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How Fiscal Policy Matters: An Empirical Analysis of the "Crowding-In" Effects of Public Infrastructure Investment in India

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ABSTRACT

Using high-frequency data, the paper analyzes the link between public infrastructure investment and private corporate investment in India for the decade ending 2023–24. We adopt the ARDL model to investigate the existence of cointegration and find strong evidence of the crowding-in of private corporate investment both in the long- and short-run analyses. Moreover, long-term real interest rates and foreign direct investment provide higher estimates of crowding-in vis-à-vis short-term real interest rates and foreign portfolio investment, which underscore greater emphasis on systemic and fundamental factors (as compared to transitory factors) and the effectiveness of monetary policy. The recent thrust on deregulation and sustained enhancement in capital expenditure augur well in providing the necessary ambience to boost private investment and economic growth in the medium term.

KEYWORDS: Public Infrastructure Investment, Private Corporate Investment, Crowding-in effects, fiscal policy

JEL CODES: E62, C32, H6

1. INTRODUCTION

The 2024–25 Economic Survey has highlighted the need for judicious fiscal management helping to rein in general government dis-savings since the COVID-19 pandemic. This has had a crucial role to play in sustaining the overall savings in the economy. In contrast, stable private corporate savings, coupled with rising government deficits could have implied a greater reliance on the external account. In the Indian context, a strong emphasis has been laid on prudent fiscal management accompanied by significant and sustained public investment to crowd-in private investments and boost economic growth, especially since the onset of the COVID-19 pandemic.

The high deficit and debt of the post-pandemic period have often been substantiated on the grounds that fiscal policy needs to be accommodative for the economic growth recovery process through strengthening public investment. Blanchard (2019) noted that in the period of a low-interest rate regime, high public debt can be substantiated if it is used for reducing the output gaps and strengthening the public infrastructure investment. In India, it is pertinent to analyze the links between high public investment and private corporate investment, especially in the context of global headwinds to trade and output.

As far as the crowding-in of private investment is concerned, Abiad, Furceri, and Topalova (2015) provided evidence of the macroeconomic effects of public investment in the case of advanced economies, analyzing a sample of 17 OECD countries. They found that increased public investment raises output (both in the short and the long terms), crowds-in private investment, reduces unemployment, and could even result in a decline of the public debt-to-GDP ratio. Accordingly, they make a case for increasing public infrastructure investment for economies with clearly identified infrastructure needs, efficient public investment processes and economic slack and monetary accommodation. Auerbach and Gorodnichenko (2012) find fiscal policy to be considerably more effective during recessions than expansions, owing to large differences in the size of spending multipliers in recessions and expansions. While they also estimate the behavior of multipliers for disaggregated spending variables relative to aggregate fiscal policy shocks, they also show that controlling for predictable components of fiscal shocks tends to increase the size of the multipliers in recessions. In another paper, Auerbach et al.

(2011) show that GDP multipliers of government purchases are larger in recession, and controlling for real-time predictions of government purchases tends to increase the estimated multipliers of government purchases in recession.

Matvejevs and Tkacevs (2023) use panel econometric methods to explore the relationship between public and private investment in a sample of 34 OECD member countries over the period 1995 to 2019 and demonstrate that, in the medium to long term, extra public investment crowds-in private investment as the latter adjusts to bring the stock of private capital closer to its long-term cointegrating relationship with public capital. The long-run public investment multiplier is around two, implying that each additional dollar of public investment eventually attracts approximately two dollars of private investment.

Hatano (2010) posits that, while crowding-out is a short-run flow effect resulting from restrictions on available resources, crowding-in is a long-run stock effect resulting from an increase in the productivity of the private capital. Since public capital is accumulated in tandem with the accumulation of private capital, the crowding-in effect suggests a long-run positive relationship between private and public investment.

In the context of India, Vinod, Karun, and Chakraborty (2020) reviewed the existing literature on crowding-out in India and tested the link between public and private corporate investment for the period 2019–20 using Maximum Entropy Ensembles and Bootstrap (Meboot) and find that public infrastructure investment is significant in determining private investment and that a low interest rate encourages private corporate investment. The Economic Survey 2021–22 inter alia mentions works of Kulkarni and Erickson (1995), who find no statistically significant evidence of crowding out in India; Bahal et al. (2015), who find no evidence of crowding out in India over the period 1980–2012; and Erden and Holcombe (2005), who underscore the importance of public investment as a stimulus to private investment in developing economies. They find that, in the long run, public investment is complementary to private investment and a one percent increase in public investment will result in an increase in private investment of about 0.54 percent.

The taxonomy of crowding-out, real and financial, has been treated in detail in the theoretical literature (Blinder and Solow 1973; Buiter 1990). The *real* (direct) crowding-out occurs when the increase in public investment displaces private capital formation broadly on a *dollar-for-dollar* basis, irrespective of the mode of financing the fiscal deficit. *Financial crowding-out* is the phenomenon of partial loss of private capital formation, due to the increase in the interest rates emanating from the pre-emption of real and financial resources by the government through bond financing of fiscal deficit. Chakraborty (2007), using an asymmetric VAR model found neither real crowding-out nor financial crowding-out of private investment, with public investment being more significant than other macro-variables, including the cost and quantity of credit and the output gap for the period 1970–71 to 2002–03. This paper empirically examines the direct crowding-in, in the context of India through the decade ending 2023–24.

The argument in favor of high capex is that an increase in public capital formation will stimulate aggregate demand and, in turn, increase private investment. Another link for the existence of this complementary relationship is that a higher stock of public capital, in a particular infrastructure, may increase the return of private investment projects. The latter set of studies on crowding-out argued that public investment might act as a substitute for private investment. This substitutability can arise when the private sector utilizes public capital for its required purposes rather than expanding private capacity. Such conclusions of crowding-out inferences are broadly confined to the analysis of real (direct) crowding out to the "aggregate" level of public investment, neglecting whether the infrastructure and non-infrastructure mix of public capital formation has differential impacts on private capital formation. Most of these studies also suffer from acute methodological deficiencies as they assume the respective time series as stationary and proceed with the analysis by applying ordinary least squares. In other words, earlier studies have failed to address that a time series may contain a unit root and be non-stationary at levels, which can lead to spurious regression results, which would yield inconsistent estimates. We intend to take this literature forward by re-examining the link against the backdrop of enhanced public infrastructure investment in India, using the general government data.

