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Understanding India's External Sector

A Savings–Investment Approach to Current Account Assessment

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UNDERSTANDING INDIA'S EXTERNAL SECTOR

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1. INTRODUCTION

The Current Account is a key macroeconomic indicator that reflects the external health of a country and its relationship with the rest of the world. At the most basic level, it accounts for the net flows of goods and services, income, and transfers from one country to the rest of the world. It is the primary driver of the exchange rate as it governs the supply and demand of the currency in exchange for foreign currency. The exchange rate is hence, a symptom of the current account position.

A current account deficit doesn't exist in isolation; it needs to be financed by the Capital Account through net capital inflows (FDI, external borrowing, portfolio equity, debt flows, etc.). This creates a structural dependence on foreign investors' and lenders' sentiment of India as a market. The currency remains supported until CAD is backed by the Capital Account. However, in the case of global shocks with investors seeking safety for their capital, the rupee ends up having to absorb the shock to the Current Account.

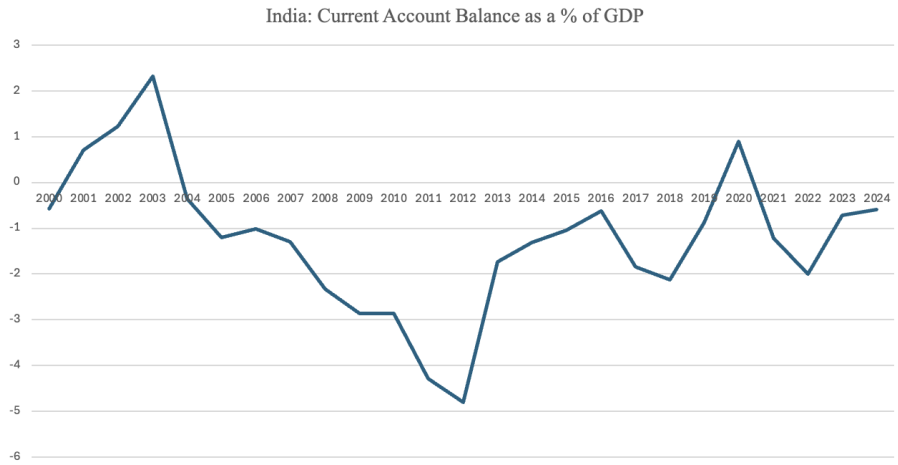

Figure 1: India: Current Account as a % of GDP

India has been running a persistent Current Account Deficit over the last two decades, and the rupee has depreciated by approximately 91% against the dollar over this period. The CAD essentially means that India has been a net seller of Indian rupees in the foreign exchange market: more rupees are being supplied than demanded (inflow of goods, services and invisibles is greater than the outflow). The severity of the CAD and exchange rate relationship was starkly visible during the 2013 Taper Tantrum episode, when CAD hit a record of 4.8% of GDP and the rupee depreciated by nearly 20% against the dollar. India was among the severely affected "Fragile Five" economies due to its high CAD and dependence on inflows of foreign capital. Additionally, the Capital Account that finances the CAD have remained structurally volatile. The net portfolio investments, for instance, have been prone to frequent reversals between 2013-2010.

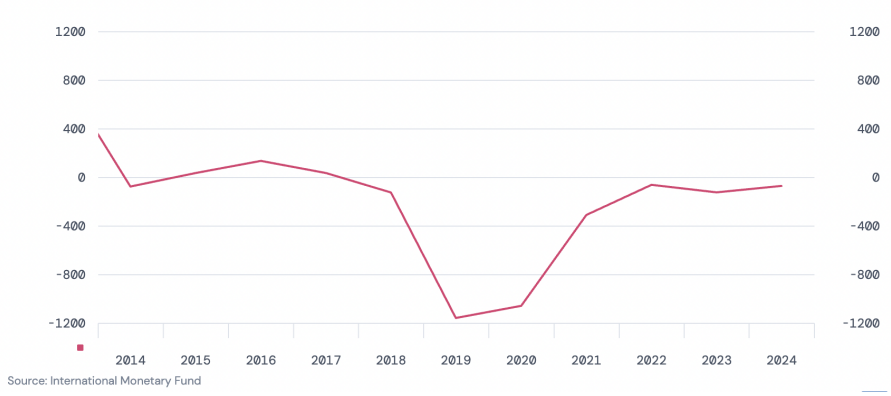

Figure 2: India: Capital Account (Mil.US$)

However rupees devaluation over the years is not just on account of such shocks, but rather a structural consequence of persistent rupee selling. Furthermore, the implications of rupee depreciation for an import intensive country like India raises the domestic cost of imports at large. Particularly, burgeoning import prices of essentials like crude oil with relatively price-inelastic demand (brought irrespective of the price hikes, even in times of global supply shocks), feeds into transportation, fertilizers and manufacturing costs, creating an economy wide inflationary pressure. Rupees fair valuation is hence imperative to safeguard the economy from external shocks and to retain macroeconomic stability. Addressing the symptom of rupee depreciation calls for addressing the root-cause, i.e. CAD.

India's CAD has reduced considerably since the 2013 crisis. Today India sits at a relatively constrained range of CAD of 1-2% of the GDP since the last four years. However, the question that arises is how do we assess if this is an appropriate CAD range to fall in. A deficit can only be assessed as too large or too small relative to a benchmark. Without knowing what India's CAD should be, given its structural fundamentals. Without a normative anchor that comprehensively studies all the structural fundamentals, there is no basis for policy action over the CAD.

This thesis aims to better understand the dynamics and drivers of India's current account. It further goes on to determine a normative value and we conclude

with a subjective assessment of the rupee valuation.

1.1 IMF'S EBA MODEL

We start by examining the ways in which current account balances are evaluated. External sector assessment is conducted by the IMF, with the canonical EBA model. It's a cross-country, inter-temporal model that regresses the current account on theoretical drivers of the current account. This section will give a brief overview with the EBA model, along with a critique relating to India. The EBA model specification is given by:

$$CA_{it} = \alpha + C'_{it}\beta + F'_{it}\lambda + P'_{it}\gamma + \epsilon_{it} \tag{1}$$

Here,

- C_{it} is a matrix of cyclical factors such as output gap, terms of trade and change in REER (Real effective exchange rate).
- F'_{it} is a matrix of macroeconomic and structural fundamentals such as output per worker, NFA and expected growth; as well as demographics and institutional quality that accounts for structural aspects.
- The final term, P'_{it} is a policy matrix consisting of fiscal balance, public health spending and capital controls

Using the aforementioned independent variable, the EBA model runs a generalised least sqaures(GLS) regression, auto-correlated on the first order over 52 countries over the years 1986-2019.

1.1.1 NORMS AND GAPS

The coefficients on the regressions are used to establish a current account norm. The independent variables in the matrices C'_{it} and F'_{it} take on cyclically adjusted values based on structural fundamentals of the said countries. The policy variables, on the other hand, are determined by the IMF staff with desirable values for any given country. After applying the above steps, we're left with a current account norm, which can

be denoted as CA_{norm}. The resulting difference gives us the gap:

$$CA_{norm} - CA_{actual,\ cyclically\ adj} = CA_{gap}$$

1.2 CRITIQUES OF THE EBA MODEL WITH RESPECT TO INDIA

We find three main concerns when it comes to such an assessment of a country's external balance:

1. **Structural Heterogeneity** The sample set selects 52 countries based on data availability and robustness. Developed, developing and low-income countries are pooled together, and although normative values do seek out aggregate dynamics, such a wide economy selection averages out very different demographic behaviour. Grigoli et al (2018) found that saving behaviour can be very different when different sets of countries are pooled, and since savings make up a directly explanatory chunk of the current account, such an estimation is not ideal.
2. **Time periods** The time period spans 34 years, primarily in search of enough data for a statistically significant coefficient. The issue with such a temporally wide dataset is that it aggregates data from countries and economies that are structurally and fundamentally different- both in terms of technology and demographic. Relationships between macroeconomic variables which were significant before might not be significant now, or even change how they impact the current account.
3. **Current Account norms, then what?** Arriving at a plain conclusion of if a country is in a deeper CA deficit than it should be, or an excessive surplus is informative but not insightful enough to drive policy. The left hand side of the estimation, being the current account, is cursed with reverse causality when we look at some of the structural and policy variables. It's hard to determine which area(even if broad) a country needs to look at in order to get closer to the norm.

   We start with summary statistics about India's current account and then motivate the approach to establishing norms.

1.3 A LOOK AT INDIA'S CURRENT ACCOUNT

The movements in Current Account has sparked a series of debates over the years around its sustainability, the exchange rate affecting the trade balance, and implications on rupee valuation. Current Account is characterised by:

$$CA = (X - M) + NY + NCT \tag{2}$$

where CA is Current Account, X is Exports, M is Imports, NY is Net Income from Abroad, and NCT is Next Current Transfers.

The Current Account can also be interpreted from a macroeconomic perspective through the national income identity, reflecting the gap between national savings and investments:

$$CA = S - I \tag{3}$$

This highlights that a CA deficit can arise when a country invests more than it saves, and the difference is then financed through foreign capital inflows. India has been in a CA deficit for most of the last 2 decades, owing to its role of a growing, import-intensive economy. The deficit has incresingly been buffered by remittences and IT/Service sector boom.

The post-2000s period saw an exponential growth in imports and exports, with imports growing at a faster rate. The CAD was manageable, around 1-2 per cent, but rapidly growing. Then the GFC lead to a momentarily alarming deficit of more than 4 percent, owing to surging oil prices, gold imports (India's bought gold as an inflationary hedge), and overall weakened global demand. However, the ensuing periods saw a steep fall in CAD due to RBI interventions, followed by widening deficit again to pre-GFC levels of 2-2.5 per cent. Post-2008 components of CA reflect growth rates similar to pre-2008, with more relative stability. Although trade balances have increased over the years (persistently rising imports), the invisibles (services, income and transfers)

have kept the CAD in check.

1.4 APPROACHING THE CURRENT ACCOUNT FROM SAVINGS AND INVESTMENTS

So far, the discourse around India's deep and persistent current account deficits have attracted policy actions on trade, tariffs, and rupee competitiveness to restore the difference between imports and exports. However, national income accounting ultimately reflect the current account as the difference between savings and investments. Moreover, studying the current account from the lens of savings and investments develops a long-term view on ideal CA norms. In the short run, inflows of foreign capital can help offset a CA deficit, in the long run it can only be balanced by increasing savings or lowering investments. This leads to a powerful result- **the long run steady state of the current account is a function of steady state values for savings and investments.** Below is some brief national income accounting to explain a novel way this paper posits to estimate a current account(CA) norm.

$$GNP_t = Y_t + r_t.B_t \tag{4}$$

Here, Y_t represents the gross domestic product at period t, and $r_t.B_t$ represents the income from owning B_t net foreign assets with returns r_t. The NFA position can also be negative, which would indicate the borrowing cost when multiplied by the return.

$$Y_t = C_t + I_t + G_t + NX_t \tag{5}$$

The current account is the sum of the trade balance plus the net income from abroad. Hence $CA_t = NX_t + r_t.B_t$. If we substitute this in (2), we get:

$$\begin{aligned} GNP_t &= C_t + I_t + G_t + CA_t \\ CA_t &= (GNP_t - C_t - G_t) - I_t \\ CA_t &= S_t - I_t \end{aligned} \tag{6}$$

We then analyse literature around the estimation of savings and investments to determine not only their dynamics but also their normative values. The first section of the proposal only deals with savings, and then builds on investments. Analysing the current account in such a manner also shows deviations within savings or investment, giving policy a more targeted approach to steer long-run current account balances. Briefly, the current account gap can be viewed as the **savings gap minus the investments gap**

$$\begin{aligned} S^* &= f(macroeconomic\ fundamentals,\ demographics,\ structural\ factors) \\ S - \hat{S^*} &= Savings\ Gap \text{ and } I - \hat{I^*} = Investment\ Gap \\ S - \hat{S^*} - (I - \hat{I^*}) &= Current\ Account\ Gap \end{aligned} \tag{7}$$

Instead of treating the current account like a black box, this methodology shows whether India's external position deviates from the norm because it saves too little(or too much) or invests too little(or too much) compared to a norm which shall be explained in the upcoming chapters.

2. LITERATURE REVIEW- SAVINGS

We've established our approach to estimate normative savings, and eventually investments. As this part of the thesis shall concern savings, we'll first start with the existing literature on estimation on savings. There are two papers that establish the foundations for savings estimation- Loayza, Schmidt-Hebbel, and Servén and Grigoli, Herman, and Schmidt-Hebbel. Loayza et al ran a system GMM over 69 countries from 1966-1995, and the most recent specification on savings was provided by Grigoli et al in 2018 when they perform a pooled OLS on aggregate savings on 165 countries from 1981-2012. Chinn and Prasad (2003) measure savings indirectly by estimating the current account first, building the first iteration of the EBA model.

Across the literature, the following variables are robustly associated with savings rates:

income per capita (positive), income growth (positive), old-age dependency ratio (negative), population growth or young dependency (negative), terms of trade (positive for developing countries), government fiscal balance (negative, with partial Ricardian offset), and credit-to-GDP (negative, reflecting financial deepening). The real interest rate and inflation are not robust and their signs flip across studies.

There are some gaps in the literature we've identified that hope to solve here- firstly, no one has looked at savings to eventually estimate the current account. There's also not been a conscious pool of countries and have usually been geographic. Some of our coefficients signs differ from the status quo- and we go on to explain why that provides an added bit of insight. Taking inspiration from the studies we decided with the following independent variables:

- GDP per capita: We measure this in PPP terms since our analysis also includes cross-country. Said coefficient is logged to ease interpretation
- $(GDPpercapita)^2$- To incorporate the U-shape nature of savings and GDP per capita.
- **Macroeconomic variables**- Inflation and GDP growth
- **Demographic variables**- Urbanization, dependency ratio and population growth. One distinction we've made compared to other estimations is including overall dependency ratio compared to old-age or young dependency ratio. The reason behind that is that India and several other east-asian economies have incredibly young populations
- Finally, we also include fiscal balance, and credit-to-GDP. Credit-to-GDP is an instrument variable that helps us capture the level of financial deepening.

It would be ideal to be able to break down the savings down by households, corporate and public, but such data is not disaggregated for all countries nor is it documented well.

