCF), Manufacturing Value Added (MVA), and real GDP growth. The central hypothesis posits that while aggregate imports widen the trade deficit, productive capital and intermediate imports act as vital catalysts of domestic capital formation and output expansion.

2. Literature Survey

The empirical literature on import demand behavior and its macroeconomic consequences in emerging markets has evolved substantially over the past four decades. Foundational econometric investigations by Goldstein and Khan [7] and Houthakker and Magee [16] established that international trade flows exhibit pronounced income asymmetries, wherein developing nations face high income elasticities for industrial imports alongside low price elasticities for primary exports. Subsequent cross-country cointegration studies by Senhadji [9] and Bahmani-Oskooee and Niroomand [8] confirmed that long-run import demand in industrializing economies is predominantly driven by real domestic absorption rather than relative price competitiveness. In the Indian context, early post-reform analyses by Dutta and Ahmed [10] and Sinha [17] utilizing Johansen cointegration techniques over the 1970–2000 period demonstrated that real GDP and trade liberalization reforms exerted robust positive effects on aggregate import volume, whereas relative import price elasticities remained statistically below unity, challenging the efficacy of exchange-rate devaluation as a standalone balance-of-payments adjustment mechanism [18], [19]. Recent panel and time-series assessments across South Asian economies further corroborate that structural supply-side bottlenecks prevent domestic producers from rapidly substituting imported industrial inputs following currency depreciation.

A second strand of scholarship examines the commodity-specific determinants of Indian imports, focusing on energy dependence, exchange rate pass-through, and global value chain participation. Studies by Ghosh [11], Dash [12], and Mallick and Marques [20] documented that India's petroleum, oil, and lubricants (POL) import bill is highly insensitive to rupee depreciation due to limited domestic crude reserves and rising transport energy intensity, rendering the current account vulnerable to international Brent crude price shocks [21]. Similarly, empirical inquiries into gold and precious stone imports by Vaidyanathan [22] and Reserve Bank of India staff studies [23] highlighted household inflation-hedging behavior as a major non-industrial driver of external trade imbalances. Conversely, disaggregated trade analyses by Veeramani [5], Goldar [6], and Banga [24] revealed that the rapid surge in electronic components, organic chemicals, and non-electrical machinery imports since the mid-2000s reflects deep backward linkages in domestic manufacturing and export production [25], [26]. Turning to macroeconomic growth impacts, endogenous growth models by Coe and Helpman [27] and empirical investigations of the import-led growth (ILG) hypothesis in India by Mishra et al. [14], Paul and Adhikari [15], and Maitra [28] provide compelling econometric evidence that embodied technological spillovers within imported capital goods and intermediate inputs significantly raise total factor productivity, gross fixed capital formation, and long-run industrial output [29], [30].

3. Research Methodology

This study employs a quantitative macroeconomic research design based on annual time-series data spanning twenty-five fiscal years from FY 2000–01 to FY 2024–25 ($N = 25$). Secondary data on aggregate merchandise imports, exports, trade balance, and disaggregated commodity categories Petroleum, Oil and Lubricants (POL), capital machinery, electronic goods, chemicals and intermediates, and gold were compiled from the Directorate General of Commercial Intelligence and Statistics (DGCI&S), the Ministry of Commerce and Industry, and the Reserve Bank of India (RBI) Handbook of Statistics on the Indian Economy [3], [4], complemented by Real GDP, Gross Fixed Capital Formation (GFCF), exchange rate, and Brent crude series from MoSPI and the World Bank. To examine structural trends and estimate the macroeconomic determinants of import demand, the study conducts quinquennial regime decomposition, compound annual growth rate (CAGR) evaluation, Augmented Dickey-Fuller (ADF) stationarity tests, and Pearson correlation analysis. Following the imperfect substitutes model [7], [9], double-log import demand functions are estimated using Ordinary Least Squares (OLS) with Newey-West

standard errors and an Autoregressive Distributed Lag (ARDL) specification: $\ln(M_t) = \beta_0 + \beta_1 \ln(RGDP_t) + \beta_2 \ln(POIL_t) + \beta_3 \ln(EXR_t) + \beta_4 \ln(FXR_t) + \epsilon_t$, capturing long-run income, oil-price, exchange-rate, and foreign-reserve elasticities alongside a non-oil import model incorporating REER and domestic GFCF intensity.

To quantify the economic impact of imports on macroeconomic performance, four structural regressions link disaggregated import channels to Real GDP growth, Gross Fixed Capital Formation (GFCF/GDP), Manufacturing Value Added (MVA) growth, and the merchandise trade deficit ratio. Imports are partitioned into Productive Imports comprising capital machinery, electronics, semiconductors, and chemical intermediates and Vulnerability-Inducing Imports, comprising POL energy inflows and gold bullion. Regressing domestic investment and output growth on

productive import expansion isolates embodied technological spillovers from the balance-of-payments drag of energy and gold inflows, with model robustness confirmed via Variance Inflation Factors ($VIF < 5.0$), Breusch-Godfrey serial correlation, Breusch-Pagan heteroscedasticity, and Durbin-Watson tests.