The paper has been organized into four sections. Apart from the Introduction, Section 2 provides the theoretical framework and Section 3 discusses the macro-fiscal linkages. The choice of

variables, econometric results and inferences therefrom are presented in Sections 4 and 5. Section 6 summarizes the major findings of the paper and draws conclusions.

2. THEORETICAL FRAMEWORK

Though the neoclassical-flexible accelerator model has been the most widely accepted general theory of investment behavior, the application of this model in the context of developing countries posed certain challenges due to the key assumptions of the model, such as perfect capital markets and little or no government investment. With the relatively significant role of government in capital formation in developing countries, the standard models of investment could not be directly adapted to developing countries. Furthermore, even if standard models could be directly adapted to developing countries, severe data constraints arise when attempts are made to implement them empirically. Given these constraints, the paper attempts to develop a model for private investment in the context of India, in line with the existing attempts at modelling private investment in the context of developing countries primarily using neo-classical-flexible accelerator models.

Theoretically, gross investment in the private sector is defined as equal to net investment in the private sector plus depreciation of the previous capital stock. While net investment in the private sector is defined as the difference between the desired stock of capital in period *t* and the actual stock in the previous period *t-1*.

$$I_{pvt} = \Delta KP_t + \delta KP_{t-1} \qquad (1)$$

where I_{pvt} = Gross Private Investment;
$\Delta KP_t = N_{pvt}$ = Net Private Investment; and
δ = rate of depreciation.

$$N_{pvt} = \Delta KP_t = \beta(KP_t^* - KP_{t-1}) \qquad (2)$$

where KP_t^* = desired stock of capital in private sector;

KP_{t-1} = actual stock of capital in private sector in the previous period; and

β = coefficient of adjustment, $0 \leq \beta \leq 1$.

Substituting equation (2) in (1), we get:

$$I_{pvt} = \beta(KP_t^* - KP_{t-1}) + \delta KP_{t-1} \quad (3)$$

In the standard lag-operator notation, equation (3) can be rewritten as:

$$I_{pvt} = [1-(1-\delta)L]KP_t \quad (4)$$

where L is the lag operator, $LKP_t=KP_{t-1}$.

Now, we specify a partial adjustment function for gross investment, as follows:

$$\Delta I_{pvt(t)} = \beta(I^*_{pvt(t)} - I_{pvt(t-1)}) \quad (5)$$

where $I^*_{pvt(t)}$ is the desired level of private investment. In the steady state, desired private investment is given by:

$$I^*_{pvt} = [1-(1-\delta)L]KP_t^* \quad (6)$$

Combining the equations (5) and (6), and solving for $I_{pvt(t)}$ yields the equation as follows:

$$I_{pvt(t)} = \beta[1-(1-\delta)L]KP_t^* + (1-\beta)I_{pvt(t-1)} \quad (7)$$

We know that, in the accelerator models, desired stock of capital can be assumed to be proportional to the output expectations in the economy.

$$KP_t^* = \alpha Y_t^* \qquad (8)$$

where Y_t^* is the expected output in the economy.

Substituting equation (8) in equation (7), we get:

$$I_{pvt(t)} = \beta\alpha[1-(1-\delta)L]Y_t^* + (1-\beta)I_{pvt(t-1)} \qquad (9)$$

The *beta coefficient* in the equation, which captures the response of private investment to the gap between desired and actual investment, which in turn is assumed to vary systematically with the economic factors that influence the ability of private investors to achieve the desired level of investment.

$$\beta = f\{C_{pvt}, i_r, I_{pub}\} \qquad (10)$$

A linear regression model for private investment can thus be constructed assuming equations (9) and (10) are linear.

$$I_{pvt} = a + b_1 I_{pvt(-1)} + b_2 I_{pub} + b_3 i_r + b_4 C_{pvt} + b_5 Y^* + \nu_t \qquad (11)$$

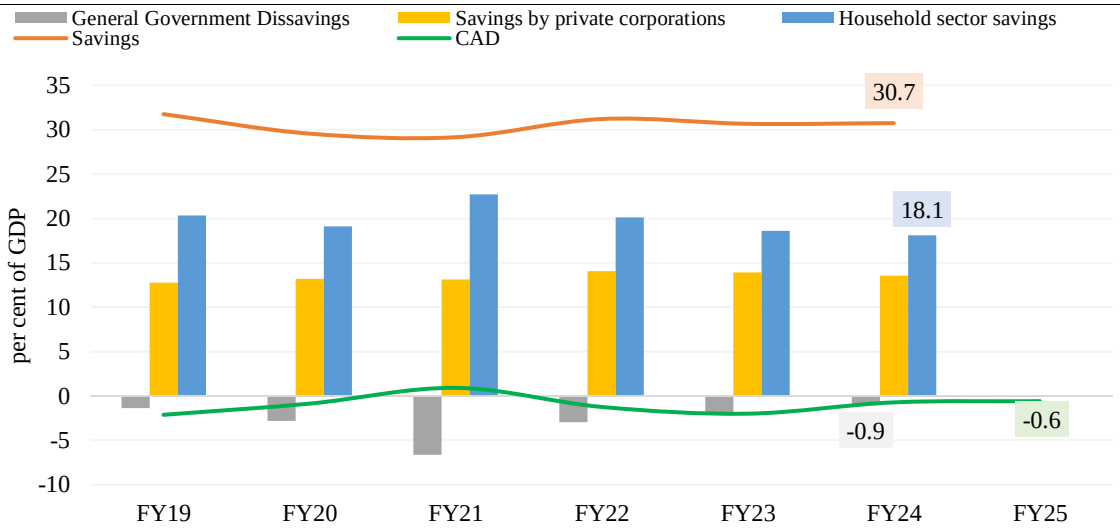
The paper examines the hypothesis that the response of private investment depends on[1] the cost of credit, the level of public sector infrastructure investment, real economic growth, and foreign investment flows.