3. EMPIRICAL STRATEGY

Before we go on with an explanation of the data- this section aims to elaborate on the empirical strategy our analysis follows. We start by collecting cross-country and inter-temporal data on various independent and macro variables. The standard estimation technique remains OLS with robust standard errors. We make the distinction to not include country fixed effects for reasons explained below. There are three questions this section aims to answer in order to give a structure to our analysis:

3.1 WHY DO WE NOT INCLUDE COUNTRY FIXED EFFECTS?

As we shall see, a lot of the independent variables are slow moving within each countries. They tend to be incredibly sticky and tied down by socio-cultural factors and as such don't offer much volatility given overall macroeconomic shocks. Dependency ratios, population growth, economic growth etc, which are some example independent variables, have very low standard variations within countries even over decades. As variation is what carries the information for an OLS to estimate differential impact of variables- country fixed effects strip out almost all of the variation. This has been established in a lot of literature that aims to study savings and investments across countries. More importantly, we'll see how including fixed effects in our regression severely compromises the explaination power and statistical significance.

3.2 THE DIFFERENCE BETWEEN NORMATIVE SAVINGS AND DYNAMICS OF SAVINGS OR INVESTMENTS

To understand the dynamics of savings or determinants of savings we primarily look at country-specific regressions. The question we aim to ask here is- historically what has driven savings or investments in said country. Like mentioned in the earlier point, we're stripping out cross country variation, and in essence losing degrees of freedom. Country-specific regressions do remain incredibly useful, however, to the understanding of drivers of savings or investments.

This paper, on the other hand, is concerned with the hypothetical of what the savings (or investments) should be. Structural differences in macroeconomic variables can explain why some countries save a higher portion compared to the rest. In such an estimation, we want panel data, and we want to exclude fixed effects in order to preserve the variation that allows us to answer, given the status quo *what should the dependent variable be?*

3.3 CHOOSING THE NUMBER OF COUNTRIES TO INCLUDE IN OUR POOL

We have critiqued the EBA methodology for arbitrarily choosing countries based on data availability, which cannot be exaggerated for emerging economies as they also span over 34 years. On the other hand, a country-specific estimation would be the most accurate in terms of understanding long-term averages pertaining to that economy. More importantly, we're no longer exaggerating panel data results to each country, but studying it precisely. So the spectrum of choice goes from one country to all that count. In the analysis, we do include panel data as a comparative exercise, but do have to handle the model carefully to get something that doesn't overfit the data. We compare the panel-data model with the country specific model. The exercise will also shed light into which model works best.

We find a middle ground in the spectrum- to choose countries which are similar economically and are in a similar phase of their economic maturity to derive estimates that can be used for specific emerging markets. They do a much more accurate job about normative estimation.

3.4 WHY NOT JUST REGRESS THE CURRENT ACCOUNT DIRECTLY?

After finding answers to how to approach normative estimations and finding the set of countries to optimise accuracy, a question could still remain- why not just regress the current account on independent variables instead of the savings-investments ap-

proach. A direct regression on the CA faces severe causality problems and specific reverse causality for each key regressor. Some key variables that have empirically documented reverse causality include fiscal policy. Sobrino (2013) demonstrated this explicitly for Peru, finding that the evidence points strongly to reverse causality and the current account causes the fiscal account, because commodity export revenues flowing through the CA directly shape government tax receipts. Handoyo et al. (2021), examining ASEAN-10 economies, similarly found unidirectional causality running from the current account deficit to the fiscal deficit which is the opposite direction from what a CA regression assumes. The EBA methodology acknowledges this problem by instrumenting fiscal policy with global factors and country-specific features (Allen et al., 2023; Phillips et al., 2013), but the instrument sets are debatable and the identifying assumptions untestable.

The savings-investment decomposition sidesteps these problems largely by construction. Rather than regressing the CA on financial and policy variables that are jointly determined with it, the S-I approach models the structural determinants of savings: income levels, demographics, urbanization; which are slow-moving and largely predetermined with respect to the current account in any given year. India's dependency ratio or urbanization rate in 2023 was not plausibly caused by its current account outcome that year. This is the logic underlying the life-cycle hypothesis (Modigliani, 1970) and its cross-country empirical applications (Loayza, Schmidt-Hebbel, and Servén, 2000; Masson, Bayoumi, and Samiei, 1998): savings rates are driven by deep structural factors that evolve independently of short-run external balance dynamics, making OLS on a savings equation far more defensible than on a CA equation where even the IMF requires instrumental variables and lagged regressors to produce usable estimates.

4. RESULTS

4.1 COUNTRY SELECTION CRITERIA

- **Middle and Low Income** First, countries must be middle-income economies, ensuring structural comparability in savings behaviour. This excludes high-income OECD economies where savings dynamics are governed by mature pension systems, aging demographics, and deep capital markets — factors that operate through fundamentally different channels than in emerging markets.
- **Not commodity dependent** Countries must not be primarily commodity-dependent (excluding Gulf states and pure resource exporters where savings are dominated by resource rents rather than household or corporate behaviour)
- **Data Coverage** Third, countries must have adequate data coverage in the World Development Indicators for the estimation period.

4.2 COUNTRY LIST AND REGRESSION

Table 1: List of Sample Countries ($N = 25$)

No.	Country	No.	Country	No.	Country
1	Argentina	10	Indonesia	19	Poland
2	Bangladesh	11	Kenya	20	Romania
3	Brazil	12	Malaysia	21	South Africa
4	Chile	13	Mexico	22	Sri Lanka
5	China	14	Morocco	23	Thailand
6	Colombia	15	Nigeria	24	Turkiye
7	Costa Rica	16	Pakistan		
8	Egypt	17	Peru		
9	Hungary	18	Philippines		

4.3 CHARACTERISTICS OF THE COUNTRY POOL

The countries in our sample are structurally similar in that they are all emerging economies with similar demographics. However, they exhibit heterogeneity across some macroeconomic variables. We make use of the heterogeneity and the slow-moving nature of the structural variables to derive the predicted values for India's variables. Before getting to the regression, we analysed the patterns exhibited by the pool of countries against India's trend to visually motivate the regression model.

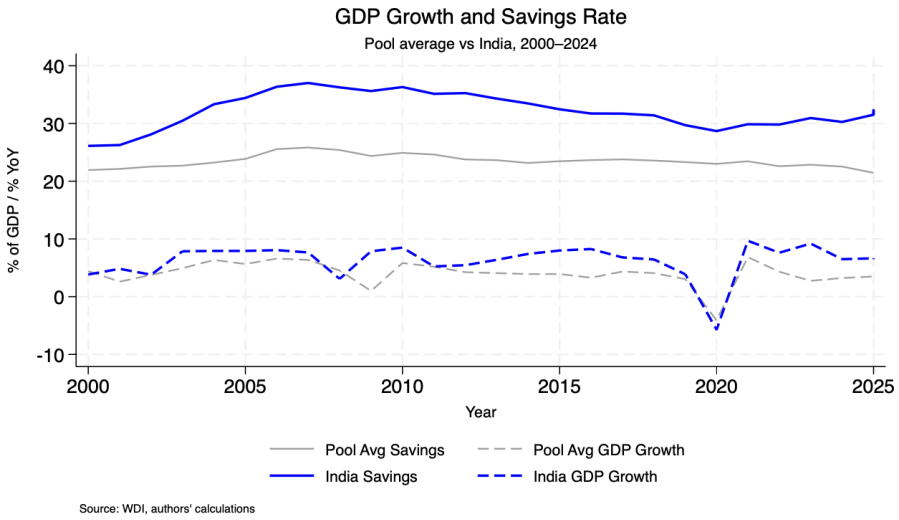

Figure 3: GDP Growth Rate and Savings Rate: Pooled Average and India

India's GDP growth vs savings rate relationship mirrors that of the average of the pool of emerging economies, confirming the positive relationship between GDP growth and savings. The pair of GDP and savings for both the pool and India rises through the early 2000s, reflecting the 'Golden Age' of most emerging economies. India's savings rate surged rapidly, surpassing the savings rate of most advanced economies and even BRICS nations (except China), peaking in 2008.

Both GDP graphs plunged during the Global Financial Crisis, and the brief expansion in the savings rate mirrored the air of conservation and reduced expenditure amidst the crisis. In their paper on the Great Indian Savings Puzzle, Ghate et. al. study this hump-shaped savings graph by modelling the relationship between inflation, demographics and Total Factor Productivity Growth rates. They attribute the post-2009 steady decline in the savings rate to a decline in inflation.

GDPs steeply contracted again in 2020 due to COVID19. Both savings graphs, however, declined during this crisis due to cuts in the interest rate on savings. Globally, most private banks instated cuts in interest rate in response to the lowering of reverse-repo rates by the central banks.

Aside from this, while India follows the path of the pooled average savings graph, there is a persistent level gap of nearly 8-10 percentage points between. This gap reflects the population's over-saving tendency as opposed to the average of other emerging economies. Furthermore, this consistent level gap is precisely what we seek to explain. The extent of the gap that is characterised by the structural characteristics unique to India (demographics, urbanisation) would be reflected in our model's calculation of the normative savings rate. The residual after accounting for these structural characteristics would constitute our 'Savings Gap' and, in turn, feed into the 'Current Account' gap.

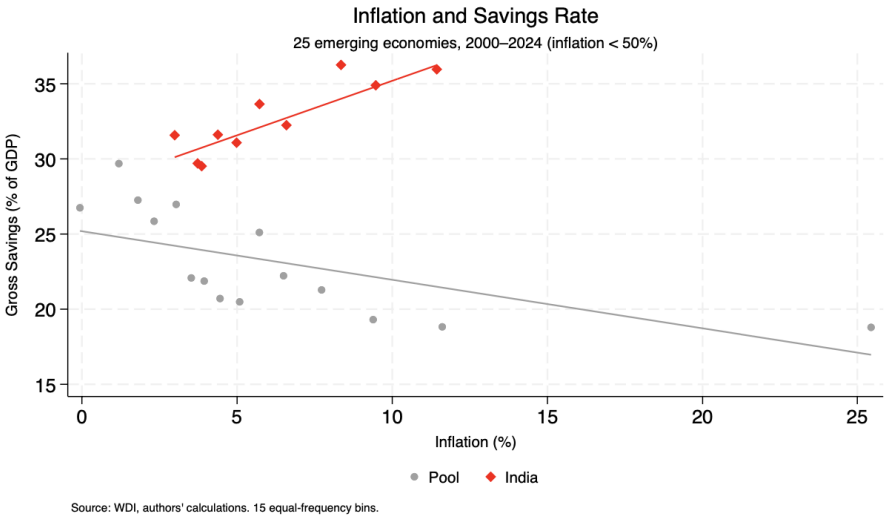

Figure 4: Inflation and Savings Rate: Pooled Average and India

The divergence in India's and other emerging economies' average response to an increase in inflation is stark. The pool goes by the standard channel of decline in response to rising inflation. Rising inflation erodes the return on savings and reduces the incentive to save as the purchasing power of savings falls over time, thereby reducing the savings rate. India's positive inflation-savings relationship stands in contrast to this. Ghate et al formally model how inflation drives savings via a cash-in-advance constraint on consumption and investment. In their model, rising inflation increases the cost of current consumption and reduces the future value of wealth. This

induces risk-averse households to reduce consumption and increase savings to smooth out consumption over time.

We anticipate that the opposing directions of the inflation-savings relationship in India and the pool would cause the effects to offset each other. Inflation would therefore be treated as a control for cyclicality rather than a primary structural driver of our normative savings estimate.

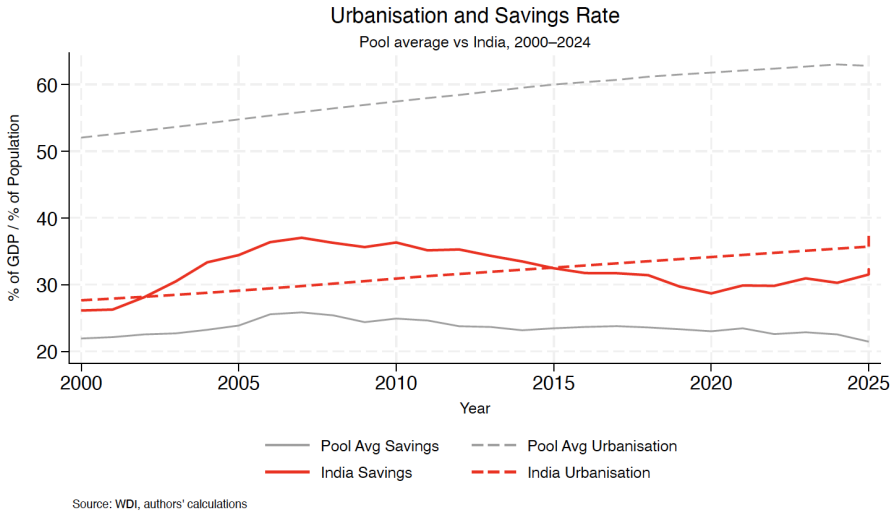

Figure 5: Urbanisation and Savings Rate: Pooled Average and India

India's urbanisation levels are significantly lower that the pool's average, which is pulled upward largely by the Latin American emerging economies (Brazil, Chile, Mexico, Argentina all exceed 75 per cent). The negative relationship is explained by increasing consumption and access to credit with an increase in urbanisation, compressing savings.

The level gap between India's savings and the pool's average is hence a reflection of the difference in levels of urbanisation. With India undergoing continued urbansiation to attain 40 per cent levels by 2030 as predicted by IMF, the downward pressure on savings from this channel is hence likely to become more pronounced. This makes

urbanisation a strong structural driver of India's long-run savings.