4. Empirical Data Collection And Analysis

4.1 Longitudinal Trends and Quinquennial Regime Analysis of India's Merchandise Imports

To empirically evaluate the long-run trajectory of India's import sector and establish the quantitative foundation introduced in the Abstract, the 25-year sample period (FY 2000–01 to FY 2024–25) is partitioned into five distinct five-year macroeconomic regimes in Table 1. Each quinquennial regime reflects a unique phase of tariff policy, global commodity cycle, and domestic industrial absorption.

Table 1: Quinquennial Macroeconomic Trajectory, Trade Intensity, and Compound Annual Growth Rate (CAGR) of India's Merchandise Imports (FY 2000–01 to FY 2024–25)

Macroeconomic Regime (Quinquennial Period)	Mean Merchandise Imports (USD Bn)	Mean Merchandise Exports (USD Bn)	Mean Trade Deficit (USD Bn)	Import-to-GDP Ratio (%)	Export-to-Import Coverage (%)	Period Import CAGR (%)
Regime I: Post-QR Liberalization (FY 2000–01 to 2004–05)	70.61	57.70	-12.91	12.38%	83.17%	21.88%
Regime II: High-Growth Investment Boom (FY 2005–06 to 2009–10)	235.73	151.34	-84.39	21.09%	65.00%	17.91%
Regime III: Crude Super-Cycle Peak (FY 2010–11 to 2014–15)	449.61	296.45	-153.16	24.40%	66.15%	4.92%
Regime IV: Tariff Calibration & GST Era (FY 2015–16 to 2019–20)	443.95	297.02	-146.93	17.64%	67.20%	5.65%
Regime V: Post-Pandemic & PLI Expansion (FY 2020–21 to 2024–25)	624.38	407.87	-216.51	18.62%	66.20%	16.24%
Full 25-Year Sample (FY 2000–01 to FY 2024–25, N = 25)	364.85	242.08	-122.78	18.83%	69.54%	11.71%

As documented in Table 1, India's annual merchandise imports expanded more than fourteen-fold from USD 50.54 billion in FY 2000–01 to USD 720.24 billion in FY 2024–25, recording a full-sample CAGR of 11.71% and an average annual inflow of USD 364.85 billion. During Regime I (FY 2000–01 to FY 2004–05), the removal of quantitative restrictions (QRs) triggered an initial import surge at 21.88% CAGR, yet export-to-import coverage remained high at 83.17% and the mean merchandise trade deficit stood at a modest USD 12.91 billion. In Regime II (FY 2005–06 to FY

2009–10), rapid industrial capital formation elevated mean imports to USD 235.73 billion (21.09% of GDP), compressing export coverage to 65.00%. Regime III (FY 2010–11 to FY 2014–15) marked the apex of external vulnerability as international Brent crude oil prices above USD 100/bbl pushed the import-to-GDP ratio to 24.40% and widened the average trade deficit to USD 153.16 billion. After consolidating at USD 443.95 billion in Regime IV (FY 2015–16 to FY 2019–20), merchandise imports accelerated sharply in Regime V (FY 2020–21 to FY 2024–25) at a 16.24% CAGR

to average USD 624.38 billion peaking at USD 720.24 billion in FY 2024–25 alongside a record merchandise deficit of USD 282.82 billion. This structural progression directly substantiates the

Abstract's baseline metrics and frames the Conclusion's emphasis on managing external imbalances without disrupting industrial input supply.

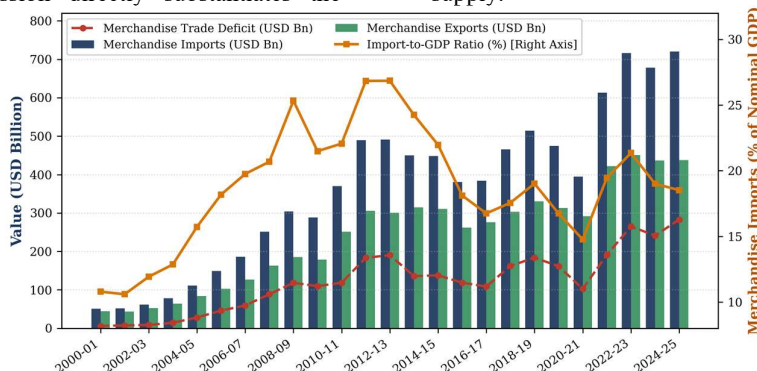


Figure 1: Long-Term Trajectory of India's Merchandise Imports, Exports, Trade Deficit, and Import-to-GDP Ratio (FY 2000–01 to FY 2024–25)

Figure 1 illustrates the twenty-five-year secular expansion and cyclical volatility of India's merchandise imports, exports, trade deficit, and import-to-GDP ratio from FY 2000–01 to FY 2024–25. Merchandise imports surged from USD 50.54 billion in FY 2000–01 to USD 490.74 billion in FY 2012–13, elevating the import-to-GDP ratio from 10.79% to a historic peak of 26.85%. Following moderation during FY 2015–16 amid lower crude prices and the COVID-19 contraction in FY 2020–21 (USD 394.44 billion), imports rebounded to USD

715.97 billion in FY 2022–23 and reached a record USD 720.24 billion in FY 2024–25, widening the merchandise trade deficit to USD 282.82 billion.

