What drives Gold Demand in India: Consumption or Investment?

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DATE: 21ST TO 22ND MAY 2026

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Background of the Study

- India has long been one of the largest consumers of gold globally, accounting for 20% of the world's demand as of 2022 (World Gold Council (WGC), 2023).
- South India alone contributing 40% to the country's consumption of gold jewellery (WGC, 2023).
- The vast bulk of India's gold demand is satisfied through imports, making gold the second-largest imported good after petroleum products (Mukherjee et al., 2017).
- Import of gold has raised concerns among policymakers due to its impact on the current account deficit (CAD) (Immanuvel and Lazar, 2021)

- In **2012-13**, merchandise trade deficit (MTD) reached $192.86 billion (CAD was 4.8% of GDP) and gold import was $53.82 billion.

- Govt. introduced effective policies to minimize the deficit.

- In **2013-14**, MTD reduced to $150.54 billion (CAD to 2.64% of GDP) and gold import reduced to $28.70 billion.

- Out of total reduction of MTD, 59.35% was due to reduction in gold imports.

Fig. 2. Trends in Gold Imports and Trade Balance in India, 1975 to 2020

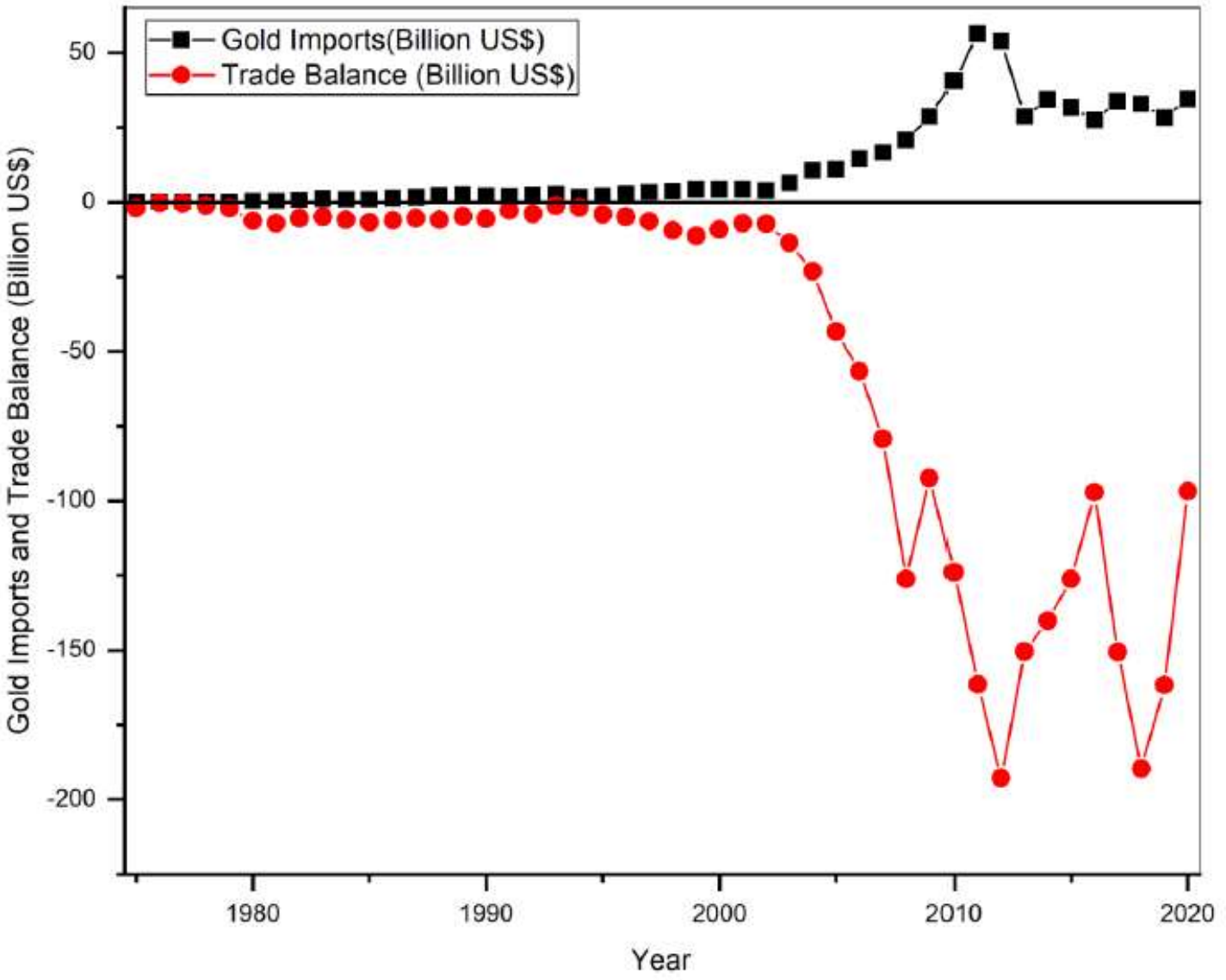
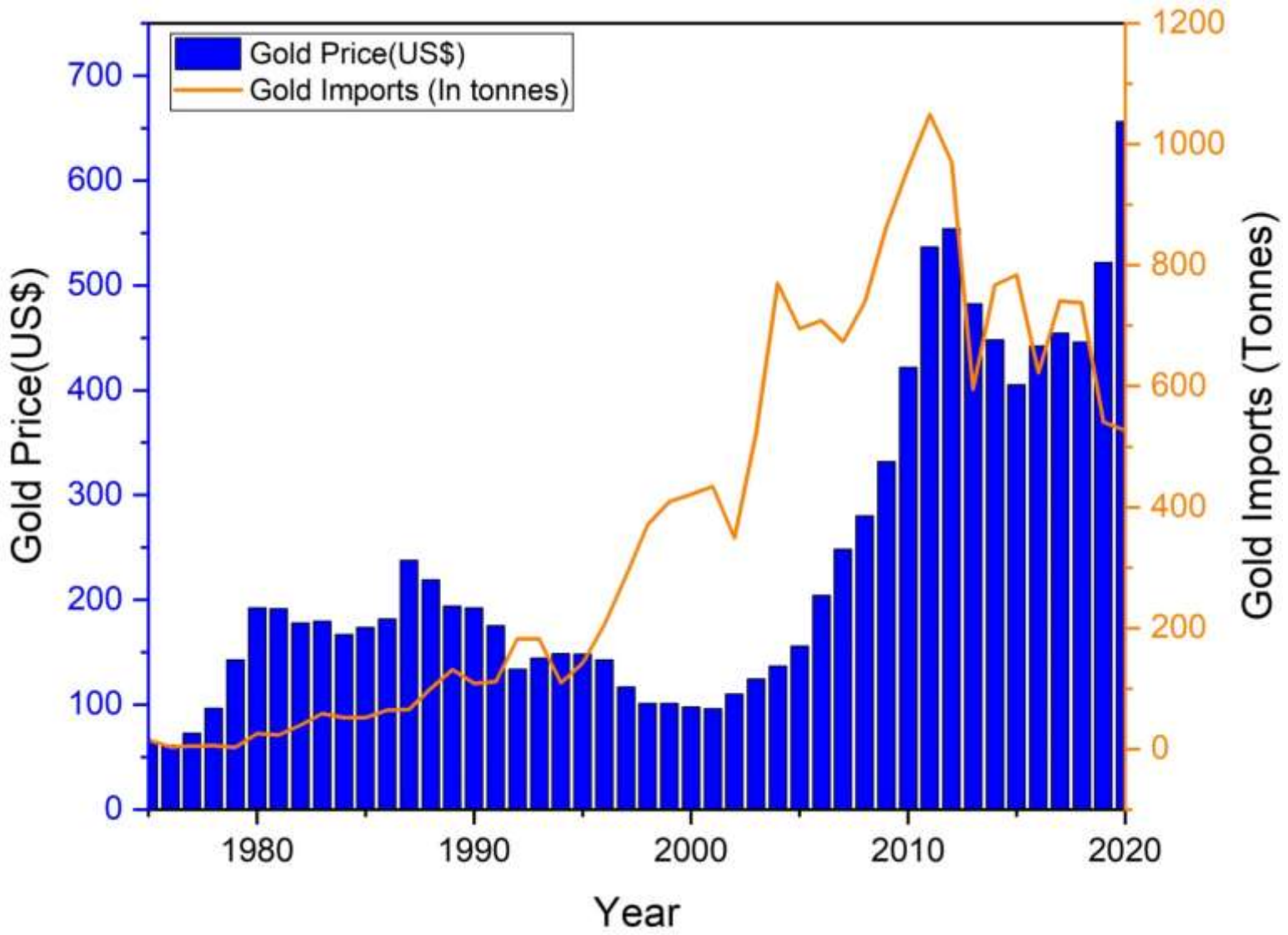


Fig. 3. Trends in Gold Price and Gold Imports, 1975-2020



Review of Literature *(Price Effect on Gold Demand)*

Author/s	Year	Country	Findings
Rao and Nagabhushanam	1960	India	Negative
Mani and Vuyyuri	2003	India	Positive
Kannan and Dhal	2008	India	Negative
Immanuvel and Lazar	2021	India, the USA, Europe and Japan	Negative
Tripathi et al.	2022	Panel data	Negative