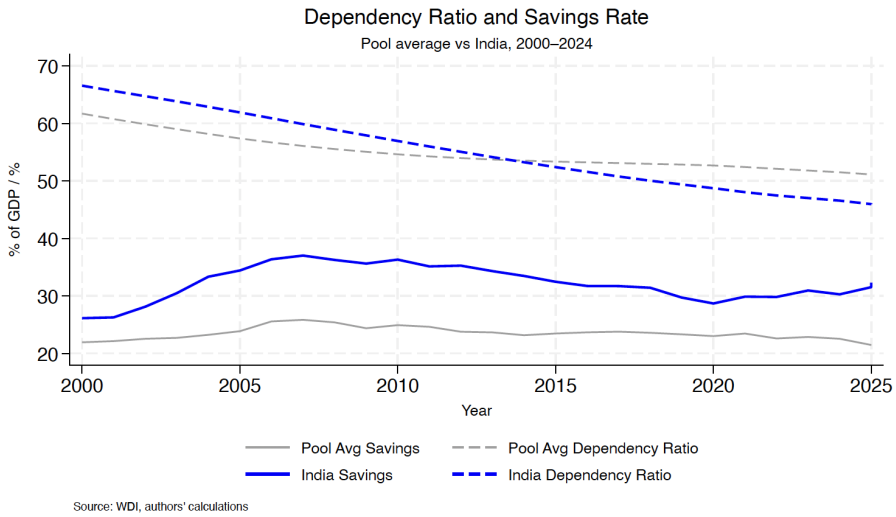

Figure 6: Dependency Ratio and Savings Rate: Pooled Average and India

India mirrors the direction of movement of the pool's average dependency ratio and savings rate. Dependency ratio measures the proportion of the population that is dependent (children and the old-age population) against the working-age population. The dependents are the proportion of the population that is dis-saving or is being supported by others. Aggregate savings, therefore hinges on the structure of the economy. Economies with a larger working-age population (lower dependency ratios) would thereby save more.

India's dependency ratio has fallen steeply, from 67% in 2000 to approximately 46% in 2024. This reflects a steady fertility decline and a widened demographic dividend. However, despite this, the savings rate continues to exhibit the hump-shaped tendency, rising through mid 2000s and declining post-2009. This indicates that the influence of savings-inflation dynamics that increases the savings ratio is highly influential. Furthermore, notable here is that, even though India's dependency ratio begins to come closer to the pool's average over the years, India continues to save significantly more than its peers.

5. REGRESSION

Table 2: Determinants of Gross Savings (% of GDP): Regression Results

	Dependent Variable: Savings/GDP		
	(1) Pooled OLS	(2) Pooled OLS (Sq.)	(3) Fixed Effects
Income			
ln GDP per Capita	-2.630^{**}	-36.860^{***}	3.043^{*}
	(0.875)	(9.695)	(1.310)
$(\ln$ GDP per Capita$)^2$		1.843^{***}	
		(0.517)	
Macroeconomic			
GDP Growth	0.929^{***}	0.908^{***}	0.045
	(0.127)	(0.126)	(0.064)
ln Inflation	-0.067	-1.657	-1.126
	(5.456)	(5.122)	(4.994)
Demographic			
Population Growth	0.801	1.239^{*}	0.430
	(0.637)	(0.628)	(0.761)
Dependency Ratio	-0.407^{***}	-0.485^{***}	0.156
	(0.061)	(0.062)	(0.095)
Urbanisation	-0.152^{***}	-0.140^{***}	0.010
	(0.024)	(0.025)	(0.105)
External			
Terms of Trade Index	-0.035	-0.048^{*}	-0.002
	(0.018)	(0.019)	(0.022)
Policy			
Fiscal Balance	0.705^{***}	0.683^{***}	0.552^{***}
	(0.131)	(0.131)	(0.109)
Credit/GDP	0.055^{***}	0.049^{***}	-0.014
	(0.013)	(0.013)	(0.032)
Constant	75.008^{***}	237.431^{***}	-11.083
	(8.983)	(46.666)	(13.822)
Year Fixed Effects	Yes	Yes	No
Country Fixed Effects	No	No	Yes
Observations	507	507	507
R^2	0.471	0.484	0.218
Adjusted R^2	0.434	0.446	0.204

Notes: Robust standard errors in parentheses for columns (1) and (2). Column (3) reports a within-estimator fixed effects model with SEs clustered at the country level (24 clusters). $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$.

The first estimate we run is across our pool of 25 countries in the time period of 2010-2025. There are some interesting coefficients that we'd like to discuss about, before moving on to the general strength of the model. Firstly, if we were to compare the sign on the coefficients from our analysis to the rest of the work that we've mentioned before:

Table 3: Coefficient Signs Across Savings Estimation Literature

	MBS (1998)	LSS (2000)	A&S (2004)	P&S (2009)	GHS (2018)	Our Model (OLS)
Income						
Income level	$+/-$[a]	$+$	$+$	$+$	$+$	$-$
Income squared	$-$	$\cdot$	$\cdot$	$-$	$\cdot$	$+$
Macroeconomic						
GDP growth	$+$	$+$	$+$	$+$	$+$	$+$
Inflation	0	$+$	$+$	$\cdot$	$+$	0
Demographic						
Old dependency	$-$	$-$	$\cdot$	$-$	$-$	$-$
Young dependency	$-$	$-$	$\cdot$	$-$	$-$	$\cdot$
Population growth	$\cdot$	$\cdot$	$\cdot$	$\cdot$	$\cdot$	$+$
Urbanisation	$\cdot$	$-$	$\cdot$	$\cdot$	$-$	$-$
External						
Terms of trade	$+$	$+$	$-$	$\cdot$	$+$	$-$
Policy						
Fiscal balance	$-$[b]	$-$[b]	$-$[b]	$\cdot$	$-$[b]	$+$
Financial						
Credit / fin. dev.	$\cdot$	$-$	$+$[c]	$+$	$-$	$+$
Dynamic						
Lagged dep. var.	$\cdot$	$+$	$+$	$\cdot$	$+$	$\cdot$

Notes: $+$ positive; $-$ negative; 0 insignificant; $\cdot$ not included. MBS = Masson, Bayoumi & Samiei; LSS = Loayza, Schmidt-Hebbel & Servén; A&S = Athukorala & Sen; P&S = Park & Shin; GHS = Grigoli, Herman & Schmidt-Hebbel.

[a] MBS find $+$ at low income and $-$ at high income (inverted-U with quadratic). Our model finds the opposite curvature (U-shape).

[b] These papers estimate *private* saving; fiscal balance enters as public saving with a negative sign reflecting partial Ricardian offset. Our model estimates *gross* saving, where a fiscal surplus directly adds to national saving, yielding a positive sign.

[c] A&S use spread of bank branches (not credit-to-GDP). LSS and GHS use credit flow; P&S and our model use credit stock level.

There are two coefficients that stand out, amongst all- firstly, our model estimates a negative relationship with income level until a certain threshold (hence the inclusion of income squared). However, the interpretation of a negative sign on income isn't

to say that with a rise in income, countries are expected to decrease savings. Such a comment can only be made when studying savings dynamics. Rather, it goes to show that amongst the set of similar countries, a higher per capita income isn't associated with higher gross savings of the economy. It could mean one of two things- there are some countries in the pool with exceptionally low savings and high per capita incomes or countries with not so high income but exceptionally high savings. Which, is in fact true. Southeast asian economies such as India(35% of GDP), China(45%) and Bangladesh(32%) have very high savings compared to pooled average. This would be important when we view India as an oversaver or an undersaver. It also goes to show why a cross-country analysis highlihgts a non-obvious answer- a negative coefficient would not be possible for any country-specific analysis. However, when pooled, cross-country variation can push the coefficient below zero.

Other coefficients that deviate from status-quo signs are fiscal balance- mainly because we have gross savings as a portion of GDP whereas other papers mainly regressed on private (household + corporate) savings. Credit to GDP surprisingly shows a positive sign, although intuitively it should be negative- higher credit draws away from savings. But, our pool also consists of developing countries with not advanced financial markets. Here, credit to GDP could play the proxy for financial deepening which increases savings. Better access to banks and financial infrastructure could indeed promote savings. It's yet another example of why we shouldn't include all countries- because the effect of credit-to-GDP reverses in developed countries where it can no longer act as a proxy for financial deepening. In the next section we discuss and India-specific regression to understand savings dynamics in India.

5.1 INDIA-SPECIFIC REGRESSION

Table 4: OLS Regression: Determinants of Savings/GDP

	Dependent Variable: Savings/GDP	
	Coefficient	95% Conf. Interval
Income		
ln GDP per Capita	410.008***	[329.653, 490.364]
	(38.248)	
(ln GDP per Capita)^2	−21.360***	[−25.486, −17.234]
	(1.964)	
Macroeconomic		
GDP Growth	0.067	[−0.061, 0.195]
	(0.061)	
Inflation	−0.256**	[−0.501, −0.011]
	(0.117)	
Demographic		
Dependency Ratio	3.798***	[2.923, 4.672]
	(0.416)	
Policy		
Fiscal Balance	−0.302**	[−0.600, −0.005]
	(0.142)	
Constant	−2114.320***	[−2545.202, −1683.437]
	(205.092)	
Observations	25	
R^2	0.9594	
Adjusted R^2	0.9459	
Root MSE	0.742	
$F(6, 18)$	70.90	

Notes: Standard errors in parentheses. $^*p < 0.10$; $^{**}p < 0.05$; $^{***}p < 0.01$.

The above regression will be slightly different from the panel regression simply because of variables that are slow moving, or move very closely with each other within a country (but not across countries). Some examples are urbanization and dependency ratio. We start with the baseline model that includes GDP per capita, GDP growth, fiscal balance and dependency ratio based on theoretical grounds. We discuss further in the statistical appendix on approaching country-specific regressions which can serve as a template for each country. We drop the following variables- (a) urbanization because of high collinearity with dependency ratio and income. Both dependency ratio

and urbanization capture India's demographic change we keep the former partly because of better theoretical grounds. (b) Population growth because it was irrelevant within country over a short period. (c) Credit to GDP- if we plot credit to GDP with savings rate in India you see the relationship breaks down after 2010. Lastly, we also drop the terms of trade index. This is on account of it failing Engle-Granger Cointegration test. The relationship was spurious within the country as it accrued it's relation to co-integrated variables that were inherently non stationery with no economically meaningful relationship. The rationale behind further simplifying the model is based on (a) variables that move together within a country (generally demographic ones) and (b) not enough within country explanatory power.

5.2 ACTUAL VS PREDICTED

This section introduces how we plan to move towards establishing the norm. We'll first plot India's predicted savings from the cross-country regression against the actual. The same is done for the India specific regression.

5.2.1 NORMATIVE SAVINGS- MODEL FROM POOL OF 25 COUNTRIES

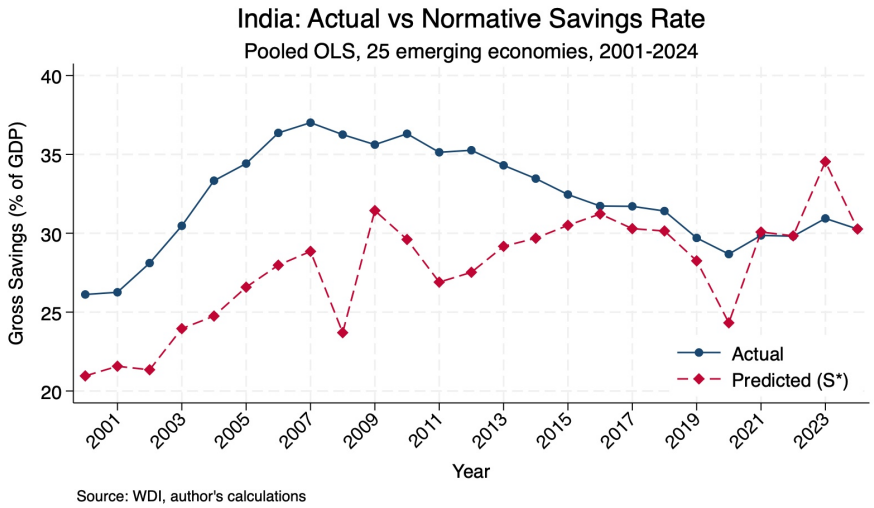

Figure 7: Actual vs Normative Savings: 25 country pooled OLS

The first figure looks at the predicted vs actual savings rate (as a % of GDP) when we apply the second pooled OLS model. There's an interesting trend of over-saving that

can be seen juxtaposed with the normative savings. What the graph shows is that India's predicted savings given it's fundamentals is much higher. In effect, India is an over-saver compared to peers. The savings gap, which we denote by $S - \hat{S}$ started at around 5% of GDP and widened when India's savings rose sharply. The unexpected troughs seen in 2008 and 2020 can be attributed to outliers which are GFC and COVID-19. We can also see that this savings gap has reduced sharply and is close to 0 as of FY25.

The gap peaked around 2006 and 2007 around 7-8%- which is consistent with the claims by Chetan Ghate and Saha who show that India's savings rose dramatically post 1990s surpassing most advanced economies and BRICS barring China. There are several hypotheses to support why India could have been an over-saver:

Precautionary savings in the absence of social insurance. India's social safety net has historically been thin. Public pension coverage remains limited, healthcare is largely out-of-pocket, and the informal sector which accounts for a majority of employment offers no unemployment insurance. In such an environment, households self-insure by saving. Carroll and Jeanne (2009) formalise this for emerging economies broadly, and Chamon, Liu and Prasad (2013) show that income uncertainty in the absence of institutional insurance can drive saving rates well beyond levels explained by standard macro determinants. India is a textbook case of this channel. The precautionary motive was particularly strong in the 2000s, when rapid but uneven growth created substantial income uncertainty even as headline GDP numbers looked impressive.

The inflation–savings channel. As we've discussed in the characteristics of the pool, India's response to inflation runs in the opposite direction to the pool's average. Where higher inflation typically depresses savings by eroding returns, in India it has historically increased savings. Ghate et al. formally model this through a cash-in-advance

constraint on consumption and investment. Rising inflation increases the cost of current consumption and reduces the future value of wealth, inducing risk-averse households to cut consumption and save more to smooth out their consumption over time. The 2004–2008 period saw CPI inflation averaging 5–6% and rising — precisely the environment where this channel would amplify savings beyond what a cross-country model, estimated on countries where inflation depresses savings, would predict. The pooled OLS coefficient on inflation is effectively zero in our specification (Table 2), which is exactly what we'd expect when India's positive and the pool's negative effects offset each other. This means the inflation-driven component of India's over-saving sits in the residual and it shows up as the gap, not in the fitted values.