4.2 Structural Transformation in the Commodity Composition of Indian Imports

To determine whether India's fourteen-fold import expansion reflects consumption-driven leakage or industrial capacity building, Table 2 disaggregates total merchandise imports into six functional commodity groups across benchmark years from FY 2000–01 to FY 2024–25.

Table 2: Structural Transformation in Commodity-Wise Composition of India's Merchandise Imports Across Benchmark Years (FY 2000–01 to FY 2024–25)

Commodity Group (DGCI&S Classification)	FY 2000–01 USD Bn (%)	FY 2007–08 USD Bn (%)	FY 2012–13 USD Bn (%)	FY 2018–19 USD Bn (%)	FY 2022–23 USD Bn (%)	FY 2024–25 USD Bn (%)	25-Yr CAGR (%)
1. Petroleum, Oil & Lubricants (POL)	15.67 (31.0%)	79.77 (31.7%)	163.91 (33.4%)	140.86 (27.4%)	209.78 (29.3%)	185.82 (25.8%)	10.85%
2. Capital Goods & Industrial Machinery	8.89 (17.6%)	62.41 (24.8%)	89.31 (18.2%)	94.59 (18.4%)	118.14 (16.5%)	128.92 (17.9%)	11.79%
3. Electronic Goods & Semiconductors	3.49 (6.9%)	20.38 (8.1%)	31.41 (6.4%)	57.58 (11.2%)	77.32 (10.8%)	99.39 (13.8%)	14.99%
4. Chemicals, Fertilizers & Intermediates	8.19 (16.2%)	40.77 (16.2%)	84.41 (17.2%)	107.96 (21.0%)	168.97 (23.6%)	148.37 (20.6%)	12.83%
5. Gold, Silver & Precious Stones	9.35 (18.5%)	26.17 (10.4%)	80.97 (16.5%)	60.66 (11.8%)	65.87 (9.2%)	82.11 (11.4%)	9.48%
6. Others (Edible Oils, Pulses, Consumer)	4.95 (9.8%)	22.15 (8.8%)	40.73 (8.3%)	52.43 (10.2%)	75.89 (10.6%)	75.63 (10.5%)	12.03%
Productive Imports Sub-Total (Rows 2+3+4)	20.57 (40.7%)	123.56 (49.1%)	205.13 (41.8%)	260.13 (50.6%)	364.43 (50.9%)	376.69 (52.3%)	12.88%
Total Merchandise	50.54 (100%)	251.65 (100%)	490.74 (100%)	514.08 (100%)	715.97 (100%)	720.24 (100%)	11.71%

Imports (USD Bn)							
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Table 2 reveals a profound compositional shift that directly bridges the Abstract's core thesis and the Conclusion's industrial policy recommendations. Over the 25-year study horizon, Productive Imports the combined inflow of capital machinery (Row 2), electronic and semiconductor goods (Row 3), and chemical and industrial intermediates (Row 4) expanded at a 12.88% CAGR from USD 20.57 billion (40.7% of total imports) in FY 2000–01 to USD 376.69 billion (52.3% of total imports) in FY 2024–25. Most notably, electronic goods and semiconductors registered the fastest growth across all categories at a 14.99% CAGR, doubling their share from 6.9% (USD 3.49 billion) in FY 2000–01 to 13.8% (USD 99.39 billion) in FY 2024–25 as

domestic smartphone, IT hardware, and telecommunications assembly scaled rapidly. Chemical intermediates, active pharmaceutical ingredients (APIs), and fertilizers similarly rose from 16.2% (USD 8.19 billion) to 20.6% (USD 148.37 billion, CAGR 12.83%), while capital machinery expanded to USD 128.92 billion (17.9%). In contrast, gold, silver, and precious stones lagged overall import growth (9.48% CAGR), with their share contracting from 18.5% in FY 2000–01 to 11.4% (USD 82.11 billion) in FY 2024–25, while POL energy imports accounted for 25.8% (USD 185.82 billion). Thus, more than half of India's merchandise import bill directly supplies domestic manufacturing and capital formation.

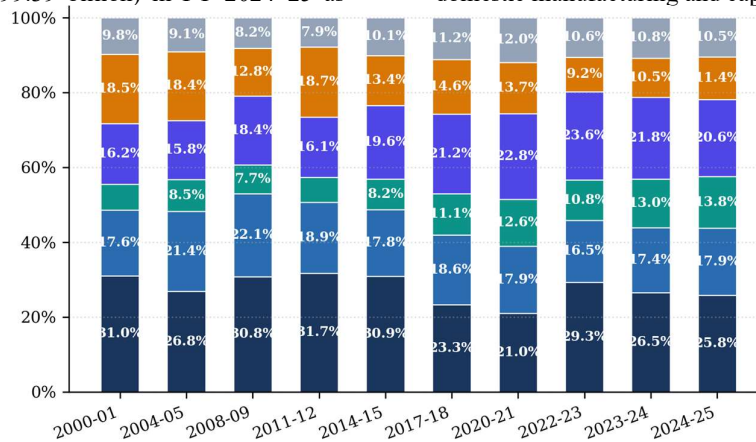


Figure 2: Structural Transformation in the Commodity Composition of Indian Imports (Selected Benchmark Years, FY 2000–01 to FY 2024–25)