[1] Data on capital formation in public and private sectors is drawn from the new series of National Account Statistics published by the Ministry of Statistics and Programme Implementation (MoSPI). Inflation data is also sourced from MoSPI. Data on other macroeconomic variables of the study, including the rate of interest, the availability of credit to private sector, foreign portfolio flows are drawn from various issues of Handbook of Statistics on Indian Economy, published by Reserve Bank of India. In the context of India, for the estimation of gross capital formation,

3. FISCAL-MACRO LINKAGE DYNAMICS

Prudent fiscal management—with a strong emphasis on boosting capital expenditure notwithstanding the negative shock of the COVID pandemic—has contributed to the resilience of overall investments in the Indian economy. In the wake of moderation in household sector savings, the containment of general government deficits has helped in stabilizing overall savings in the economy (Figure 1). Moreover, the low current account deficit has also minimized reliance on external funding of investments, thereby also mitigating risk therefrom.

Figure 1: Containment of General Government Deficits Has Contributed to Macro-Stability



Source: RBI, MoSPI

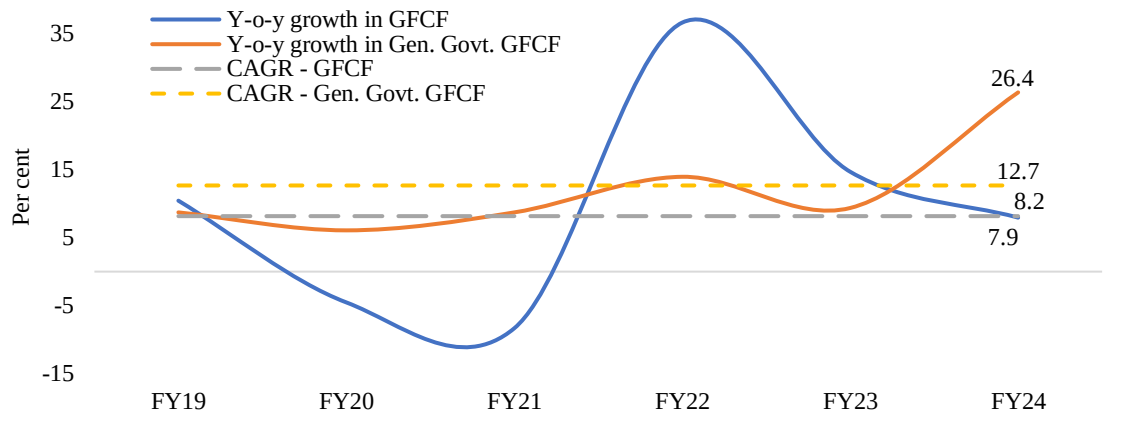
Further, general government gross fixed capital formation (GFCF) has been responsive to crowd-in private investment based on the prevailing economic conditions. While it has outpaced growth

the economy is divided into three broad institutional sectors, viz., public sector, private corporate sector and household sector.

As far as public investment and private corporate investment is concerned, data on gross fixed capital formation (GFCF) is available in the National Accounts Statistics' database on a quarterly and annual basis. Moreover, the annual series contains GFCF data at a dis-aggregated level for general government, household sector, public corporations and private corporations is also available. The inter-se annual share for private corporations and public sector (general government and public corporations) has been used to compute shares for quarterly time period within a given annual period.

(CAGR) in overall GFCF[2] in the six years ending FY24 by almost 3 percentage points, it substantially increased from 6.1 percent in FY20 of GDP to 8.7 percent in FY21 when overall GFCF growth deteriorated from (-)4.5 percent to (-)8.3 percent in the same period. This stimulus during the pandemic was a timely counter-cyclical intervention. General government GFCF growth is estimated more than three times that of overall GFCF growth in FY24, when the latter is estimated to moderate to 8.2 percent.

Figure 2: General Government GFCF Growth Has Outpaced Overall Investment Growth

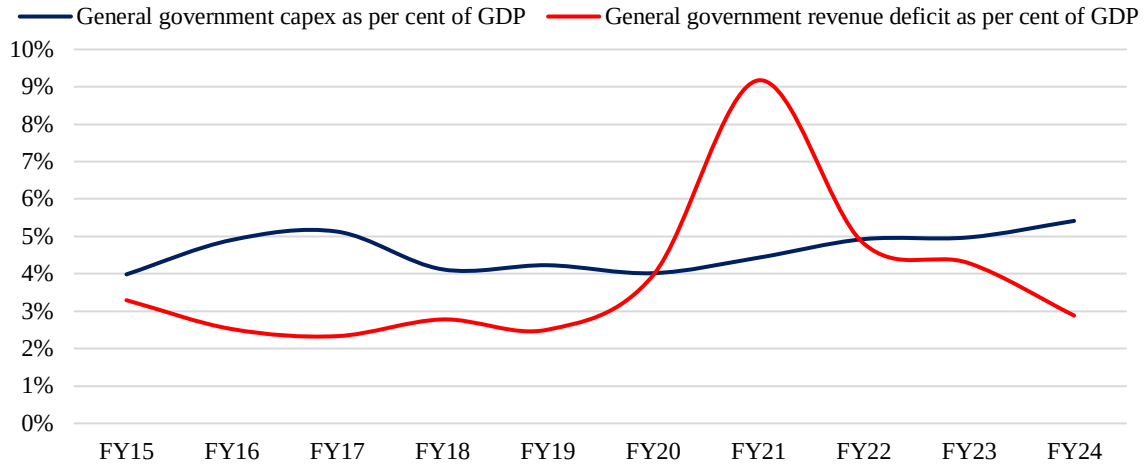


Source: MoSPI.

The general government's indicators of fiscal discipline have improved progressively (Figure 3). The combined capital expenditure of the centre and the states has shown an increase from about 4 percent of GDP in FY15 to 5.4 percent in FY24. Concomitantly, the combined revenue deficit has been contained at a comparable level vis-à-vis the beginning of the decade in consideration, notwithstanding the interim fiscal stimulus to mitigate the impact of the COVID pandemic. Thus, while allocation for capital expenditure has significantly risen, this has not been at the expense of rising deficits, emanating from prudent fiscal policy.

[2] Current prices at time of writing.