Rising formalisation and the demographic dividend. The Ghate et al. heterogeneous-agent model distinguishes between Ricardian (formal sector) households who save and rule-of-thumb (informal) households who consume their entire wage. A rising share of formal workers in the economy increases the aggregate weight of savers. India's formal employment share expanded through the 2000s, driven by the IT/services boom and the post-liberalisation expansion of organised manufacturing. This structural shift pushed aggregate savings upward in a way that a cross-country regression — which doesn't observe the formal-informal composition cannot capture. Furthermore, India's dependency ratio fell steeply from 67% in 2000 to 52% by 2008, faster than most peers. Even though our model includes the dependency ratio, the sheer pace of India's demographic transition meant that the actual savings response overshot what the pooled coefficient would predict.

Low urbanisation. India's urbanisation levels are significantly below the pool average (pulled upward by Latin American economies where urbanisation exceeds 75%). As Figure 4 shows, the negative urbanisation–savings relationship is well established — higher urbanisation increases consumption opportunities and access to credit, compressing savings. India's relatively low urbanisation during the 2000s meant fewer

consumption outlets and less access to consumer credit, reinforcing the tendency to save. The model does account for this through the urbanisation coefficient (-0.14, significant), but the interaction between low urbanisation and the other India-specific channels likely amplifies the effect beyond what the linear specification captures.

Cultural and institutional preferences. Suri and Hada (2018) document that India has a long-term oriented culture where households are more focused on the future than the present. Indian households have traditionally preferred physical assets; real estate accounted for 61% of household savings between 2010 and 2020 (Goldman Sachs, 2024). Gold, another preferred savings vehicle, serves simultaneously as a hedge against inflation and as cultural capital for marriages and social commitments. These preferences create a structural floor under savings that is not easily captured by macroeconomic regressors.

5.3 PREDICTED SAVINGS- MODEL FROM INDIA-ONLY

The India-only model does produce far fewer deviations on account of how tight our dataset is.

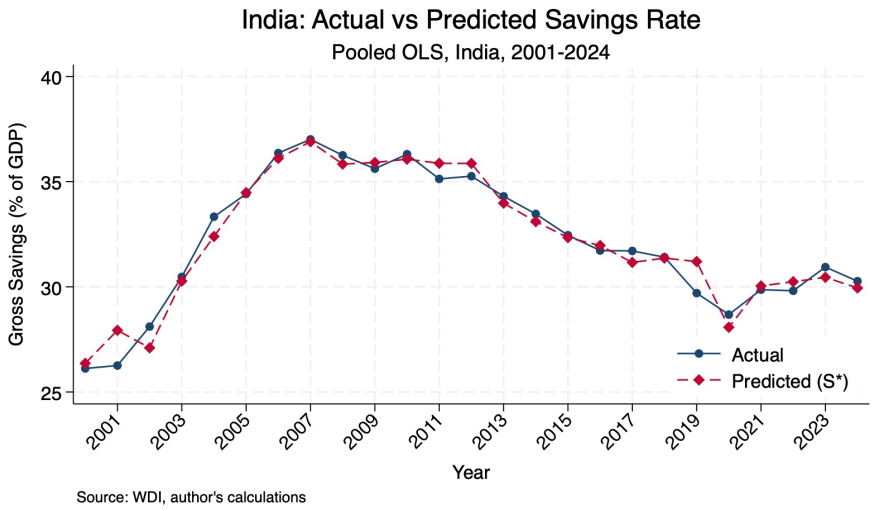

Figure 8: Caption

6. PROJECTIONS AND NORMS

This section of our paper first makes assumptions about the independent variables in order to project them. We show this in table 5, wherein we've projected values for the next 5 years. Then we apply the coefficients on the pooled model (with 25 countries) as well as the India-only model. The pooled model's coefficients are projected as shown in figure 9. As we can see, the predicted *normative* savings rate for India shifts up for the very next year, which is 33.8%. This can be accrued to a higher GDP growth rate predicted for the next FY. It tapers down to 30-31% of GDP. If we use the coefficients from the India-only regression we get a predicted savings rate of 28.54%. The two models have opposing projections- one historically predicted a lower savings rate and now predicts higher, whereas the India-only model predicts a lower savings rate. With this in mind we move on to the investments section.

Table 5: India: Macroeconomic Projections, FY2025/26–FY2029/30

Variable	Unit	25/26	26/27	27/28	28/29	29/30
Growth & Income						
GDP per Capita (Nominal)	USD	2,818	3,051	3,330	3,638	3,975
GDP per Capita (PPP)	Int'l USD	12,101	12,964	13,908	14,927	16,047
Real GDP Growth	% YoY	6.8	7.0	6.5	6.5	6.5
Prices						
CPI Inflation (Average)	% YoY	2.8	4.0	4.5	4.5	4.5
Demographics						
Population Growth	% YoY	0.80	0.77	0.74	0.71	0.68
Dependency Ratio	%	46.1	45.8	46.0	46.3	46.3
Urban Population Share	% total	37.0	37.7	38.4	39.1	39.8
External Sector						
Terms of Trade (G&S)	% Δ YoY	−0.5	0.0	0.5	0.5	0.5
Fiscal						
Fiscal Balance (Centre)	% of GDP	−4.5	−4.5	−4.2	−4.0	−3.8
Financial						
Private Credit to GDP	% of GDP	57.0	58.5	60.0	61.5	63.0

Sources: IMF World Economic Outlook (October 2025); IMF Article IV Consultation (November 2025); UN World Population Prospects (2024); World Bank / Reserve Bank of India. All projections are on a fiscal year (April–March) basis. GDP per capita figures are calendar year approximations. Dependency ratio and urbanisation are interpolated from UN WPP 2024 trends. Private credit-to-GDP estimated from RBI data and IMF domestic credit growth projections (≈10% per year). Fiscal balance refers to the central government; the general government deficit is approximately 2.5 percentage points wider throughout. Column headings are fiscal years, FY2025/26 through FY2029/30.

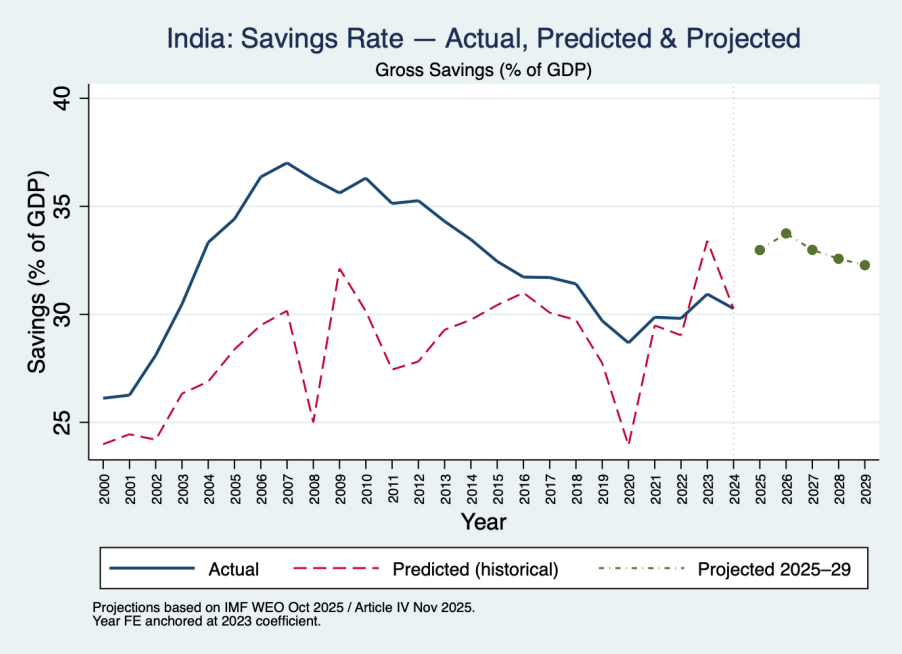

Figure 9: India's Savings Rate- Projected (Pooled Model)

6.1 PROJECTING USING COUNTRY SPECIFIC MODELS

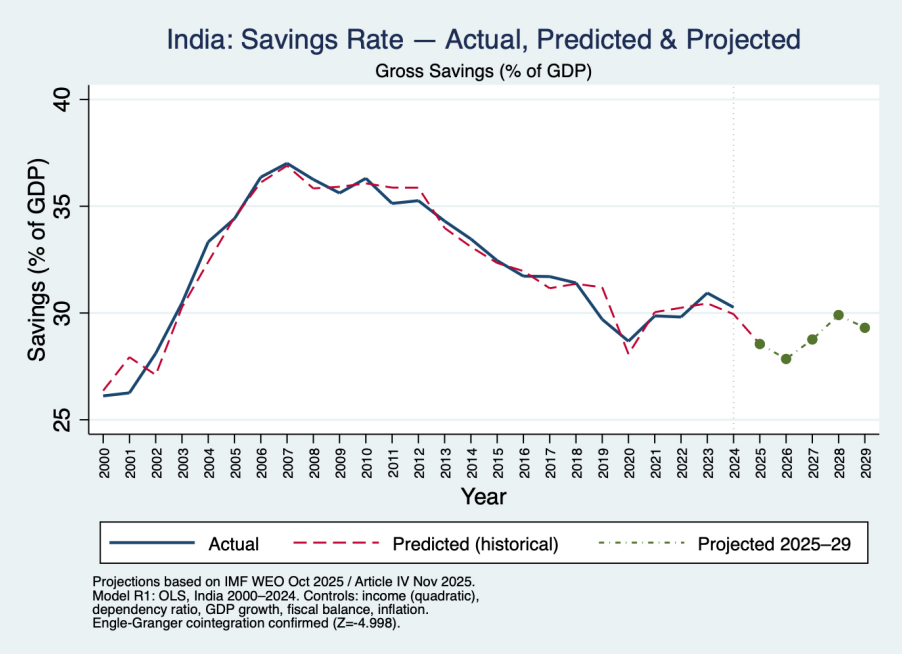

Figure 10: India Only Model Projections

We use the same projections for India and apply it to an India-specific model. The regression here omits some variables that have been discussed in section 5.1 and the statistical appendix. We can see the country only models predict savings really well,

with an adjusted R^2 of 94% and root MSE of 0.74.

6.2 A COMPARISON OF PROJECTIONS

Table 6: Projected Values: Cross Country vs India Only Model

Year	Cross Country	India Only Model
2025	28.88891	28.54865
2026	28.97180	27.84841
2027	28.26892	28.76113
2028	27.83702	29.90616
2029	27.55344	29.30839

Table 6 compares the projections for either model- an India specific one as well as a Cross country model. They deviate a little further around 2028/2029, wherein the India only model projects higher savings for India at around 29% of GDP, although historically lower since we once had savings of 36-37% of GDP. The gap highlights why cross-country analyses aren't ideal for projections. Even with a limited country pool, we do get projections that are significantly different. Although, the idea of a norm is to look at averages of the collective, this section highlights the importance of looking at countries specifically.

7. INVESTMENTS

Having developed our framework for estimating India's normative savings rate, we now turn to the second pillar of the savings-investment decomposition. The current account identity CA $= S - I$ requires us to separately determine the structural level of investment. This section develops a parallel framework for estimating I^*, India's normative investment rate, drawing on a distinct theoretical specification that calls for a different empirical specification than the one we used for savings. A different specification also overcomes the reverse causality issue previously spoken about in the EBA model.

7.1 DEFINING THE INVESTMENT VARIABLE

A first methodological decision concerns the measure of investment. The national accounts identity CA $= S - I$ is closed using Gross Capital Formation (GCF), which decomposes as:

$$\text{GCF} = \text{GFCF} + \Delta\text{Inventories} + \text{Net acquisitions of valuables} \tag{8}$$

where GFCF (Gross Fixed Capital Formation) captures spending on fixed productive assets such as machinery, equipment, structures, intellectual property and changes in inventories capture the working capital component of investment. For India over 2000–2024, the inventory component has averaged approximately 2.0 percentage points of GDP, with substantial cyclical variation (peaking at 4.8pp in 2009 during post-GFC stockpiling and falling to 0.3pp in 2000). Using GFCF alone would mechanically widen the implied current account gap by this amount, yielding a normative current account that does not reconcile with the national accounts identity.

We therefore use GCF as our dependent variable throughout. This introduces novelty compared to the current India specific investment literature (Anand and Tulin 2014; Chhibber and Kalloor 2016; Raj, Sahoo, and Shankar 2018), which focuses on GFCF for its policy relevance to productive capacity. The choice of GCF is dictated by the requirements of the S–I decomposition, where consistency with the national accounts identity takes precedence.

7.2 LITERATURE REVIEW

This review is an explanation behind the selection of independent variables to estimate investments in the pooled as well as country-specific model.

GDP growth over GDP levels The earliest investment theory, due to Clark (1917), holds that firms invest in response to changes in demand rather than its level. When

output is expected to grow faster, firms expand capacity to accommodate the additional demand; when growth slows, they postpone capital expenditure. Samuelson (1939) formalised this in his multiplier-accelerator model. Hence, across the investment specifications, we include GDP growth and not GDP levels.

Developing-country extensions. The seminal contributions by Servén and Solimano (1992), Rama (1993), and the subsequent papers by Servén (1998, 2003) identify four mechanisms missing from the standard neoclassical model when applied to developing countries, which we shall also include in our regressors

1. **Credit rationing** (McKinnon 1973; Shaw 1973). When firms face binding financial constraints, the relevant variable is not the cost of capital but its availability. Credit to the private sector emerges as the single most important determinant of LDC investment in Rama's classification of 25 empirical studies.
2. **Public investment complementarity.** Government capital expenditure can crowd in private investment through infrastructure provision rather than crowding it out through resource competition. The fiscal balance is the standard proxy.
3. **Macroeconomic uncertainty** (Pindyck and Solimano 1993). Under irreversibility, uncertainty raises the option value of waiting and depresses investment. Inflation and real exchange rate volatility are the standard proxies.
4. **External-sector constraints.** Terms-of-trade movements affect the profitability of tradable-sector investment, while the real exchange rate affects relative prices.