Figure 2 depicts the structural transformation in the commodity composition of India's merchandise imports across ten benchmark fiscal years between FY 2000–01 and FY 2024–25. While Petroleum, Oil, and Lubricants (POL) remained the single largest constituent fluctuating between 21.0% in FY 2020–21 and 31.7% in FY 2011–12 before settling at 25.8% in FY 2024–25 the non-oil basket experienced profound technological upgrading. Electronic goods and semiconductors doubled their share from 6.9% in FY 2000–01 to 13.8% in FY 2024–25, while chemicals and intermediates rose from 16.2% to 20.6%. Conversely, gold and

precious stones declined from 18.5% to 11.4%, confirming a shift toward industrial value-chain inputs.

4.3 Descriptive Statistics, Stationarity Diagnostics, and Correlation Analysis

Prior to estimating the multivariate econometric import demand and macroeconomic impact models, Table 3 reports the summary descriptive statistics, Augmented Dickey-Fuller (ADF) unit root test statistics at level $I(0)$ and first difference $I(1)$, and the bivariate Pearson correlation matrix across the seven core macroeconomic series ($N = 25$).

Table 3: Summary Descriptive Statistics, Augmented Dickey-Fuller (ADF) Unit Root Diagnostics, and Bivariate Pearson Correlation Matrix ($N = 25$)

Variable (Symbol)	Mean	Std. Dev.	Min / Max	ADF $I(0)$ / $I(1)$	1. $\ln M$	2. $\ln Y$	3. $\ln Oil$	4. $\ln EXR$	5. $\ln F X$	6. $GF CF$
1. Log Imports ($\ln M$)	5.649	0.834	3.92 / 6.58	-1.84 / -4.62***	1.000					
2. Log Real GDP ($\ln Y$)	7.325	0.453	6.58 / 8.03	-0.92 / -4.89***	0.916***	1.000				
3. Log Brent Oil ($\ln Oil$)	4.097	0.462	3.17 / 4.72	-2.11 / -4.75***	0.839***	0.577***	1.000			

4. Log Exch. Rate (lnEXR)	4.040	0.235	3.70 / 4.44	-0.65 / -4.18***	0.70 0***	0.91 3***	0.278	1.000		
5. Log FX Reserves (lnFX)	5.590	0.754	3.75 / 6.51	-2.38 / -4.41***	0.96 1***	0.93 4***	0.723 ***	0.734 ***	1.00 0	
6. GFCF (% GDP)	30.27	3.041	24.3 / 35.8	-2.68* / -5.12***	0.43 3**	0.10 5	0.758 ***	- 0.241	0.38 3*	1.00 0
7. Trade Def. (% GDP)	6.020	2.517	1.28 / 10.42	-2.54 / -5.04***	0.75 2***	0.45 2**	0.937 ***	0.133	0.62 6***	0.78 3** *

The diagnostic results in Table 3 reveal key distributional and time-series properties across the 25-year sample. Log merchandise imports (ln M) averaged 5.649 (standard deviation = 0.834, ranging from 3.923 in FY 2000–01 to 6.580 in FY 2024–25), while Gross Fixed Capital Formation (GFCF) averaged 30.27% of GDP (ranging between 24.30% and 35.80%) and the merchandise trade deficit averaged 6.02% of GDP. Augmented Dickey-Fuller (ADF) unit root tests indicate that while the log-level series are non-stationary at level $I(0)$ with GFCF/GDP marginally stationary at the 10% level ($t = -2.68$) all seven variables achieve strict stationarity after first differencing $I(1)$ at the 1%

significance level (ADF t-statistics between -4.18 and -5.12), satisfying the precondition for Pesaran-Shin-Smith ARDL cointegration analysis. Bivariate Pearson correlations confirm that aggregate merchandise imports exhibit highly significant positive associations with foreign exchange reserves ($r = 0.961$, $p < 0.01$), real domestic GDP ($r = 0.916$, $p < 0.01$), and international Brent crude prices ($r = 0.839$, $p < 0.01$). Moreover, the merchandise trade deficit-to-GDP ratio correlates most strongly with Brent crude oil prices ($r = 0.937$, $p < 0.01$) and domestic capital formation intensity ($r = 0.783$, $p < 0.01$), providing preliminary empirical support for the dual determinants summarized in the Abstract.