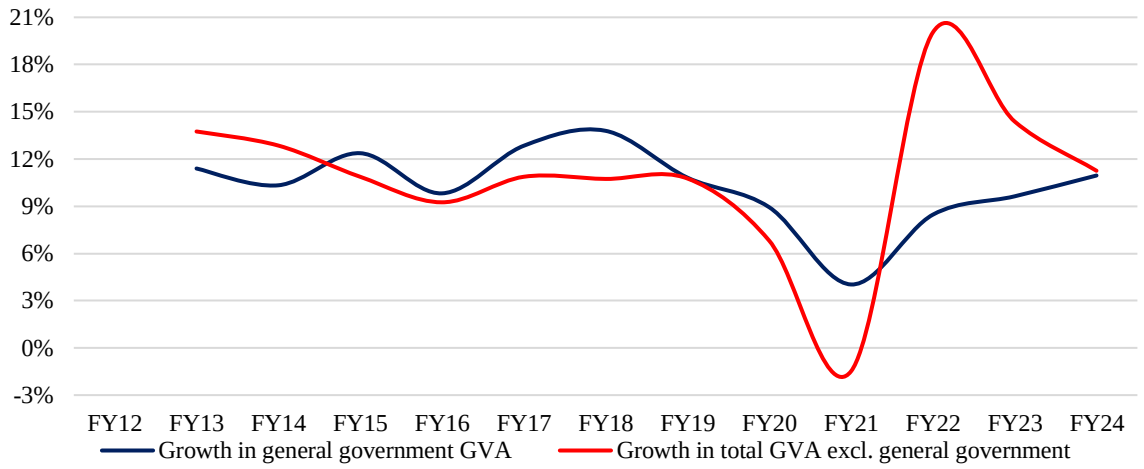
Figure 3: Capex *vs* Deficits of Centre and States (current prices)



Source: Union budget documents, Reserve Bank of India.

The trend in the contribution of general government consumption and investment to total GVA also reveals the counter-cyclical nature of fiscal policy. Figure 4 depicts year over year growth in general government GVA (gg_gva) and growth in total GVA excluding general government GVA (gva_less_gg). In the initial period shown in the chart, growth in gva_less_gg has surpassed that of gg_gva. From FY15 to FY20, gg_gva has shown relatively greater growth compared to relatively lesser growth in gva_less_gg. After the pandemic, the growth of gg_gva rose at a stable pace compared to the sharp increase in growth of gva_less_gg. These shifts reveal the counter-cyclicity of fiscal stance.

Figure 4: Total GVA Less General Government and Total General Government GVA



Source: National Accounts Statistics 2024, Ministry of Statistics and Programme Implementation

4. CHOICE OF VARIABLES

Now, we attempt to evaluate whether the trend in general government GFCF has led to the crowding-in of private corporate investment. Particularly, we emphasize the infrastructure component of the general government GFCF, i.e., the public infrastructure investment. The correlation with real interest rates (cost of credit), foreign direct investment (stable and long-term flows with controlling stake), and foreign portfolio investment (flows more responsive to dynamic market sentiments guided by profit-making opportunities) as well as real gross domestic product (aggregate demand in the economy) are also examined.

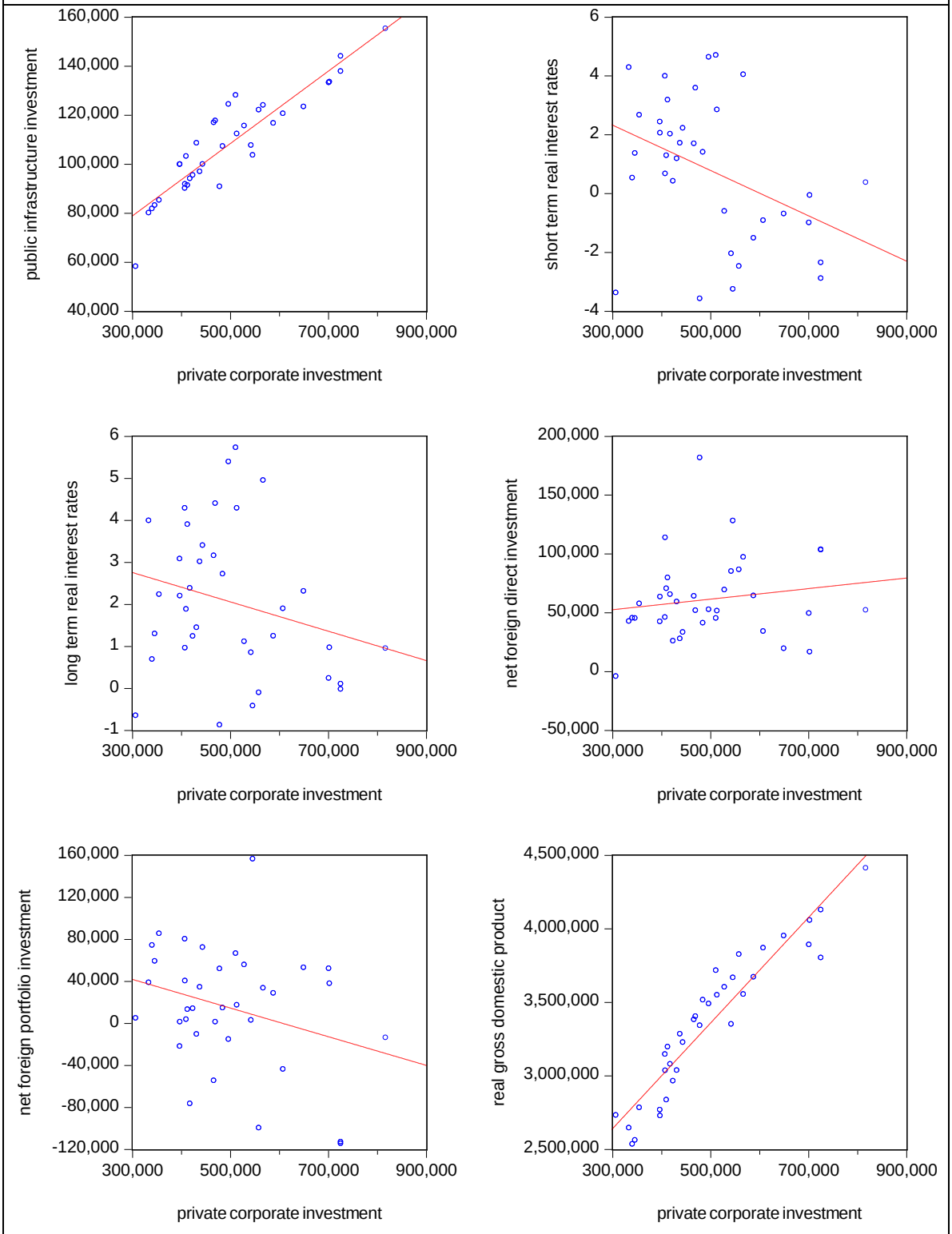
Over a 10-year period, public infrastructure investment and private corporate investment exhibit a strong positive correlation. The concentration of data points along the linear trend suggests a consistent and proportional relationship between public and private investment levels. A similar trend is observed between private corporate investment and real gross domestic product.