Inventory investment. Because GCF includes inventory changes, our specification must accommodate the inventory literature, which has its own theoretical foundations different from those for fixed investment. Blinder and Maccini (1991) identify three motives for inventory holding: production smoothing under demand shocks, stockout avoidance, and economies of scale in restocking. Empirically, inventory changes are the most volatile component of GDP (Ramey and West 1999) and serve as a buffer absorbing unexpected demand fluctuations. Carpenter, Fazzari, and Petersen (1994) document that inventory investment is highly sensitive to changes in credit supply,

since inventories are typically working-capital financed. The most relevant variable for the inventory channel is therefore the *output gap*—the deviation of current growth from its trend since unexpected positive demand shocks deplete inventories (negative coefficient) while unexpected negative shocks lead firms to accumulate them.

India-specific literature. The investment-determinants literature for India is substantial and has converged around a similar set of regressors despite varied econometric techniques. Anand and Tulin (2014, IMF WP 14/47) attribute a large share of India's post-2012 investment slowdown to economic policy uncertainty and business confidence; their structural decomposition uses GDP growth, the real interest rate, and a measure of macroeconomic uncertainty. Bahal, Raissi, and Tulin (2015, IMF WP 15/264) use a structural VAR to show that public investment crowds in private investment in the post-1980 period, reversing the earlier crowding-out finding from Sundararajan and Thakur (1980). Chhibber and Kalloor (2016, NIPFP WP 181) identify the public capital stock, real effective exchange rate, output gap, and credit to the private sector as the four binding determinants; they find no significant role for the real interest rate. The most comprehensive recent treatment is Raj, Sahoo, and Shankar (2018, RBI WP 05/2018), which uses 1950–2018 data and concludes that "economic activity, real interest rate and bank credit were the major determinants of investment activity in India," with the gross fiscal deficit crowding out private investment in the long run. Sahoo and Bishnoi (2021) revisit the post-2004 slowdown using ARDL with quarterly data, finding aggregate demand, fiscal policy, monetary policy, and economic uncertainty as the binding constraints. Karun, Vinod, and Chakraborty (2020) and Rai et al. (2024) confirm the crowding-in finding using maximum-entropy bootstrap and asymmetric ARDL respectively.

A key takeaway from this literature is that investment regressions look different from savings regressions. Where the savings literature is based on the life-cycle hypothesis (Modigliani 1970) and its implications justifying GDP per capita with a quadratic

to capture non-linear development effects—the investment literature centres on the accelerator and uses GDP growth as the income-side regressor. The empirical convention is unambiguous: Blejer and Khan (1984), Greene and Villanueva (1991), Servén and Solimano (1992), Rama (1993), Servén (1998), Anand and Tulin (2014), Chhibber and Kalloor (2016), and Raj, Sahoo, and Shankar (2018) all use GDP growth rather than GDP per capita as the demand-side variable. Our investment specification follows this convention.

7.3 VARIABLE SELECTION

Drawing on the above literature, we consider the following candidate regressors:

- **GDP growth** The accelerator (Clark 1917; Jorgenson 1963).
- **Output gap** Deviation of current GDP growth from its 5-year trailing average. Captures inventory-channel demand shocks (Blinder and Maccini 1991; Ramey and West 1999).
- **Inflation**. Macroeconomic uncertainty proxy (Pindyck and Solimano 1993; Servén 2003).
- **Credit to the private sector / GDP** Financial constraint (McKinnon 1973; Shaw 1973; Rama 1993).
- **Trade openness** Access to imported capital goods and tradable-sector demand (Wacziarg 2001).
- **Real interest rate** User cost of capital (Jorgenson 1963).
- **Terms of trade** External profitability (Servén and Solimano 1992).
- **Fiscal balance** Public investment / crowding-in proxy (Servén and Solimano 1993; Bahal, Raissi, and Tulin 2015).
- **FDI inflows / GDP**, **dependency ratio**, **urbanisation**, **population growth**. Tested but excluded based on diagnostic results.

We deliberately exclude GDP per capita (and its squared term) on theoretical grounds. As discussed above, the investment literature uses growth rather than levels as its income-side regressor, reflecting the accelerator mechanism that distinguishes invest-

ment dynamics from savings dynamics. Demographic variables and FDI are tested empirically and excluded based on the diagnostic procedure described below.

7.4 SUMMARY STATISTICS

Table 7: Summary Statistics: Pool vs. India

	Pool (N=625)				**India (N=25)**			
Variable	Mean	SD	Min	Max	Mean	SD	Min	Max
GFCF/GDP (%)	22.2	6.0	10.8	45.0	28.9	2.8	23.0	33.5
GCF/GDP (%)	23.5	6.4	11.6	47.7	31.0	3.7	23.8	36.9
GDP growth (%)	4.1	3.5	-11.0	15.3	6.4	3.2	-5.8	9.8
Inflation (%)	7.5	10.6	-1.1	133.5	6.1	2.6	3.3	12.0
Credit/GDP (%)	49.6	33.6	8.0	192.0	46.8	8.6	28.0	56.0
Trade openness (%)	61.7	36.5	20.0	220.0	38.5	6.8	26.0	51.0
Real interest rate (%)	2.4	6.4	-70.0	30.0	2.8	2.0	-1.0	6.0
Terms of trade index	100.4	9.9	70.0	155.0	92.6	6.1	82.0	107.0
Fiscal balance (% GDP)	-2.7	3.5	-16.5	8.8	-7.1	2.0	-10.8	-3.3
Output gap (pp)	0.0	2.8	-12.9	11.3	0.3	3.1	-9.7	5.5

Note: Pool comprises 25 emerging economies, 2000–2024. India ranks 2nd of 25 by mean GCF/GDP (behind China at 42.6%). The 2-percentage-point gap between mean GFCF (28.9%) and GCF (31.0%) for India captures the average inventory component over the sample. Compared to the pool, India displays substantially lower volatility in growth, inflation, and credit conditions, but a substantially wider fiscal deficit—a feature directly relevant to our crowding-in result below.

Two features of the data merit emphasis. First, India's mean GCF/GDP of 31.0% is the second-highest in the pool, exceeded only by China (42.6%). The pool average is 23.5%, putting India 7.5 percentage points above the pool mean. This persistent over-investment is the central data fact motivating the country-specific dimension of our analysis. Second, India's average fiscal deficit of 7.1% of GDP (well above the pool's 2.7%) reflects the country's consistent recourse to deficit-financed public capital expenditure, a feature that will prove central to our India-specific specification.

7.5 POOLED CROSS-COUNTRY REGRESSION

Table 8: Determinants of GCF/GDP: Regression Results

	Dependent Variable: GCF/GDP	
	Coefficient	Std. Error
Macroeconomic		
GDP Growth	1.284***	(0.095)
Output Gap	-1.159***	(0.117)
Inflation	-0.096***	(0.029)
Financial		
Credit/GDP	0.086***	(0.007)
External		
Trade Openness	-0.029***	(0.007)
Real Interest Rate	-0.194***	(0.046)
Terms of Trade	-0.061**	(0.021)
Constant		
Constant	23.114***	(2.235)
Observations	575	
R^2	0.442	
Root MSE	4.913	

*Notes:*Sample: 25 economies, 2000–2024. ** $p < 0.01$, *** $p < 0.001$.

The coefficients are consistent with a-priori predictions. The coefficient on output gap is negative as demand shocks would deplete inventories. Credit/GDP enters positively, reflecting the financial-deepening channel. Inflation enters negatively (uncertainty effect), and the real interest rate enters negatively (user-cost effect). The negative coefficients on trade openness and terms of trade reflect cross-country composition effects: highly trade-open economies in our pool (Hungary, Malaysia) are entrepot economies with lower domestic capital formation, while terms-of-trade movements interact with commodity-dependent versus manufacturing-dependent investment patterns in ways the linear specification can only partially capture. Within India, both effects flip in sign once we control for India's specific structural environment (see below).

The pooled regression's R^2 of 0.44 is in line with the cross-country investment literature, where Servén (1998) reports values of 0.35–0.50 across 94 countries. Although this is lower than the IMF EBA's reported R^2 of 0.525 (Allen et al. 2023), the compar-

ison is not direct: the EBA estimates the current account—a tightly bounded variable ranging approximately -10% to $+10\%$—whereas our regression estimates GCF, ranging approximately 12% to 48% of GDP.

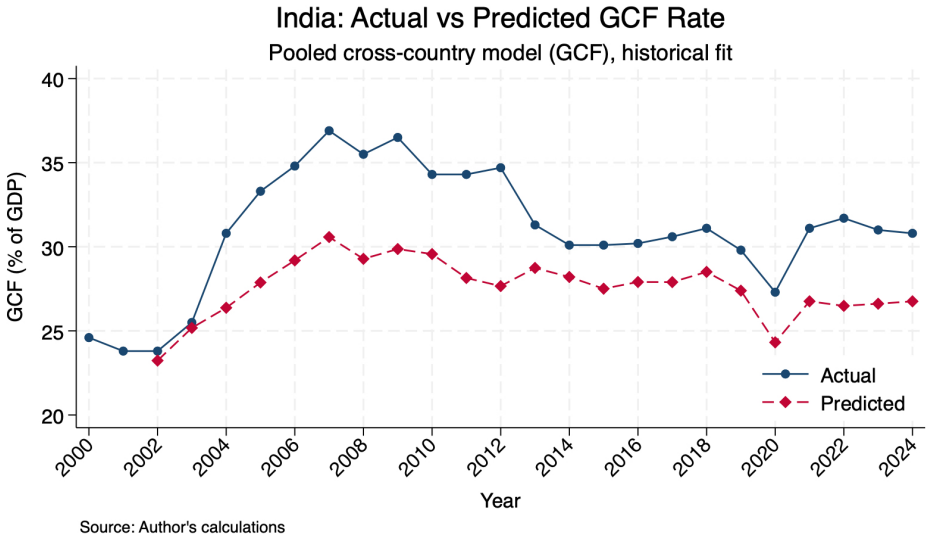

Figure 11: GCF- Actual vs Pooled Results

7.6 WHY INDIA PERSISTENTLY OVER-INVESTS AND THE JOURNEY TILL NOW

When the pooled regression is applied to India, the predicted GCF/GDP averages approximately 27.5% over 2000–2024, against an actual average of 31.0%, a persistent structural gap of approximately 4 percentage points. This is not noise: it is large, persistent across the entire 25-year sample, and consistent in direction. India invests more than the pool's relationship with fundamentals predicts, every year.

This kind of persistent, country-specific deviation is precisely what the IMF EBA accommodates through its country-specific adjustors. As Allen et al. (2023) note, such adjustors "account for specific characteristics of a small number of countries that can determine their patterns of saving and/or investment but are not adequately captured by the model." Before turning to the India-specific specification that captures these channels formally, we go through the investment journey itself.

Gross capital formation rose from 27.6% of GDP in FY 2003–04 to a peak of **39.0% in FY 2011–12**. India had recorded several consecutive years of 8–9% real growth,

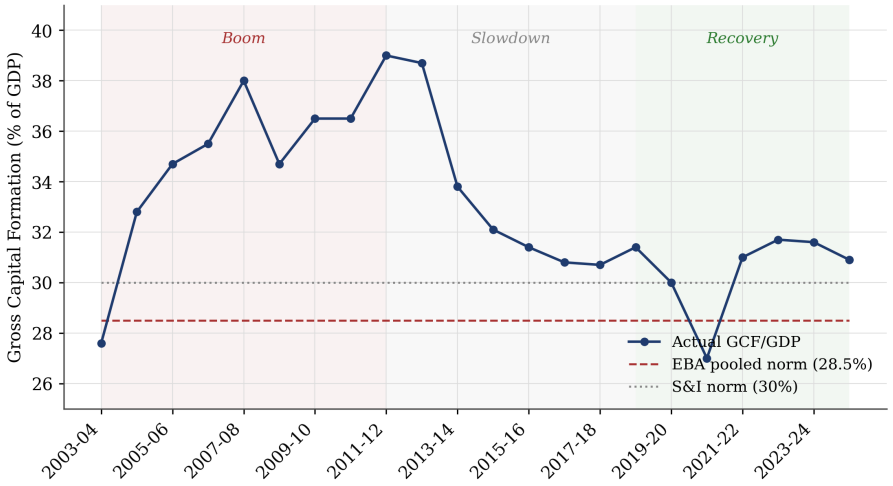

Figure 12: India: GCF/GDP, 2003–04 to 2024–25, against EBA and S&I norms

and the post-1991 reform dividend was finally translating into sustained productivity gains. It also came with a very favourable lending environment. The boom-period real lending rate averaged 3.6%, the repo rate 6.6%, and bank credit growth ran at **23% per year** roughly three times nominal GDP growth. Bank credit to GDP rose from 36% to 51% in eight years. Corporates took on debt against optimistic growth expectations, and banks lent against the same optimism. The wide lending which is a repo gap of 4.6 percentage points indicated weak monetary transmission, but during the boom this actually *helped* banks lent at high spreads while still passing on enough of the policy rate to keep borrowing attractive.

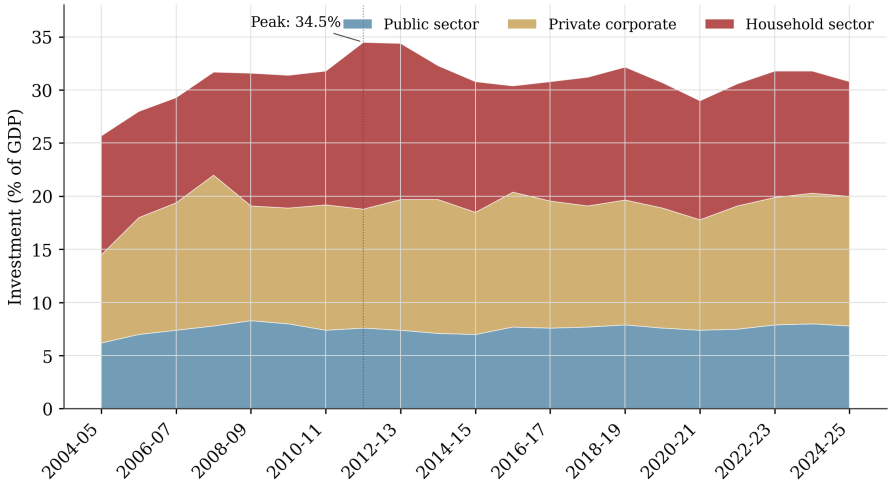

Figure 13: Investment by institutional sector (% of GDP), 2004–05 to 2024–25

By institution, the most striking feature is the household sector. As Figure 13 shows, household GFCF rose from 9.7% of GDP in FY 2007–08 to **15.7% in FY**

2011–12 which is a 6 percentage-point jump in just four years. This is the largest single contributor to the over-investment phase, and almost all of it was real estate. Indian residential property prices grew at 22–24% per year through this period, and households interpreted that as a one-way bet. Private corporate investment rose more modestly, from 8.3% to 11.2% of GDP, with significant concentration in infrastructure (telecom, power, roads, airports) and metals as the sectors that would later become the core of the stressed-assets problem. Public-sector investment, by contrast, sat in a narrow 7–8% band throughout: the state was not the driver of either the boom or the slowdown.