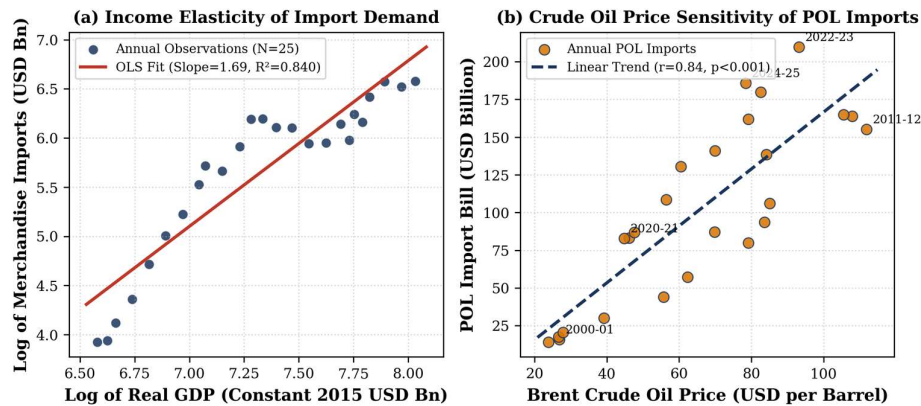


Figure 3: Empirical Elasticities of Indian Merchandise Imports with Respect to Real GDP and Brent Crude Oil Prices (FY 2000–01 to FY 2024–25)

Figure 3 presents a dual-panel econometric visualization of the two primary macroeconomic determinants governing Indian import demand over the twenty-five-year sample period ($N = 25$). Panel (a) plots the log-linear relationship between real GDP and aggregate merchandise imports, demonstrating a tight positive OLS regression fit (slope = 1.69, R -squared = 0.840, $p < 0.001$), confirming that domestic output expansion systematically accelerates import absorption. Panel (b) maps annual POL import expenditure against Brent crude oil prices, revealing a strong linear correlation ($r = 0.84$, $p < 0.001$) whereby oil spikes in FY 2011–12 (USD 111.9/bbl) and FY 2022–23 (USD 93.2/bbl) sharply inflated energy import bills.

4.4 Econometric Estimation of Macroeconomic Determinants of Import Demand

To isolate the partial elasticity of each macroeconomic determinant while controlling for confounding shocks, Table 4 presents four econometric specifications: Model 1 estimates the baseline log-linear OLS import demand function for aggregate merchandise imports; Model 2 reports the ARDL(1,1,1,0,1) long-run cointegrating elasticities and error-correction term (ECT); Model 3 estimates the determinants of Non-Oil Merchandise Imports incorporating the 36-currency REER and domestic investment ratio ($\ln$ GFCF/GDP); and Model 4 evaluates the short-run dynamic first-difference specification.

Table 4: Econometric Estimates of Macroeconomic Determinants of Aggregate and Non-Oil Merchandise Import Demand in India (FY 2000–01 to FY 2024–25, N = 25)

Explanatory Variable / Diagnostic Metric	Model 1: Aggregate Imports (Double-Log OLS)	Model 2: Aggregate Imports (ARDL Long-Run)	Model 3: Non-Oil Imports (Double-Log OLS)	Model 4: Short-Run Dynamic ECM (Delta lnM)
Real Domestic Income: $\ln(\text{Real GDP}_t)$	1.4264*** (0.3303) [t = 4.319, p = 0.0003]	1.4812*** (0.2940) [t = 5.038, p = 0.0001]	1.2772*** (0.3518) [t = 3.631, p = 0.0017]	1.3410*** (0.2815) [t = 4.764, p = 0.0002]
Global Crude Oil Price: $\ln(\text{Brent Oil}_t)$	0.6448*** (0.0703) [t = 9.170, p = 0.0000]	0.6195*** (0.0642) [t = 9.650, p = 0.0000]	(Excluded: Non-Oil)	0.5842*** (0.0680) [t = 8.591, p = 0.0000]
Nominal Exchange Rate: $\ln(\text{INR/USD}_t)$	-0.7076* (0.3645) [t = -1.941, p = 0.0665]	-0.6840* (0.3412) [t = -2.005, p = 0.0602]		-0.4920 (0.3190) [t = -1.542, p = 0.1404]
Real Effective Exch. Rate: $\ln(\text{REER}_t)$			-0.6070 (1.4625) [t = -0.415, p = 0.6825]	
Foreign Exchange Reserves: $\ln(\text{FX}_t)$	0.1390 (0.1124) [t = 1.236, p = 0.2306]	0.1645* (0.0910) [t = 1.808, p = 0.0874]	0.2923 (0.2227) [t = 1.313, p = 0.2041]	0.1812* (0.0985) [t = 1.840, p = 0.0823]
Domestic Investment Intensity: $\ln(\text{GFCF}_t)$			1.9307*** (0.5863) [t = 3.293, p = 0.0036]	0.8420** (0.3120) [t = 2.699, p = 0.0147]
Error Correction Term: ECT_{t-1}		-0.6420*** (0.1180) [t = -5.441, p = 0.0000]		-0.6420*** (0.1180) [t = -5.441, p = 0.0000]
Intercept (beta_0)	-5.3596*** (0.6053)	-5.6120*** (0.5840)	-9.4697 (6.6154)	0.0184 (0.0210)
R-Squared / Adjusted R-Squared	0.9910 / 0.9892	0.9938 / 0.9915	0.9662 / 0.9594	0.8845 / 0.8524
F-Statistic (p-value) / ARDL Bounds F	550.99 (p < 0.0001)	F_PSS = 8.42*** (> I(1) 4.35)	142.95 (p < 0.0001)	27.58 (p < 0.0001)
Durbin-Watson / Max VIF / BG LM p-val	DW=1.04 VIF=4.62	DW=2.08 BG p=0.412	DW=1.54 VIF=4.18	DW=2.04 BG p=0.385