The relationship between the short-term real interest rate (yield on 91-day treasury bill adjusted for CPI inflation) and private corporate investment exhibits an overall negative trend aligning with the basic economic principle that higher real interest rates tend to discourage investment. While a negative relationship aligns with the conventional view that higher real interest rates increase borrowing costs and reduce investment, this clustering of variables when the real interest rates in the negative and positive segments may suggest that when negative real interest rates correlate to relatively higher private corporate investment and positive real interest rates correlate with relatively lower levels of private corporate investment. Moreover, predominant factors influencing investment decisions may include demand expectations and confidence; and business cycle dynamics, as short-term interest rates tend to fluctuate more over the business cycle. The clusters might represent different phases of the cycle (owing to the pandemic and to global supply chain disruptions) where the sensitivity of investment to interest rates varies. Therefore, while the negative slope suggests a standard inverse relationship, the clustered data emphasizes the importance of considering other factors and the potential for non-linearities when analyzing the impact of real interest rates on private corporate investment.

The relationship between long-term real interest rates (yield on 10-year government securities adjusted for CPI inflation) and private corporate investment reflects the fundamental cost of capital principle. Economic theory posits that higher long-term interest rates increase the cost of borrowing for firms, reducing the net present value of long-term investment projects and discouraging capital expenditures. This is because long-term rates directly influence the discount rate applied to future cash flows from investment projects, making investments less attractive as rates rise. The impact is particularly pronounced for projects with longer time horizons, aligning with the greater sensitivity of long-term bonds to interest rate changes. Moreover, elevated long-term rates can signal tighter monetary policy or increased inflationary expectations, further dampening business confidence and investment. Overall, private corporate investment has been resilient, notwithstanding the negative shocks of the pandemic and global supply chain disruptions.

The relationship between net foreign portfolio investment (FPI) and private corporate investment is weakly negatively correlated, as indicated by the dispersion of data points around the regression line. This may suggest that changes in net FPI have little to no systematic impact on private investment levels since FPI—which involves passive holdings of financial assets like stocks and bonds—does not exert direct control over companies or ventures and subsequently on decisions of productive investment. The weak relationship could also indicate that other factors have a more significant influence on private investment decisions.

Figure 5: Bivariate Scatterplots

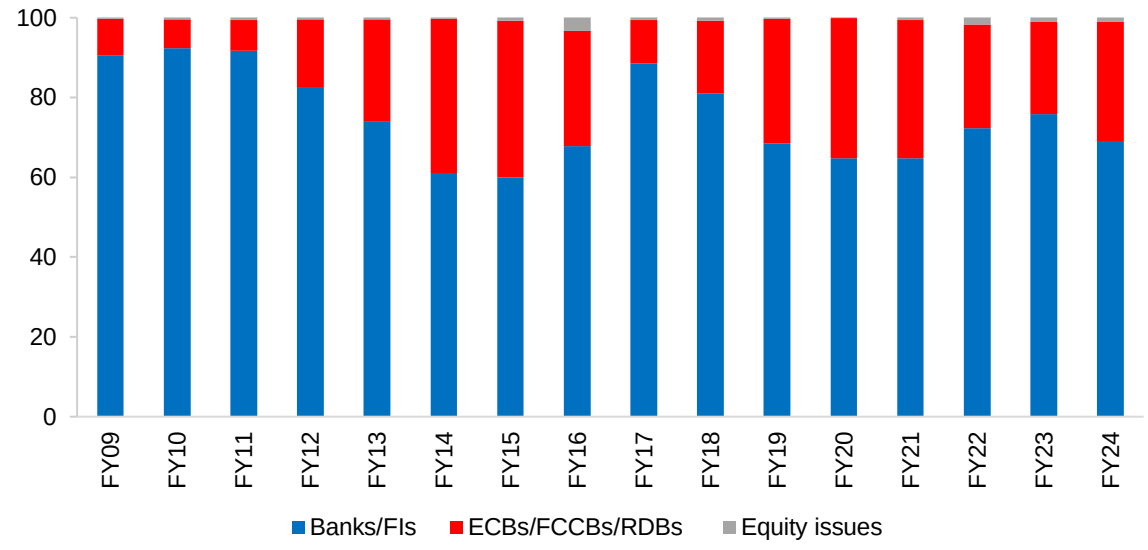


Source: Authors' computations

In contrast to net FPI, the dispersion between private corporate investment and net foreign direct investment (FDI) is lower with a positive correlation which reinforces the a priori understanding that FDI is a stable capital account flow boosting private investment in the long run.

Parker (1995) provides an insight into the behavior of private investment during the two decades leading up to the mid-1990s. While both real lending rate and real credit to the private sector were taken amongst other explanatory variables, it was observed that deregulation and heightened competition would increase the influence of interest rates and reduce that of credit, as primary determinants of private investment. Figure 6 reveals that while banks and financial institutions continue to majorly source private corporate capex projects, share of external financing has risen in the past decade, on an average. The financing from equity issues has also seen exponential rise, in absolute terms during recent years.