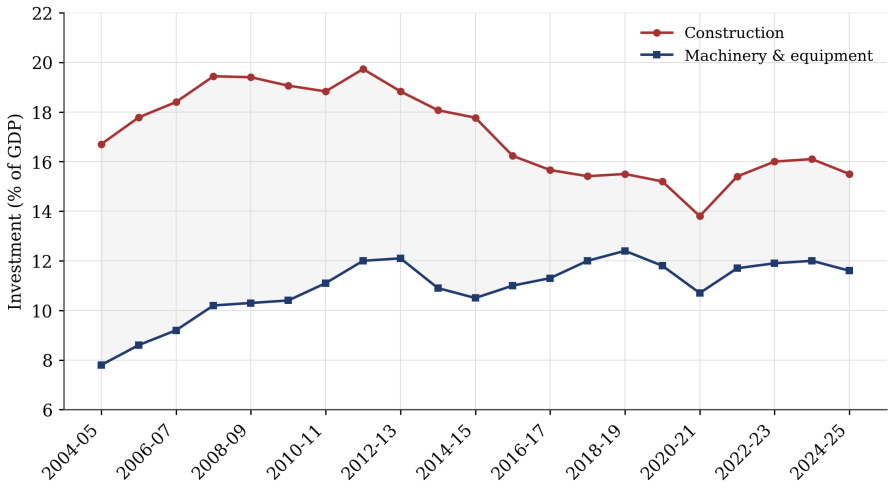

Figure 14: Investment by asset type (% of GDP): construction vs machinery and equipment

By asset type, the boom was overwhelmingly a construction boom. Figure 14 shows that construction averaged 18.7% of GDP across the boom phase and peaked at 19.7% in FY 2011–12. Machinery and equipment investment the productive, tradable-sector capacity that builds export competitiveness averaged just 9.9% and only reached 12% at the peak. Roughly two-thirds of fixed investment went into things that cannot be exported: residential buildings, commercial real estate, roads, and dwellings. The over-investment was real, but its productive content was narrow. India invested at rates that would have made sense for an East-Asian-style export-led growth model, but channelled most of it into non-tradable sectors that do not generate the foreign exchange needed to service the debt that financed them. That mismatch is the seed of the slowdown.

GCF/GDP fell from 38.7% in FY 2012–13 to 30.7% by FY 2017–18, a contraction of 8 percentage points. Property price growth collapsed from 24% in FY 2011–12 to 6% by FY 2017–18. Household construction investment fell by roughly 5 percentage points of GDP. As Figure 13 shows, this is the single largest contributor to the aggregate slowdown was larger than the corporate retreat and also larger than the credit-channel collapse.

Second, the twin balance-sheet problem. The Reserve Bank's 2014–15 Asset Quality Review forced banks to recognise stressed assets that had accumulated through the boom. Gross NPAs rose from 1.3% of advances in FY 2011–12 to **6.8% by FY 2018–19** which was a five-fold increase. Bank credit growth halved, from 23% in the boom to 11% in the slowdown (Figure 15). When the financing channel that drove the boom shut down and corporates were simultaneously trying to deleverage, investment had to fall.

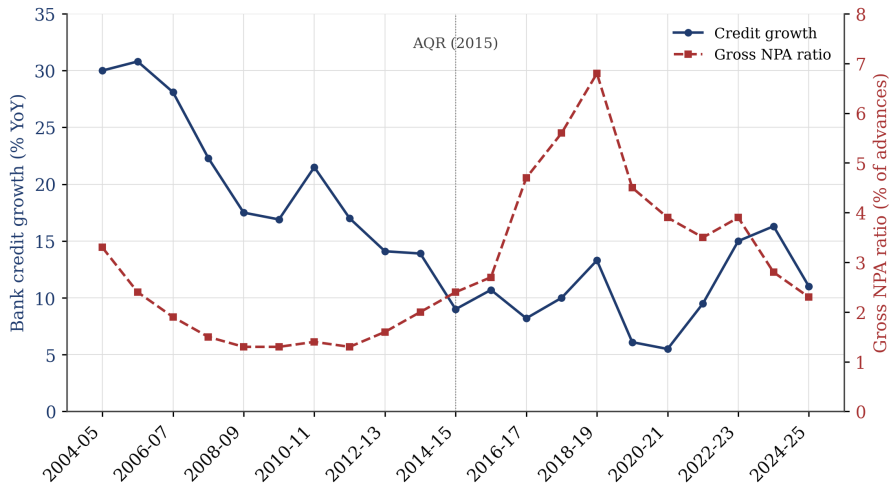

Figure 15: Bank credit growth (% YoY) and gross NPA ratio (% of advances)

Through 2013–2016 the RBI maintained nominal lending rates around 10% even as inflation fell from 10% to 5%. The user cost of capital was rising at exactly the moment corporates needed to roll over boom-era debt at lower rates.

Fourth, confidence and uncertainty. The Business Confidence Index fell from a boom average of 117 to 111, and the dispersion of firm expectations rose from 0.60 to 0.69. Demonetisation in 2016, the GST rollout in 2017, and the IL&FS NBFC crisis in 2018 each delivered fresh shocks to expectations. With Indian firms heterogeneous

in their ability to absorb policy uncertainty, the marginal investment decision shifted from "go" to "wait" across large parts of the corporate sector. What is striking is how *little* the public sector compensated. Public-sector investment was 7.5% of GDP in the boom and 7.5% in the slowdown; essentially unchanged.

The *composition* has shifted in important ways. Public-sector investment has risen from 7.5% to 7.7–8.0% of GDP a small but meaningful capex push, with the central government's capital expenditure rising from roughly 1.6% of GDP in FY 2019–20 to over 3% by FY 2023–24. Private corporate investment has recovered to 12% of GDP, broadly matching boom-phase levels. Household investment, however, remains depressed averaging 11.5% in the recovery against 15.7% at the peak. The household sector has not returned to its pre-2012 risk appetite for real estate, which is why aggregate construction is at 15.5% of GDP in the recovery against 18.7% in the boom.

The trajectory matters more than any single average. In the boom, the household sector drove a construction-led investment surge financed by rapid bank credit growth at falling real rates. In the slowdown, the household sector retreated from real estate, the twin balance-sheet problem shut down the credit channel, and investment converged downward to the norm. In the recovery, the public sector has stepped up modestly while household investment remains structurally lower than its pre-2012 levels a composition shift that has left aggregate investment close to the S&I norm but with the productive content (machinery and equipment) higher than the construction-heavy boom-era mix.

7.7 FINAL INDIA-SPECIFIC REGRESSION RESULTS

Similar to how a distinct savings regression was run for a country-specific model, we perform a similar exercise for investments. Few coefficients to take note are- (a) Trade Openness whose sign flips from the cross country model indicating that increasing trade integration genuinely catalyses capital formation. (b) Output gap- the negative coefficient reflects excess demand's affect on inventory drawdown. The negative

Table 9: India: Determinants of GCF/GDP (Country-Specific Estimation)

	Dependent Variable: GCF/GDP	
	Coefficient	Std. Error
Macroeconomic		
GDP Growth	1.252***	(0.285)
Output Gap	-1.053***	(0.262)
Inflation	-0.336*	(0.153)
Financial		
Credit/GDP	0.184**	(0.056)
External		
Trade Openness	0.364***	(0.063)
Policy		
Fiscal Balance	-0.607*	(0.222)
Constant		
Constant	-1.291	(4.193)
Observations	23	
$F(6, 16)$	34.28	
R^2	0.928	
Adjusted R^2	0.901	
Root MSE	1.028	
Engle-Granger $Z(t)$	-4.44	

Notes: OLS estimation, India 2002–2024. Output gap requires a 5-year backward window, restricting the sample. $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$. The Engle-Granger cointegration test rejects the unit-root null (5% critical value: -3.37), confirming a stable long-run relationship.

coefficient on fiscal balance (-0.61, $p = 0.015$) requires explanation. A worse fiscal balance (more deficit) is associated with *higher* private investment, not lower. This is the canonical crowding-in finding from the India public-investment literature: Bahal, Raissi, and Tulin (2015, IMF WP 15/264) document that public investment in India "crowds in" private investment in the post-1980 period, and Raj, Sahoo, and Shankar (2018, RBI WP 05/2018) confirm this for the long run, finding that "the gross fiscal deficit" has crowding-in effects through public capital expenditure on infrastructure that catalyses private capacity expansion. Our coefficient of -0.61 implies that every 1 percentage point worsening in the fiscal balance reflecting larger public capex programmes is associated with 0.61pp higher GCF. The mechanism is direct: deficit-financed government infrastructure investment reduces the bottleneck on private cap-

ital formation, and the National Infrastructure Pipeline operationalises precisely this channel.

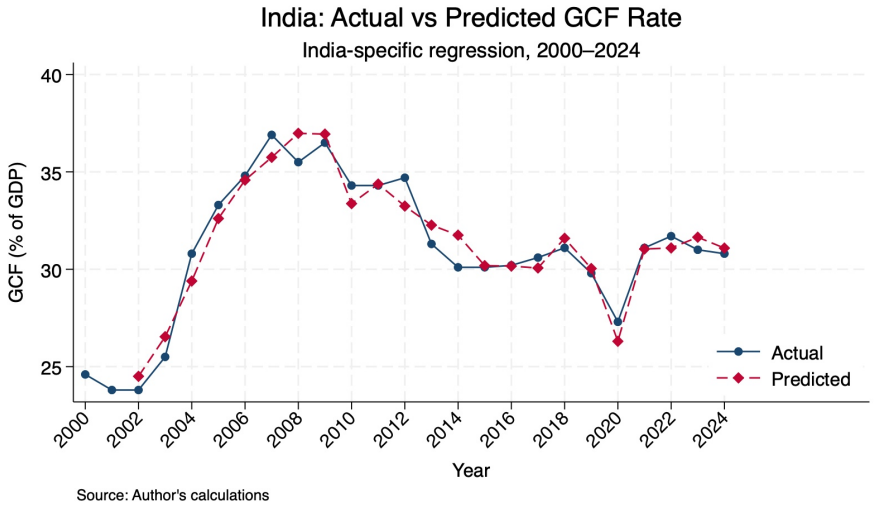

Figure 16: Enter Caption

7.8 MACROECONOMIC PROJECTIONS

We project the right-hand-side variables over FY2025/26 to FY2029/30. Several values are inherited from the savings chapter (Table 5 there); we re-state them in Table 10 alongside the additional variables specific to the investment regression.

Table 10: India: Macroeconomic Projections, FY2025/26 – FY2029/30 (Investment-Specific Variables)

Variable	Unit	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30
Real GDP growth	%	6.8	7.0	6.5	6.5	6.5
Output gap	pp	1.0	0.8	0.8	0.5	0.3
Inflation	%	2.8	4.0	4.5	4.5	4.5
Credit/GDP	%	56.5	57.0	57.5	57.5	58.0
Trade openness	% GDP	38.5	38.5	38.5	39.0	40.0
Real interest rate	%	5.7	4.5	4.0	4.0	4.0
Terms of trade	2015=100	85.6	85.6	86.0	86.4	86.9
Fiscal balance	% GDP	−4.5	−4.5	−4.2	−4.0	−4.0

Sources: IMF World Economic Outlook (October 2025); IMF Article IV Consultation (November 2025); Reserve Bank of India; Economic Survey 2025–26; ICRA Research (December 2025). Output gap is computed as the deviation of projected GDP growth from the 5-year trailing moving average. Real interest rate is weighted average lending rate (WALR) less CPI inflation.

7.9 PROJECTION RESULTS

Applying the pooled coefficients and the India-only coefficients to these projected values yields the normative investment paths shown in Table 11.