Review of Literature *(Income Effect on Gold Demand)*

Author/s	Year	Country	Findings
Rao and Nagabhushanam	1960	India	Positive
Baker and Van Tassel	1985	US	No significant impact
Starr and Tran	2008	Panel of 21 gold importing countries	Positive
Kanjilal and Ghosh	2014	India	Positive
Immanuvel and Lazar	2021	India, the USA, Europe and Japan	Positive

Research Gap

- **Existing studies examined the gold price and gold demand relationship in a linear framework.**
- **In India, Gold is demanded by individuals irrespective of income levels and surge in its price.**
- **Thus the relationship may not be linear.**

Objective

- **To examine the presence of asymmetry in the relationship between gold price and gold imports in India.**

Data and Variables

Data type	Time Period
Annual data	1975-2020

Variables	Measurements	Source
Gold imports (GI)	% of GDP (Real)	Reserve Bank of India
Gold price (GP)	US$ per 10 grams in Mumbai (Real)	Reserve Bank of India
Per capita GDP (Y)	US$ (Real)	Reserve Bank of India
Exchange rate (EXR)	Indian Rupee per US$ (Real)	Reserve Bank of India
Crude Oil Price (OP)	West Texas oil price (US $ per Barrel) (Real)	BP Statistical Review of World Energy
Interest Rate (IR)	Interest Rate (%) (Real)	World Development Indicators, World Bank

Theoretical Model

Following Ghosh et al. (2004), the theoretical model for gold demand can be stated as follows:

$$Q_t^D = Q_{Ct}^D + Q_{At}^D \quad (1)$$

The demand for gold, Q^D, comprises a consumption demand for gold, Q_C^D, and an asset demand for gold, Q_A^D.

$$Q_{Ct}^D = f(P_t, Y_t) \quad (2)$$

$$where\ \frac{dQ_C^D}{dP} < 0;\ \frac{dQ_C^D}{dY} > 0.$$

$$Q_{At}^D = f(R_t) \quad (3)$$

$$where\ \frac{\partial Q_A^D}{\partial R} < 0.$$

Consequently, the total demand for gold, Q^D, combines $Eqs.\ (2)\ and\ (3)$:

$$Q_t^D = f(P_t, Y_t, R_t) \quad (4)$$

where, P is the price of gold; Y is disposable income; and R is the real interest rate.

Model Estimation and Methodology

The empirical model can be shown as:

$$GI_t = f(GP_t, OP_t, Y_t, EXR_t, IR_t)$$

Methodology:

Nonlinear Autoregressive Distributed Lag (NARDL) by Shin et al. (2014).

The NARDL model put forth by Shin et al. (2014) can be written as follows:

$$\Delta GI_t = \rho_0 + \rho_1 GI_{t-1} + \rho_2^+ GP_{t-1}^+ + \rho_3^- GP_{t-1}^- + \rho_4^+ OP_{t-1}^+ + \rho_5^- OP_{t-1}^- + \rho_6^+ Y_{t-1}^+ + \rho_7^- Y_{t-1}^-$$
$$+ \rho_8^+ EXR_{t-1}^+ + \rho_9^- EXR_{t-1}^- + \rho_{10}^+ IR_{t-1}^+ + \rho_{11}^- IR_{t-1}^- + \sum_{i=1}^{p-1} \rho_{12} \Delta GI_{t-i}$$
$$+ \sum_{i=0}^{q-1} (\rho_{13}^+ \Delta GP_{t-j}^+ + \rho_{13}^- \Delta GP_{t-j}^-) + \sum_{i=0}^{q-1} (\rho_{14}^+ \Delta OP_{t-k}^+ + \rho_{14}^- \Delta OP_{t-k}^-)$$
$$+ \sum_{i=0}^{q-1} (\rho_{15}^+ \Delta Y_{t-l}^+ + \rho_{15}^- \Delta Y_{t-l}^-) + \sum_{i=0}^{q-1} (\rho_{16}^+ \Delta EXR_{t-m}^+ + \rho_{16}^- \Delta EXR_{t-m}^-)$$
$$+ \sum_{i=0}^{q-1} (\rho_{17}^+ \Delta IR_{t-n}^+ + \rho_{17}^- \Delta IR_{t-n}^-) + \varepsilon_t$$

Results and Discussion

Results of unit-root tests

Unit root results without structural break

Variables	ADF		PP		KPSS		
	Level	1st Diff	Level	1st Diff	Level	1st Diff	Order
GI_t	-1.856	-9.125*	-1.791	-8.791*	0.674**	0.089	I(1)
GP_t	-1.524	-3.221**	-1.150	-3.221**	0.581**	0.129	I(1)
OP_t	-0.689	-5.888*	-0.689	-5.857*	0.564**	0.105	I(1)
Y_t	-0.977	-5.063*	-1.165	-5.095*	0.518**	0.130	I(1)
EXR_t	-2.513	-6.128*	-2.430	-6.141*	0.212***	0.072	I(1)
IR_t	-4.764*	--	-4.796*	--	0.228	--	I(0)

Note: *, **, and *** shows significance at 1%, 5%, and 10% levels, respectively.
Source: Authors' computation.