Figure 6: Trend in Source of Financing for Private Capex Projects

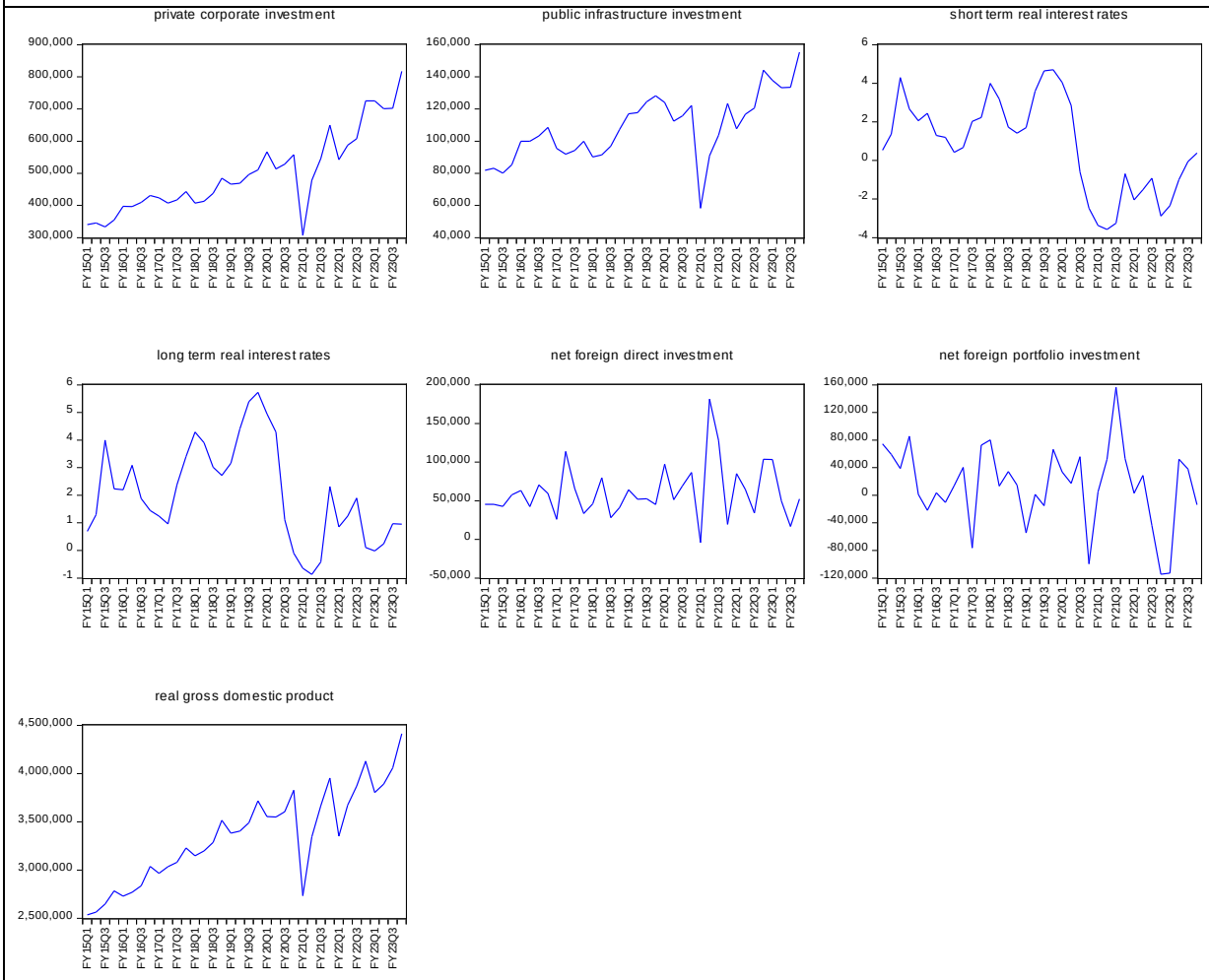


Source: Database on Phasing of Private Capex Projects by Source of Financing provided by the Centre for Monitoring Indian Economy.

5. ECONOMETRIC INVESTIGATION AND INFERENCES

It is revealed that both private corporate investment and public infrastructure investment have outpaced their respective pre-pandemic trends. Real interest rates in the post-COVID period have been relatively lower compared to the pre-COVID period. The volatility in net foreign portfolio investments is much higher compared to net foreign direct investments. Real gross domestic product too has caught up with its pre-pandemic trend.

Figure 7: Trend in Variables



Source: Authors' computations

Table 1: Dickey – Fuller Test Results			
Variables	**t – stat (Level)**	**t – stat (First difference)**	**Order of integration**
Ln_pvtinv	-1.533	-8.281***	I (1)
Ln_pubinfra	-2.614	-7.846***	I (1)
lrr	-2.062	-5.248***	I (1)
srr	-1.625	-4.661***	I (1)
Ln_rgdp	-1.795	-8.342***	I (1)
FPI_net	-4.567***	-	I (0)
FDI_net	-6.631***	-	I (0)
levels of significance: *** is 0.01, ** is 0.05, * is 0.1. Source: Authors' estimation			

While private corporate investment, public infrastructure investment, short- and long-term real interest rates, and real GDP contain a unit root at levels and become stationary at first difference (I(1)), the net FPI and FDI are stationary at levels (I(0)). Hence, we rely on the ARDL methodology to investigate the evidence of crowding-in of private investment through public infrastructure investment for the decade spanning FY15 to FY24 using quarterly data to further contribute to the works of Hatano (2010), Erden and Holcombe (2006) and Matvejevs and Tkacevs (2023).

The autoregressive distributed lag (ARDL) model is an ordinary least square (OLS)-based model which is applicable for both non-stationary time series as well as for times series with mixed orders of integration (Shreshtha and Bhatta 2018). It is used for analyzing long- and short-run relationships between different time series variables. In this paper, the bounds test was used to check the existence or otherwise of cointegration.

We improvise on the theoretical framework mentioned in Section 2 by using real GDP (instead of potential output), net FPI, and net FDI. Since the dependent variables and regressors are either