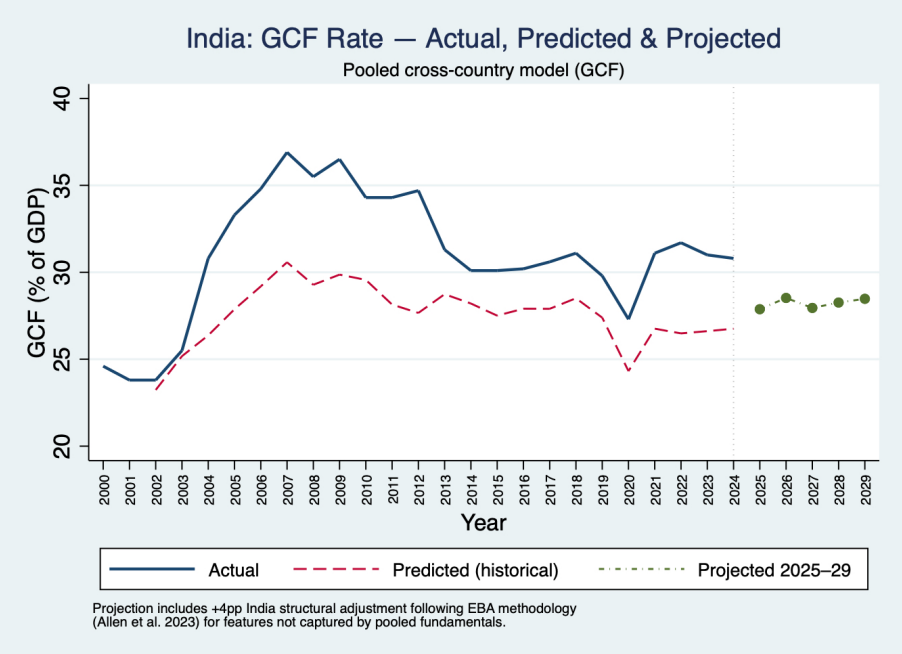

Figure 17: Cross Country Projections

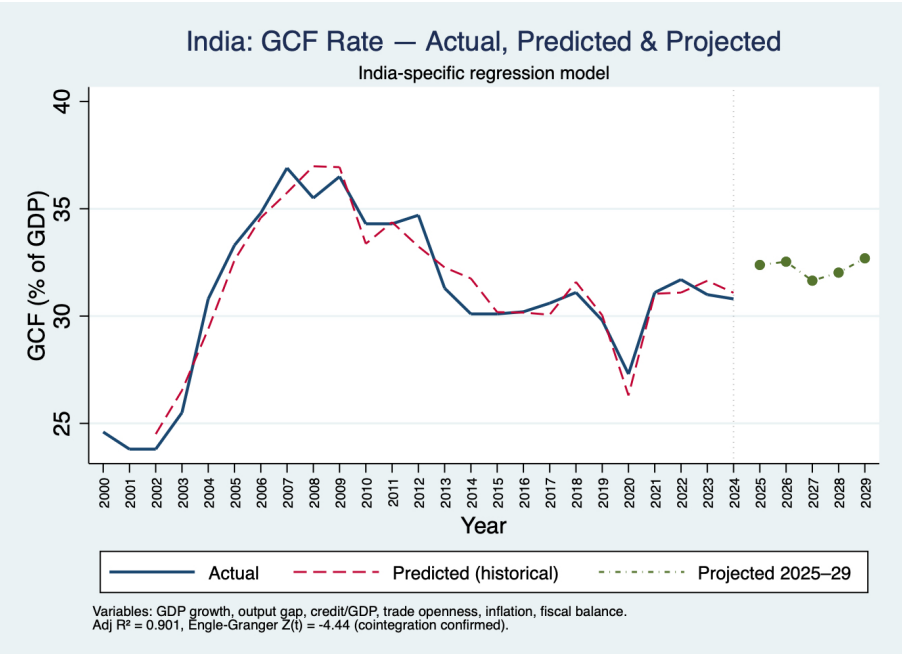

Figure 18: Country Specific Projections

Table 11: India: Normative GCF/GDP Projections

	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	Average
Pooled	27.88	28.53	27.95	28.26	28.48	28.22
India-only	32.38	32.53	31.65	32.03	32.69	32.26

7.10 COMPUTING THE CURRENT ACCOUNT NORM

We can now combine the savings and investment projections to compute India's normative current account.

Table 12: India: Normative Current Account, FY2025/26 – FY2029/30 (% of GDP)

	FY25/26	FY26/27	FY27/28	FY28/29	FY29/30	Average
Pooled cross-country approach						
S^*	28.89	28.97	28.27	27.84	27.55	28.30
I^*	27.88	28.53	27.95	28.26	28.48	28.22
CA*	1.02	0.44	0.32	0.32	−0.42	0.08
India-only country-specific approach						
S^*	28.55	27.85	28.76	29.91	29.31	28.88
I^*	32.38	32.53	31.65	32.03	32.69	32.26
CA*	−3.83	−4.68	−2.89	−2.12	−3.38	−3.38

7.11 MACROECONOMIC INTERPRETATION: INDIA'S UNDER-BORROWING IN A TARIFF-DISRUPTED WORLD

The two approaches yield different results. With the pooled model, India's current account actually lies is a marginal surplus. In the country-specific model, it's a significant deficit of -3.4%. Which isn't surprising mainly because:

1. India was an over-saver compared to what its macroeconomic fundamentals would suggest. However, the gap between actual savings and predicted has narrowed. India is no longer an over saver
2. India has consistently over invested which resulted in our historical deep CAD. This gap continues to remain unlike the savings one.

First, India is structurally under-borrowing. Both frameworks indicate that India *should* be running a wider CAD than it actually is. This reframes the conventional "India runs a chronic deficit" narrative: structurally, given India's growth trajectory,

infrastructure deficit, and ongoing capex push, India should be borrowing approximately 3–4% of GDP from the rest of the world, but is instead absorbing only 1–1.5%. The wedge which is approximately 2–3pp of GDP must be reconciled on the financing side of the balance of payments.

Second, the wedge is being absorbed primarily by foreign exchange reserve accumulation and rupee defence. Recent RBI data illustrate the mechanism. India's foreign exchange reserves peaked at a record $728 billion in late February 2026 before falling to approximately $717 billion by early March, with the RBI estimated to have sold approximately $6.1 billion in dollar reserves to defend the rupee against external pressures. On a balance-of-payments basis, reserves declined by $30.8 billion between April and December 2025, indicating that actual capital inflows fell short of what was required to cover the basic external financing need. Yet the headline CAD remains narrow because services exports ($50.9 billion surplus in Q2 FY26, up from $44.5 billion a year earlier) and remittances (a record $141.3 billion in net invisibles for H1 FY26) more than offset the merchandise deficit. The structural under-borrowing manifests not as a wider headline deficit but as foregone reserve accumulation and rupee weakness, which would have been larger absent the services and remittance surpluses.

Third, the merchandise-trade deterioration intensifies the structural picture. US tariffs of 50% on Indian exports have driven a sharp 11.8% YoY decline in October 2025 merchandise exports to an 11-month low of $34.4 billion. Average monthly exports to the US have collapsed from $8.4 billion (January–August 2025) to $5.9 billion (September–October 2025). The October 2025 merchandise trade deficit reached an all-time high of $41.7 billion. Were it not for the offsetting strength in services exports (computer and business services contributing the bulk) and stable remittances, the actual CAD would already be approaching 2–2.5% of GDP. The IMF Article IV's projected actual CAD of 1.1–1.2% incorporates these tariff effects in the baseline; our normative CAD of 3.4–3.9% does not depend on them and represents the structural reality irrespective of the tariff environment.

The investment-income channel adds nuance. Primary income outflows (largely

investment-income payments to foreign investors) expanded to $12.2 billion in Q2 FY26 from $9.2 billion a year earlier. This is the legacy of decades of net foreign investment in India: as the foreign capital stock matures, it generates rising profit repatriation. In the S–I framework, this manifests as a widening primary-income deficit that—holding everything else constant—tightens the headline CAD even as the underlying trade gap may be improving. Going forward, this is a structural drag on the headline CAD, requiring either a larger trade surplus, higher remittances, or wider net foreign borrowing to maintain external balance.

The capital-flow composition has become more reassuring. Net FDI more than doubled to $7.7 billion in H1 FY26, a meaningful improvement that reflects renewed investor confidence in India's growth trajectory. However, foreign portfolio investment reversed sharply: net outflows of $4.1 billion in H1 FY26 against $20.8 billion in net inflows a year earlier, driven by US dollar strength, elevated US Treasury yields, and uncertainty around the H-1B visa policy and US HIRE Act. The composition shift—from portfolio to FDI—is qualitatively favourable for external sustainability, even if the absolute volumes are smaller. From a savings-investment perspective, this suggests that the structural under-borrowing is partly a deliberate policy choice: the RBI's reserve buildup over 2023–2024 created precisely the buffer that is now being deployed against tariff-induced volatility, and the macroprudential tilt toward FDI-financed inflows reduces the system's vulnerability to the kind of sudden-stop dynamics that drove India's 2013 "taper tantrum" crisis.

Forward-looking implications. As India's demographic transition progresses, the dependency ratio is projected to bottom around 2030–2032 before rising. If S^* faces downward pressure from this demographic shift while I^* remains elevated due to ongoing structural transformation, the normative CAD will widen further. This is the medium-term external-sector challenge: India's transition from a young, high-saving economy to an aging, lower-saving one will, mechanically, raise the equilibrium current account deficit unless either investment moderates or productivity gains accelerate. The 3–4% normative CAD we estimate today is plausibly the lower bound

of what India should expect over the next decade. From a policy perspective, this argues for a deliberate strategy of building reserve buffers and FDI relationships now, while the actual CAD remains comfortable, to create the financing space for the wider deficits that fundamentals will eventually warrant.

8. IMPLICATIONS FOR THE RUPEE

The savings-investment framework developed in the preceding chapters delivers a normative current account deficit of approximately 3.4–3.9% of GDP, against an actual CAD of roughly 1.1–1.2%. The wedge of 2–3 percentage points has implications that extend beyond the external accounts; We use the normative CA result to interpret recent rupee dynamics, examine what the NEER and REER reveal about real currency competitiveness, and arrive at a subjective assessment of rupee valuation.

What is telling about the 2025–26 episode is that it has unfolded against a comparatively narrow headline CAD. The 2013 crisis carried with it a 4.8% CAD that demanded a sharp adjustment. The 2026 depreciation has come with the CAD at approximately 1.2% that is well within the comfort zone the IMF and the RBI have historically flagged. The disconnect is precisely what the savings-investment framework helps resolve: India's actual CAD is narrow because services exports and remittances have plugged the merchandise gap, not because the underlying structural demand for foreign capital is small.

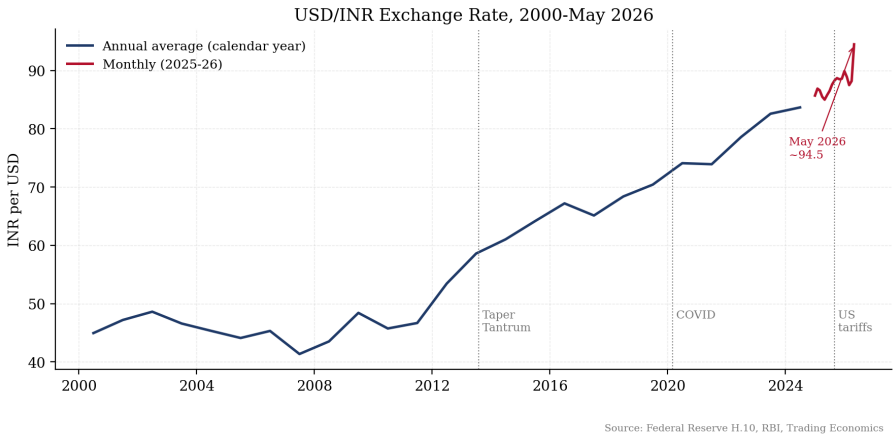

Figure 19: USD/INR

8.1 NEER AND REER

The nominal exchange rate against the dollar is, on its own, a misleading guide to currency valuation for a country that trades with a basket of partners and runs persistent inflation differentials. The Reserve Bank of India publishes two indices that correct for these. The Nominal Effective Exchange Rate (NEER) is the trade-weighted geometric average of bilateral nominal exchange rates against 40 partner currencies. The Real Effective Exchange Rate (REER) deflates the NEER by the ratio of domestic to foreign price levels. By construction, an REER reading of 100 (the base year, 2015–16 for the RBI 40-currency series) corresponds to a currency that has neither gained nor lost real competitiveness against its trading partners since the base year. Readings above 100 signal real overvaluation; readings below 100 signal real undervaluation.

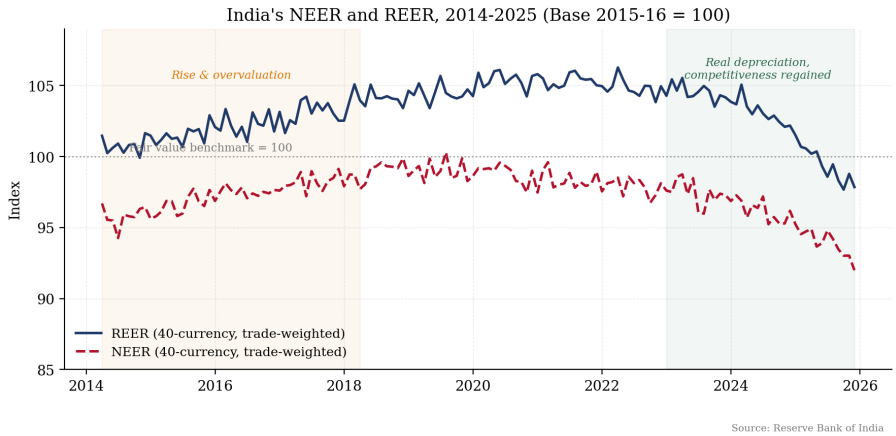

Figure 20: NEER and REER

The most consequential phase has been 2023–2025. Both indices have fallen steadily, with the NEER declining to 91.99 and the REER to 97.85 by late 2025. The rupee is, for the first time in over a decade, broadly aligned with or mildly undervalued relative to its 2015–16 base in real effective terms. From the perspective of competitiveness alone, this is the most favourable position the rupee has occupied since 2014.

The two readings appear, at first glance, to point in opposite directions. The REER says the rupee is mildly undervalued. The S–I framework says the actual CAD (1.2%) is substantially smaller than the predicted CAD (3.4–3.9%), implying that India is under-

borrowing which on a standard EBA reading would be associated with an undervalued currency, since an undervalued currency tends to produce a larger trade surplus or a smaller deficit than fundamentals warrant. So both readings are pointing the same way once interpreted carefully: the rupee is currently weaker than what India's structural demand for foreign capital alone would imply.

The interesting question is why the rupee is undervalued in REER terms when the actual CAD is so narrow. The standard EBA mechanism is that an undervalued exchange rate produces a smaller deficit and would lead one to expect a CAD of perhaps 0.5% rather than 1.2%, given how much the REER has fallen. The S–I decomposition gives a sharper reading: the headline CAD is narrow because of services exports and remittances, but the trade gap (which is what the REER directly affects through Marshall-Lerner-type adjustment) is in fact widening. India's October 2025 merchandise trade deficit of $41.7 billion was an all-time high. The exchange rate has weakened in response to this widening goods gap; what holds the headline CAD narrow is the offsetting services and remittance surpluses, which are largely insensitive to the REER on the relevant horizon (Sourahbji 2018 finds Indian export elasticity to REER is significant only in the short run; import elasticity dominates in the long run). If India is structurally under-borrowing by 2–3pp of GDP, the wedge has to show up somewhere on the balance of payments. The savings-investment framework is silent on which financing item absorbs it; the data shows the answer is foreign exchange reserves and reserve management.