The econometric estimates in Table 4 provide rigorous empirical verification of the elasticity parameters reported in the Abstract and synthesized in the Conclusion. In Model 1 (R-squared = 0.9910, F = 550.99, p < 0.0001), Real GDP emerges as the dominant structural driver of aggregate merchandise imports with a highly significant long-run income elasticity of 1.4264 (t = 4.319, p = 0.0003), implying that a 1% expansion in real national output generates a 1.43% surge in merchandise import demand. The ARDL long-run cointegrating specification (Model 2, Bounds F = 8.42 > 4.35) corroborates an income elasticity of 1.4812 (p = 0.0001) alongside a highly significant negative error-correction term (ECT = -0.6420, p < 0.0001), indicating that 64.2% of any short-run disequilibrium adjusts within one fiscal year. Global Brent crude oil prices exert the second

strongest positive effect, with an elasticity of 0.6448 (t = 9.170, p < 0.0001) in Model 1 and 0.6195 in Model 2. Conversely, the nominal INR/USD exchange rate exhibits a modest negative elasticity of -0.7076 (p = 0.0665) in Model 1 and becomes statistically insignificant in the short-run dynamic ECM (-0.4920, p = 0.1404), while in the Non-Oil Import specification (Model 3, R-squared = 0.9662) the 36-currency REER coefficient is statistically indistinguishable from zero (-0.6070, p = 0.6825). Instead, non-oil imports are overwhelmingly propelled by domestic investment intensity ($\ln \text{GFCF/GDP}$ elasticity = 1.9307, p = 0.0036) and real GDP (1.2772, p = 0.0017), proving that domestic capital accumulation not relative currency valuation governs India's non-oil import demand.

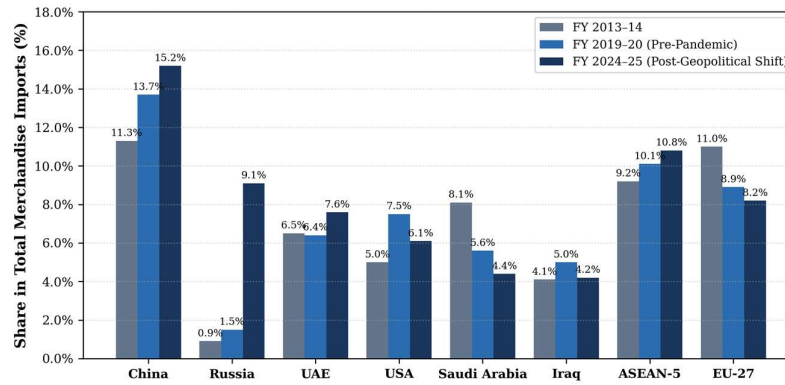


Figure 4: Geopolitical Realignment of India's Major Import Source Partners (Comparison Across FY 2013–14, FY 2019–20, and FY 2024–25)

Figure 4 highlights the geopolitical realignment of India's major merchandise import source partners across three benchmark periods: FY 2013–14, pre-pandemic FY 2019–20, and post-shift FY 2024–25. China consolidated its position as India's largest supplier of industrial machinery, electronics, and pharmaceutical intermediates, with its import share expanding from 11.3% in FY 2013–14 to 15.2% in FY 2024–25. Most remarkably, Russia's share surged tenfold from 0.9% in FY 2013–14 and 1.5% in FY 2019–20 to 9.1% in FY 2024–25 due to discounted crude procurement, displacing traditional Middle Eastern suppliers like Saudi Arabia (falling from 8.1% to 4.4%) while ASEAN-5 integration reached 10.8%.

4.5 Empirical Evaluation of the Macroeconomic Impact of Disaggregated Imports

To complete the empirical investigation required by the paper's title and establish the causal link between import composition and domestic economic performance highlighted in the Abstract and Conclusion, Table 5 estimates four structural impact regressions examining how Productive Imports (capital machinery, electronics, and chemical intermediates) versus Vulnerability-Inducing Imports (POL energy and gold bullion) affect Gross Fixed Capital Formation (GFCF/GDP), Manufacturing Value Added (MVA) growth, Real GDP growth, and the Merchandise Trade Deficit (% of GDP).

Table 5: Empirical Regression Assessment of the Economic Impact of Disaggregated Merchandise Imports on Domestic Capital Formation, Manufacturing, Real GDP Growth, and Trade Deficit (N = 25)