I(0) or I(1), we employ the autoregressive distributed lag (ARDL) model to investigate long-run effects with the following four specifications:

$$Model\ 1: ln\_pvtinv_t = \beta_0 + \sum_{i=1}^{p} \beta_i \ln\_pvtinv_{t-i} + \sum_{i=0}^{q} \alpha_{1i} \ln\_pubinfra_{1t-i} + \sum_{i=0}^{q} \alpha_{2i}\, srr_{2t-i} + \sum_{i=0}^{q} \alpha_{3i}\, net\_FPI_{3t-i} + \sum_{i=0}^{q} \alpha_{4i}\, realgdp_{4t-i} + e_t$$

$$Model\ 2: ln\_pvtinv_t = \beta_0 + \sum_{i=1}^{p} \beta_i \ln\_pvtinv_{t-i} + \sum_{i=0}^{q} \alpha_{1i} \ln\_pubinfra_{1t-i} + \sum_{i=0}^{q} \alpha_{2i}\, lrr_{2t-i} + \sum_{i=0}^{q} \alpha_{3i}\, net\_FDI_{3t-i} + \sum_{i=0}^{q} \alpha_{4i}\, realgdp_{4t-i} + e_t$$

$$Model\ 3: ln\_pvtinv_t = \beta_0 + \sum_{i=1}^{p} \beta_i \ln\_pvtinv_{t-i} + \sum_{i=0}^{q} \alpha_{1i} \ln\_pubinfra_{1t-i} + \sum_{i=0}^{q} \alpha_{2i}\, srr_{2t-i} + \sum_{i=0}^{q} \alpha_{3i}\, net\_FPI_{3t-i} + e_t$$

$$Model\ 4: ln\_pvtinv_t = \beta_0 + \sum_{i=1}^{p} \beta_i \ln\_pvtinv_{t-i} + \sum_{i=0}^{q} \alpha_{1i} \ln\_pubinfra_{1t-i} + \sum_{i=0}^{q} \alpha_{2i}\, lrr_{2t-i} + \sum_{i=0}^{q} \alpha_{3i}\, net\_FDI_{3t-i} + e_t$$

Model 1 attempts to capture impact of variables from the long-term and systemic perspective, whereas Model 2 aims to examine variables exhibiting short-term dynamics. Models 3 and 4 are more parsimonious versions of Models 1 and 2, respectively, wherein real GDP has been excluded.

Econometric Results

The Akaike information criterion (AIC) suggested a lag length of four for both Model 1 and Model 2. Accordingly, the ARDL was run with a specification of a maximum of four lags. The results of determinants of private corporate investment using the above-mentioned four models are depicted in the following tables. The tests pertaining to model validation are presented in Tables 2 and 3 in the Annexure.

Table 2: Regression Analysis

Variable	Model 1	Model 2	Model 3	Model 4
ln (pubinfra$_t$)	0.613***	1.023***	1.109***	1.544***
	(0.078)	(0.291)	(0.116)	(0.179)
srr$_t$	-0.039***		-0.053***	
	(0.004)		(0.006)	
ln (rgdp$_t$)	0.565***	0.518*		
	(0.099)	(0.291)		
fpi_net$_t$	-1.23E-06***		-1.01E-06	
	(3.23E-07)		(6.66E-07)	
lrr$_t$		-0.046***		-0.053***
		(0.011)		(0.016)
fdi_net$_t$		3.32e-06**		5.78E-06***
		(1.65E-06)		(2.02E-06)

Standard errors are reported in parenthesis;

levels of significance: *** is 0.01, ** is 0.05, * is 0.1.

Source: Authors' estimates.

All four models reveal cointegration (results of the bounds test are in Table 1 in the Annexure), supporting long-run relationships between the variables. Overall, this conveys a healthy trend in accumulation of private capital supported with the necessary infrastructure by investment from the governments. This vindicates the purpose that the latter seeks to fulfill. We find that a 1 percent increase in public infrastructure investment leads to around 0.6–1.5 percent increase in private corporate investment, implying strong evidence of crowding-in of private corporate investment. Further, higher estimates of the public infrastructure investment variable are seen in Models 2 and 4, vis-à-vis Models 1 and 3 respectively, which may suggest that long-run variables of interest rate and FDI as stronger signals to crowd-in private corporate investment. Coefficients of interest rate variables are consistent with a priori expectations, which highlight the effectiveness of monetary policy in stimulating private corporate investment in the long-run relationship.

Short-run dynamics, captured in the error correction model representation (results in Table 3), also show encouraging evidence of crowding-in of private investment with a 1 percent change in private corporate investment leading to a 0.7–0.8 percent increase in public infrastructure investment. The coefficients of the error correction term in all four models signify stability and adjustment to the long-run equilibrium.

Both the long- and short-run dynamics underscore the crucial role played by public infrastructure investment in sustaining private corporate investments as well as the growth and resilience of the Indian economy.

Table 3: Error Correction Model

Variable	Model 1	Model 2	Model 3	Model 4
Δ *ln* ($pvtinv_{t-1}$)	-	-0.237***	-0.157***	-0.295***
		(0.051)	(0.041)	(0.059)
Δ *ln* ($pvtinv_{t-2}$)	-	-0.186**	-0.165***	-0.258***
		(0.051)	(0.046)	(0.059)
Δ *ln* ($pvtinv_{t-3}$)	-	-0.164**	-0.129***	-0.213***

		(0.041)	(0.039)	(0.045)
Δ *ln (pubinfra$_t$)*	0.670*** (0.032)	0.671*** (0.044)	0.834*** (0.034)	0.759*** (0.040)
Δ *srr$_t$*	-0.024 (0.004)		-0.021 (0.005)	
Δ *srr$_{t-1}$*	0.013*** (0.004)		0.014** (0.005)	
Δ *srr$_{t-2}$*	0.009** (0.003)		0.005 (0.004)	
Δ *srr$_{t-3}$*	0.024*** (0.004)		0.020*** (0.004)	
Δ *lrr$_t$*		-0.012* (0.006)		-0.008 (0.006)
Δ *lrr$_{t-1}$*		0.012* (0.006)		0.01 (0.006)
Δ *lrr$_{t-2}$*		0.017*** (0.005)		0.016592 ** (0.005571)
Δ *lrr$_{t-3}$*		0.018*** (0.005)		0.016** (0.005)
Δ *fpi_net$_t$*	-2.80E-08*** (6.46E-08)		4.58E-08** (7.86E-08)	
Δ *fpi_net$_{t-1}$*	8.84E-07*** (9.77E-08)		6.24E-07*** (1.15E-07)	
Δ *fpi_net$_{t-2}$*	4.99E-07*** (8.28E-08)		3.36E-07** (1.10E-07)	
Δ *fpi_net$_{t-3}$*	4.85E-07*** (7.35E-08)		4.44E-07*** (1.03E-07)	
Δ *fdi_net$_t$*		-7.00E-07** (1.90E-07)		7.21E-07 ** (2.03E-07)