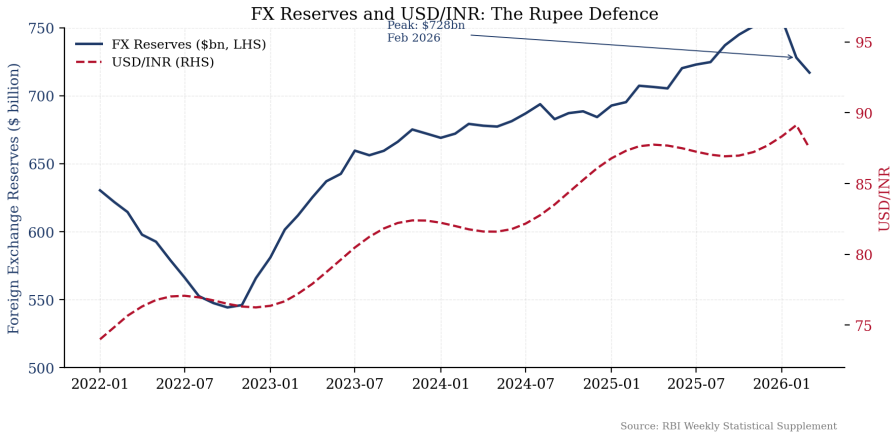

Figure 21: Forex reserved

On a real effective basis, the rupee is broadly fairly valued, with a mild undervaluation tilt. The REER at 97.85 sits a little over 2 points below the 2015–16 fair-value benchmark; the NEER at 91.99 reflects a much larger nominal correction that has been substantially neutralised in real terms by the recent narrowing of the inflation differential. There is no overvaluation problem of the kind that characterised 2014–18. Relative to fundamentals, the rupee is somewhat weaker than the structural CA norm alone would imply. India's normative CAD of 3.4–3.9% would, if it were being fully financed by capital inflows on the scale fundamentals warrant, support a slightly stronger rupee than current levels. The undervaluation is not a sign of misalignment in the standard sense; it reflects the under-financing of the structural deficit, with reserve management and the services-remittance cushion taking up the slack. The currency is, however, more vulnerable than the headline numbers suggest. The narrow actual CAD of 1.2% is a thin cushion against external shocks. It depends on services exports running at $50 billion per quarter and remittances at 140 billion annualised — both of which are sensitive to global growth, US tech-sector hiring, and Gulf labour-market conditions in ways that are hard to forecast. The IMF Article IV (November 2025) projects the actual CAD widening modestly over FY27, and the structural norm we estimate widens further as the demographic transition raises the equilibrium deficit over the medium term. Forward-looking, the policy challenge is to migrate from reserve-financed external balance to FDI-financed external balance. The composition shift already underway — net FDI doubling to $7.7 billion in H1 FY26

against portfolio outflows of $4.1 billion — is qualitatively favourable, since FDI is structurally more stable than portfolio capital. But the absolute volumes remain too small to cover even the actual CAD, let alone the structural one. Building the institutional infrastructure that makes India a destination for long-term productive capital — clearer tax certainty, deeper bond markets, predictable regulation — is what would allow the structural under-borrowing to close on the right side: more borrowing because more investment is being financed by the rest of the world, rather than less depreciation because reserves are being run down.

8.2 CONCLUSION

The investment side of the savings-investment decomposition tells a substantively different story from the savings side, both in its theoretical foundations (accelerator and credit-constraint models rather than the life-cycle hypothesis) and in its empirical implications. Combined with our savings estimates, the framework yields a normative current account deficit of 3.4–3.9% of GDP, against an actual CAD of approximately 1.1–1.2%. The wedge implies that India's external sector is more conservative than its fundamentals warrant, with the gap absorbed by reserve accumulation and the strength of services-export and remittance flows. In a world of US tariffs and global trade fragmentation, this structural under-borrowing has provided India with an external buffer; it also represents foregone investment capacity that, in a less hostile global environment, would have been financed by foreign savings. The forward-looking implication—that the demographic transition will widen the structural CAD norm over the coming decade—suggests this buffer should be deployed deliberately rather than maintained reflexively, with policy emphasis on FDI relationships and the institutional infrastructure that supports stable long-term capital inflows.

9. STATISTICAL APPENDIX

9.1 HOW WE NARROW DOWN THE SAVINGS REGRESSION FOR THE INDIA MODEL

Table 13: Correlation Matrix

	savings	lngdppc	$lngdppc^2$	growth	dep_ratio	fiscal	inflation	urban	credit
savings	1.000								
lngdppc	-0.041	1.000							
$lngdppc^2$	-0.062	0.999	1.000						
growth	0.341	0.050	0.049	1.000					
dep_ratio	0.041	-0.990	-0.987	-0.005	1.000				
fiscal	0.488	0.243	0.233	0.517	-0.228	1.000			
inflation	0.627	0.081	0.067	0.002	-0.080	-0.002	1.000		
urban	-0.086	0.995	0.994	0.001	-0.998	0.203	0.055	1.000	
credit	0.400	0.853	0.840	-0.008	-0.867	0.353	0.456	0.844	1.000

Notes: Entries report pairwise correlation coefficients.

Here, dependency ratio, income and urbanization are all highly correlated, and hence we decided to drop urbanization in the India-specific model. We could also drop the dependency ratio, but it's more consistent with theory. To validate that it has worked, we check the VIF factor before and after removing urbanization. We also run time series plots for savings against each independent variable as a visual sense check.

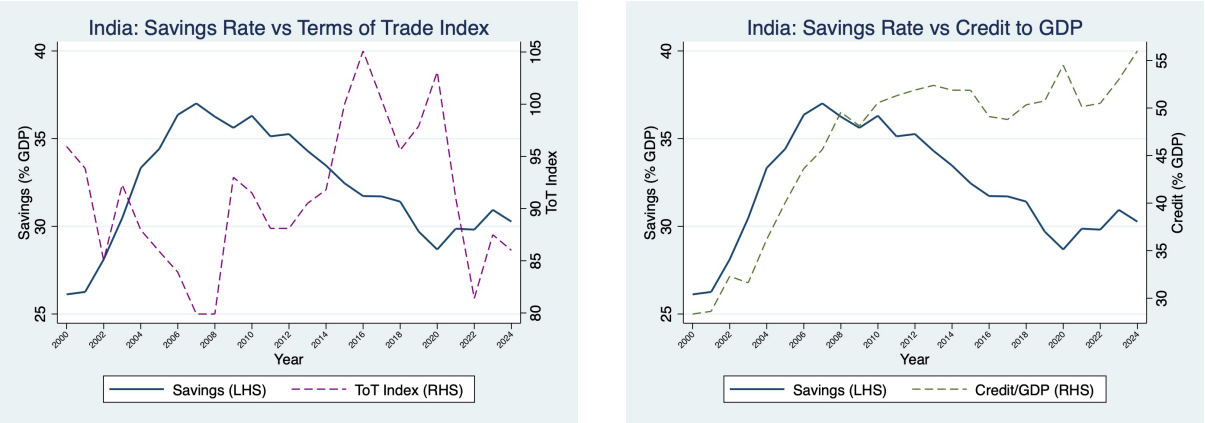

Figure 22: Savings plotted against Terms of Trade and Credit

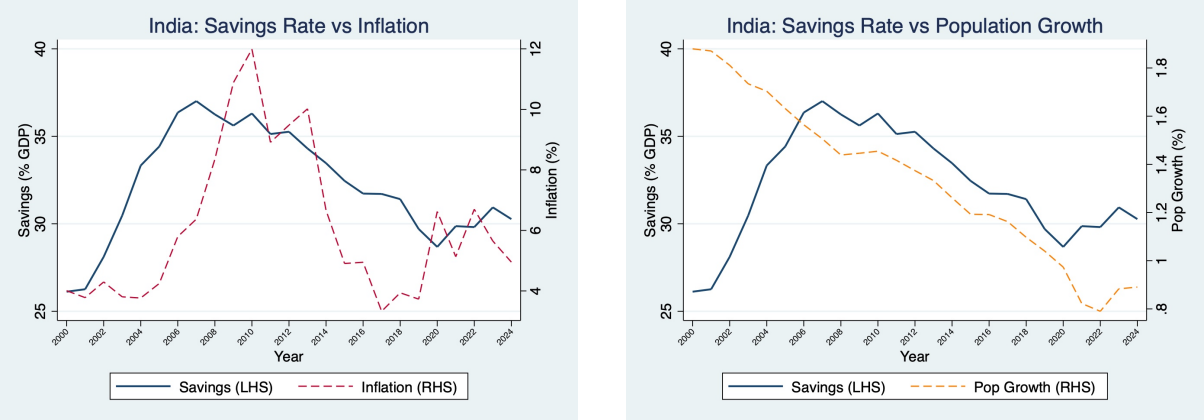

Figure 23: Savings plotted against Inflation and Population Growth

There are some characteristics here that are important in terms of choosing our independent variables. All variables are non-stationary, so we also do need to check for cointegration. We can drop population growth and credit-to-GDP because their trajectories seem independent of savings.

Looking at time-series plots as well as pairwise correlations, we build the baseline model also backed by literature- the independent variables are log of GDP per capita and it's square, GDP growth and fiscal balance. To that we add inflation and the terms of trade index. We settle at the model with the baseline plus inflation, removing terms of trade, credit-to-GDP, urbanisation and population growth. All excluded variables are either insignificant when added to the baseline and inflation model or provide a worse model when tested with the engle-granger cointegration test.

9.2 CHOOSING REGRESSORS FOR INDIA-SPECIFIC INVESTMENTS

9.3 INDIA-SPECIFIC VARIABLE SELECTION: A DIAGNOSTIC APPROACH

The cross-country pooled regression is identified primarily by between-country variation, but our objective is to project India's normative GCF. The within-India relationship between investment and its determinants may differ structurally from the cross-country average—as discussed above, India is a persistent over-investor, and the channels driving this over-investment are themselves country-specific. We therefore estimate a separate India-only specification, with variables selected through a trans-

parent diagnostic procedure rather than imposed from the cross-country specification.

Step 1: Pairwise Correlations.

Table 14: Within-India Correlations with GCF/GDP

Variable	r	Variable	r
Trade openness	$+0.94$	Output gap	$+0.06$
Inflation	$+0.59$	Population growth	-0.23
Credit/GDP	$+0.59$	Dependency ratio	-0.24
Terms of trade	-0.56	Urbanisation	$+0.15$
Real interest rate	-0.48	FDI/GDP	$+0.21$
Fiscal balance	$+0.41$	GDP growth	$+0.40$

Trade openness dominates with $r = +0.94$, mirroring GCF's hump-shaped trajectory: both rose sharply from 2000 to 2008 as India liberalised trade and saw an investment boom, and both fell after the global financial crisis. Inflation, credit/GDP, and terms of trade show moderate correlations. Demographic variables and FDI carry essentially no within-India information, consistent with the theoretical case for excluding them. The output gap appears uncorrelated bivariately, but this is misleading—it captures cyclical demand shocks whose effect on GCF is masked by the broader trend; its multivariate role becomes clear once trend variables are controlled for.

Step 2: Bivariate Regressions.

Table 15: Bivariate Regressions of GCF/GDP on Each Candidate

Variable	Coefficient	p-value	Bivariate R^2	Significance
Trade openness	$+0.495$	< 0.001	0.827	***
Inflation	$+0.701$	0.006	0.307	**
Terms of trade	-0.266	0.018	0.238	*
Credit/GDP	$+0.177$	0.076	0.143	†
Real interest rate	-0.630	0.075	0.144	†
GDP growth	$+0.356$	0.095	0.127	†
Fiscal balance	$+0.333$	0.380	0.037	NS
Dependency ratio	$+0.038$	0.787	0.004	NS
FDI/GDP	$+0.159$	0.927	0.000	NS

This pattern allows us to discard FDI, dependency ratio, urbanisation, and population growth on empirical grounds. Notably, the fiscal balance is insignificant in bivariate isolation, but emerges as significant in the multivariate specification—a pat-

tern characteristic of variables whose effect operates through interaction with other macro conditions.

Step 3: ADF Unit Root Tests. Most candidate regressors and the dependent variable itself fail to reject the unit-root null at conventional significance levels: GCF, inflation, trade openness, credit/GDP, real interest rate, fiscal balance, and dependency ratio are all non-stationary in levels (ADF $p > 0.05$). This motivates the Engle-Granger cointegration test on regression residuals as the standard approach: a stationary residual confirms a stable long-run relationship rather than a spurious correlation among trending series.

Step 4: Exhaustive Specification Search. We test all combinations of 3 to 6 variables drawn from the theoretically-motivated candidate set, and filter on three criteria: (i) all included variables significant at $p < 0.10$; (ii) Engle-Granger residual-based cointegration confirmed (ADF $Z(t) < -3.37$ at the 5% critical value); (iii) adjusted R^2 within the standard range for India-specific time-series specifications. Multiple specifications were considered:

Table 16: Comparison of India-Only Specifications

Specification	Adj. R^2	EG $Z(t)$	Cointegration
With RIR	0.880	-3.07	Borderline
With Dep. ratio	0.859	-2.78	Fails
Five-variable (no extras)	0.863	-2.93	Fails
With Fiscal balance (winner)	**0.901**	-4.44	**Confirmed**

The clear winner is the fiscal-balance specification:

$$\left(\frac{\text{GCF}}{\text{GDP}}\right)_t = \alpha + \beta_1\,\text{GDP\_growth}_t + \beta_2\,\text{output\_gap}_t + \beta_3\,\text{Credit\_GDP}_t + \beta_4\,\text{Trade\_open}_t + \beta_5\,\text{Inflation}_t + \beta_6\,\text{Fiscal\_bal}_t + \varepsilon_t \tag{9}$$

with adjusted $R^2 = 0.901$, Engle-Granger Z(t) of -4.44 (well below the 5% critical value of -3.37), and all six variables significant. The combination is intuitive: it pairs the accelerator (GDP growth) with the inventory channel (output gap), the financial constraint (credit/GDP) and external integration (trade openness) with macroeco-

nomic uncertainty (inflation), and adds the public-investment channel (fiscal balance) that the India-specific literature consistently identifies as a binding determinant.

Step 5: VIF Multicollinearity Check. Variance inflation factors confirm the specification is well-conditioned: all VIFs are below 6, except for the mechanical correlation between GDP_growth and output_gap (the latter is a deviation from the trend of the former). This multicollinearity is theoretically intentional—we want to separate the trend-growth accelerator from the cyclical inventory-channel effect—and the resulting coefficients on both variables are precisely estimated.

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