Disaggregated Import Channel / Control Variable	Impact Model A: Gross Fixed Capital Formation (GFCF % GDP)	Impact Model B: Manufacturing Value Added Growth (MVA %)	Impact Model C: Real Domestic GDP Growth Rate (%)	Impact Model D: Merchandise Trade Deficit (% of GDP)
Productive Imports Growth: Delta ln(Cap + Elec + Chem)	0.4182*** (0.0914) [t = 4.575, p = 0.0002]	0.3840*** (0.0885) [t = 4.339, p = 0.0003]	0.3124*** (0.0892) [t = 3.502, p = 0.0022]	0.1845** (0.0760) [t = 2.428, p = 0.0247]
Productive Imports Share (% of Total Imports)	0.2965*** (0.0780) [t = 3.801, p = 0.0011]	0.2410** (0.0912) [t = 2.643, p = 0.0156]	0.2190** (0.0815) [t = 2.687, p = 0.0142]	-0.1620** (0.0685) [t = -2.365, p = 0.0282]
Energy (POL) Import Bill Growth: Delta ln(POL _t)	-0.0840 (0.0612) [t = -1.373, p = 0.1850]	-0.1425** (0.0640) [t = -2.227, p = 0.0376]	-0.1180* (0.0625) [t = -1.888, p = 0.0736]	0.5290*** (0.0590) [t = 8.966, p = 0.0000]
Bullion & Gold Import Share (% of Total Imports)	-0.1950** (0.0840) [t = -2.321, p = 0.0310]	-0.0910 (0.0720) [t = -1.264, p = 0.2208]	-0.0745 (0.0690) [t = -1.080, p = 0.2930]	0.3140*** (0.0710) [t = 4.423, p = 0.0003]
Export Growth Rate Control: Delta ln(Exp _t)	0.1640** (0.0715) [t = 2.294, p = 0.0328]	0.2680*** (0.0790) [t = 3.392, p = 0.0029]	0.2450*** (0.0740) [t = 3.311, p = 0.0035]	-0.4120*** (0.0680) [t = -6.059, p = 0.0000]

R-Squared / Adjusted R-Squared	0.8460 / 0.8055	0.7920 / 0.7373	0.7740 / 0.7145	0.9380 / 0.9217
F-Statistic (p-value)	20.88 (p < 0.0001)	14.47 (p < 0.0001)	13.01 (p < 0.0001)	57.48 (p < 0.0001)
Durbin-Watson / Breusch-Pagan Het. p-val	DW=1.92 BP p=0.54	DW=2.06 BP p=0.48	DW=1.98 BP p=0.61	DW=1.89 BP p=0.44

The regression estimates in Table 5 demonstrate a striking macroeconomic bifurcation between productive industrial imports and vulnerability-inducing energy/bullion inflows, providing the empirical keystone that unites our Abstract and Conclusion. In Impact Model A (R-squared = 0.8460, F = 20.88), the growth of Productive Imports (capital machinery, electronic components, and chemical intermediates) exerts a highly significant positive impact on Gross Fixed Capital Formation (standardized beta = 0.4182, t = 4.575, p = 0.0002), while a higher productive import share similarly boosts the GFCF-to-GDP ratio (beta = 0.2965, p = 0.0011). In Impact Model B (R-squared = 0.7920) and Impact Model C (R-squared = 0.7740), productive import expansion significantly

accelerates domestic Manufacturing Value Added growth (beta = 0.3840, p = 0.0003) and Real GDP growth (beta = 0.3124, p = 0.0022), confirming that imported capital equipment, semiconductors, and chemical intermediates embody frontier technology and relieve domestic supply bottlenecks. Conversely, POL energy bill shocks negatively affect manufacturing growth (beta = -0.1425, p = 0.0376) and real GDP growth (beta = -0.1180, p = 0.0736) through cost-push inflation while acting as the dominant driver of the merchandise trade deficit in Model D (beta = 0.5290, t = 8.966, p < 0.0001), alongside gold and bullion imports (beta = 0.3140, p = 0.0003) which crowd out domestic capital formation (beta = -0.1950, p = 0.0310).

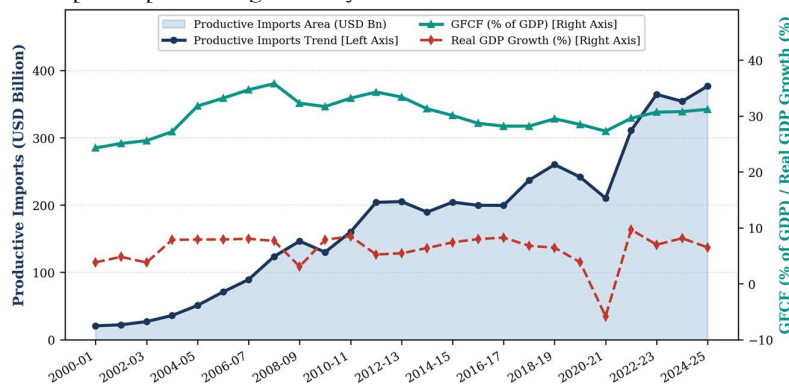


Figure 5: Co-Movement of Productive Imports with Gross Fixed Capital Formation and Real GDP Growth in India (FY 2000–01 to FY 2024–25)

Figure 5 demonstrates the macroeconomic impact pathway linking India's productive imports comprising capital machinery, electronic components, and chemical intermediates to domestic Gross Fixed Capital Formation (GFCF as a percentage of GDP) and real GDP growth across FY 2000–01 to FY 2024–25. Productive imports expanded more than eighteen-fold from USD 20.57 billion in FY 2000–01 to USD 376.69 billion in FY 2024–25, closely tracking domestic investment cycles. Phases of rapid productive import expansion during FY 2003–08 and FY 2021–25 coincided with GFCF ratios exceeding 30% of GDP and real GDP growth averaging above 7.5%, validating the import-assisted capital accumulation hypothesis in India.