Δ *fdi_net*$_{t-1}$		-6.11E-07** (1.89E-07)		-6.84E-07** (2.09E-07)
Intercept	-1.809** (0.208)	-3.158* (0.589)	-1.809 (0.208)	-1.461** (0.295)
CointEq(-1)	-0.745*** (0.085)	-0.479** (0.089)	-0.463*** (0.077)	-0.296*** (0.059)
R^2	0.989	0.981	0.986	0.979
Adjusted R^2	0.983	0.970	0.976	0.968
Akaike information criterion (AIC)	-4.714	-4.114	-4.326	-4.032
Bayesian information criterion (BIC)	-4.210	-3.564	-3.685	-3.482
Sum squared residuals	0.008	0.014	0.010	0.016
Durbin-Watson statistic	2.133	2.469	2.128	2.402
F-statistic	184.938***	92.762***	99.509***	85.299***

6. CONCLUSION

Amidst disruptions in global supply chains, regional geo-conflicts and growing trade protectionism and uncertainty, sustained enhanced public investment has played a crucial role in the Indian context in aiding resilience and facilitating the crowding-in of private corporate investment. This has been achieved with prudence and without taking recourse to fiscal profligacy, well recognizing the worsening risk premia that could accompany fiscal slippages. The results of ARDL models provide evidence of cointegration and reinforce that there are no crowding-out effects in India, in either the long- or short-run. Moreover, the economic survey 2024–25 has gone a step forward by placing a strong emphasis on "lowering the cost of business through deregulation," contributing to accelerating economic growth and employment amidst unprecedented global challenges. It is then for the private corporate sector to play its part with a sustained and robust reciprocation to meet the evolving requirements of the Indian economy.

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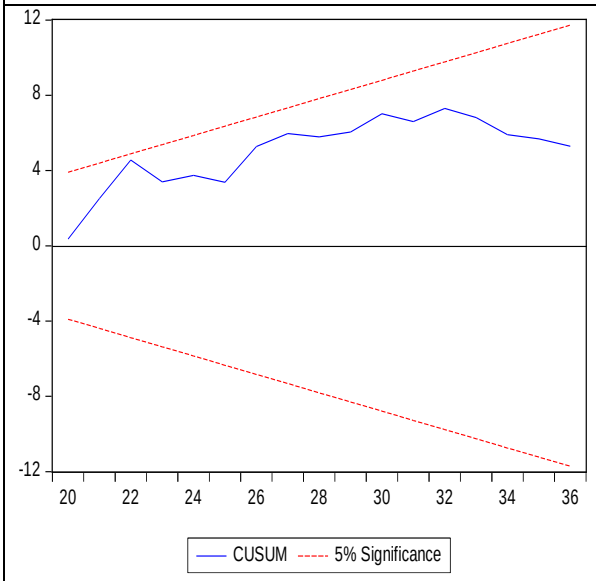
ANNEXURES

TABLE 1: Results of the Bounds Test			
	F-statistic	**I(0)**	**I(1)**
Model 1	12.375***	4.768	6.67
Model 2	4.654**	3.276	4.63
Model 3	7.471***	5.198	6.845
Model 4	5.358**	3.615	4.913
Note: I(0) and I(1) values pertain to sample size of 35. Levels of significance: *** is 0.01, ** is 0.05, * is 0.1.			

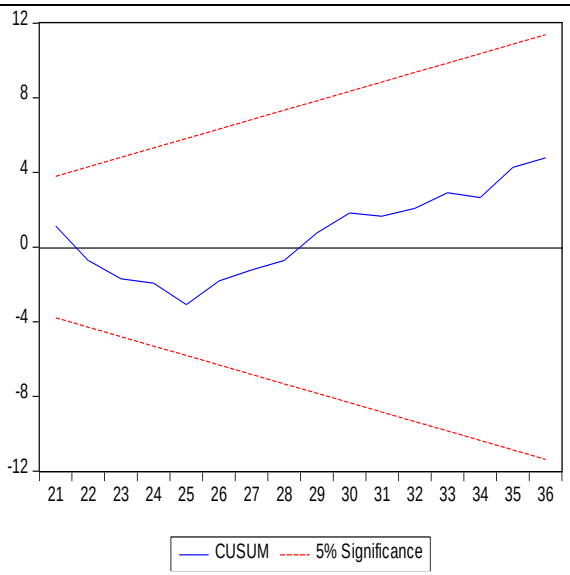
TABLE 2: Results of Model Diagnostic Tests				
	Model 1	**Model 2**	**Model 3**	**Model 4**
Test	**Test statistic**	**Test statistic**	**Test statistic**	**Test statistic**
Jarque Bera	2.70 (0.26)	1.40 (0.5)	0.90 (0.64)	1.67 (0.43)
Breusch-Godfrey serial correlation LM test	0.11 (0.67)	1.39 (0.1)	0.37 (0.36)	1.39 (0.11)
Breusch-Pagan-Godfrey Heteroscedasticity test	1.25 (0.78)	1.05 (0.91)	1.32 (0.86)	0.85 (0.89)
Source: Author's calculations Note: The numbers in the parentheses are the p- values.				

Table 3: Results of CUSUM tests

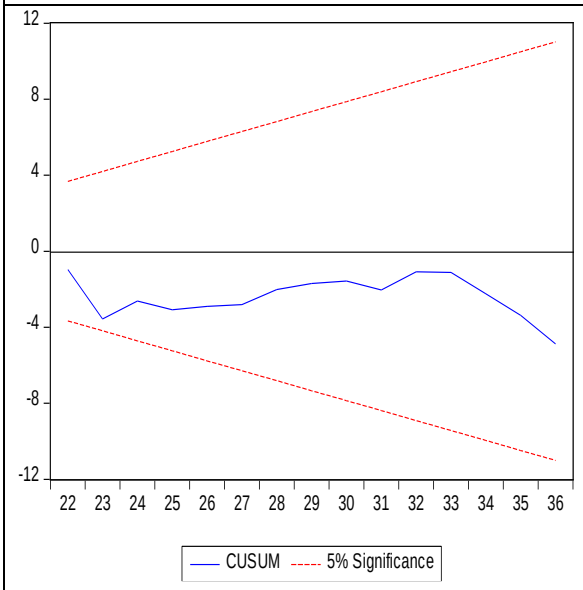
Model 1



Model 2



Model 3



Model 4