Cont...

Unit root results with an unknown structural break (Kim and Perron, 2009)

Variables	ADF test at Level		ADF test at 1st Diff		
	t-stat.	Break	t-stat.	Break	Order
GI_t	-2.870	2013	-10.878*	1995	I(1)
GP_t	-4.293***	1999	----	----	I(0)
OP_t	-1.621	2014	-6.321*	2015	I(1)
Y_t	-2.847	1988	-5.999*	1991	I(1)
EXR_t	-2.800	1987	-7.501*	1992	I(1)
IR_t	-6.028*	2009	----	----	I(0)
Significance					
CV@1%	-4.949				
CV@5%	-4.443				
CV@10%	-4.194				

Note: *, ** and, *** shows significance at 1%, 5%, and 10% levels, respectively.
Source: Authors' computation.

Bounds test results for non-linear ARDL cointegration

Models	F-Stat.	Structural break	Cointegration
$GI_t = F(GP_t, OP_t, Y_t, EXR_t, IR_t)$	4.634*	2013	YES

Significance	Lower bound	Upper bound
10%	1.83	2.94
5%	2.06	3.24
2.5%	2.28	3.5
1%	2.54	3.86

Note: The critical values are drawn from Pesaran et al. (2001). * indicates significance at 1% level. Akaike Information Criteria (AIC) is utilised for the lag selection.

Long-run Estimation Results

Variables	Coefficient	t-statistic	Prob. value
Panel A: Long-run estimates			
GP_t^+	0.808*	4.051	0.000
GP_t^-	-0.483*	5.717	0.000
OP_t^+	0.343*	5.759	0.000
OP_t^-	-0.088**	-2.123	0.049
Y_t^+	-0.104	-0.515	0.613
Y_t^-	-1.399*	-5.443	0.000
EXR_t^+	-0.571*	-6.332	0.000
EXR_t^-	0.455*	4.532	0.000
IR_t^+	0.002	0.898	0.382
IR_t^-	0.011**	2.502	0.023
D_t $(t = 2013)$	-0.230*	-7.759	0.000
$Constant$	2.242*	68.207	0.000

Note: *, **, and *** indicate 1%, 5% and 10% significance levels, respectively.

Short-run Estimation Results

Variables	Coefficient	t-statistic	Prob. value
Panel B: Short-run estimates			
ΔGI_{t-1}	0.226**	2.238	0.039
GP_t^+	-0.064	-0.291	0.774
GP_t^-	-0.358*	-3.220	0.005
ΔOP_t^+	0.323*	3.402	0.003
ΔOP_t^-	0.006	0.100	0.921
Y_t^+	1.223*	3.564	0.002
Y_t^-	-0.781*	-3.194	0.005
ΔEXR_t^+	-0.776*	-5.142	0.000
ΔEXR_t^-	0.722*	3.156	0.006
IR_t^+	0.003	0.915	0.373
IR_t^-	0.005**	2.146	0.047
D_t $(t = 2013)$	-0.230*	-7.759	0.000
ECT_{t-1}	-0.931*	-5.218	0.000
R^2	0.910		
Adj-R^2	0.764		
D-W test	2.216		

Note: *, **, and *** indicate 1%, 5% and 10% significance levels, respectively.

Diagnostic Test Results

Panel C: Diagnostic check	F -Statistics	Prob.
χ^2_{Normal}	1.275	0.528
χ^2_{ARCH}	1.059	0.309
χ^2_{RESET}	2.933	0.103
χ^2_{SERIAL}	1.375	0.279

Note: *, **, and *** indicate 1%, 5% and 10% significance levels, respectively.

Note*: Residual is normally distributed; no ARCH effect; No model misspecification; No serial correlation problem.

Conclusion and Policy Implications

- Our research highlights the critical need to consider asymmetries in gold import demand for devising effective macroeconomic and trade policies.
- In the long run, where both an increase and decrease in gold price enhance imports and widen the trade deficit, policymakers may find non-price measures more effective in managing gold imports and addressing long-term trade imbalances.
- Short-term measures like increased custom duties can deter excessive imports, particularly during price reductions.
- India's persistent merchandise trade deficit, compounded by substantial gold imports, highlights the importance of exercising restraint during crises to preserve forex reserves for essential goods.

Thank you…

Tests of Model Stability