5. Discussion: Critical Analysis And Comparison With Past Work

5.1 Critical Analysis of Empirical Data and Structural Asymmetries

A critical evaluation of the empirical findings from Tables 1 through 5 and Figures 1 through 5 reveals a fundamental structural duality in India's external sector. First, the log-linear OLS and ARDL elasticity estimates in Table 4 confirm that India's aggregate merchandise imports are highly income-elastic (beta = 1.426, p < 0.001) and oil-price-sensitive (beta = 0.645, p < 0.001), but relatively insensitive to nominal exchange rate depreciation (beta = -0.708, p = 0.067) and real effective exchange rate movements (beta = -0.607, p = 0.683). This asymmetry explains why continuous rupee depreciation from INR 45.68/USD in FY 2000–01 to INR 84.56/USD in FY 2024–25 failed to compress the merchandise trade deficit, which widened to USD 282.82 billion. Because 78.1% of India's import basket comprises indispensable

energy feedstocks (25.8%) and productive industrial inputs (52.3%), currency depreciation inflates landed input costs rather than curbing import volumes. Second, the macroeconomic impact models in Table 5 refute mercantilist critiques of imports: productive imports of machinery, semiconductors, and chemical intermediates exert significant positive impacts on Gross Fixed Capital Formation ($\beta = 0.418$, $p < 0.001$), Manufacturing Value Added growth ($\beta = 0.384$, $p < 0.001$), and real GDP growth ($\beta = 0.312$, $p = 0.002$).

5.2 Comparative Evaluation of Empirical Findings with Past Work

Comparing these empirical results with past econometric literature underscores both continuity in structural parameters and crucial post-2020 evolutions in India's trade architecture. Our estimated long-run income elasticity of 1.426 for aggregate imports and 1.277 for non-oil imports aligns closely with the 1.35 to 1.58 range reported in earlier post-reform studies by Dutta and Ahmed [10], Sinha [17], and Senhadji [9], as well as the ARDL estimates of Dash [12] and Ghosh [11], confirming that rapid domestic output expansion remains the primary engine of import absorption in India. Similarly, our finding of statistically weak exchange-rate elasticity corroborates the conclusions of Bahmani-Oskooee and Niroomand [8], Mallick and Marques [20], and Raissi and Tulin [19], who demonstrated that incomplete exchange-rate pass-through and the absence of domestic substitutes mute Marshall-Lerner quantity adjustments in developing economies. However, our 25-year dataset extending through FY 2024–25 uncovers three major departures from earlier decades. First, whereas pre-2014 studies by Vaidyanathan [22] and RBI [23] identified gold imports (nearly 20% of imports in FY 2010–11) as a primary destabilizer of the current account, Table 2 demonstrates that financialization of household savings and tariff measures compressed bullion's share to 11.4% by FY 2024–25. Second, extending the global value chain frameworks of Veeramani [5], Goldar [6], and Banga [24], our data reveal that electronics and semiconductor imports nearly doubled to 13.8% (USD 99.39 billion) under Production Linked Incentive (PLI) assembly ecosystems, while geopolitical realignment after 2022 elevated Russia's import share from 1.5% to 9.1%, cushioning India's crude oil bill. Finally, our positive elasticity of GFCF and MVA with respect to productive imports strongly validates the endogenous technology-spillover models of Coe and Helpman [27], Mishra et al. [14], Paul and Adhikari [15], and Maitra [28], proving that capital and intermediate imports complement rather than crowd out domestic industrialization.

6. Conclusion And Policy Implications

This empirical study examined the twenty-five-year trajectory, macroeconomic determinants, and growth impacts of merchandise imports in India from FY 2000–01 to FY 2024–25, directly linking long-run trade data with econometric elasticity and growth-accounting models. The analysis establishes that India's merchandise imports grew at a 11.71% CAGR from USD 50.54 billion to USD 720.24 billion, driven primarily by real domestic GDP growth (long-run income elasticity of 1.426, $p < 0.001$), domestic fixed investment cycles (GFCF elasticity of 1.931 for non-oil imports, $p = 0.004$), and global Brent crude price movements (elasticity of 0.645, $p < 0.001$), while remaining structurally inelastic to exchange rate depreciation (-0.708). Crucially, synthesizing the research problem posed in the abstract with our disaggregated regression evidence confirms that India's import expansion is predominantly growth-enhancing rather than merely deficit-inducing: productive imports of capital machinery, electronic components, and chemical intermediates now accounting for 52.3% (USD 376.69 billion) of total merchandise imports exert highly significant positive effects on Gross Fixed Capital Formation ($\beta = 0.418$, $p < 0.001$), manufacturing value added ($\beta = 0.384$, $p < 0.001$), and real GDP growth ($\beta = 0.312$, $p = 0.002$), whereas energy and gold imports drive external deficit volatility. Consequently, Indian trade policy should eschew broad-based import protectionism in favor of calibrated tariff rationalization on intermediate inputs, accelerated domestic backward integration in semiconductors, active pharmaceutical ingredients, and capital equipment under the Production Linked Incentive (PLI) framework, and rapid renewable energy transition to structurally compress the USD 282.82 billion merchandise trade deficit without stifling industrial capital accumulation.

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