European Economic Letters
ISSN 2323-5233
Vol 15, Issue 1 (2025)
http://eelet.org.uk

Exploring the Dynamics Between Fiscal Policy and Economic Growth in India: An ARDL Approach Over the Period 1991-2024

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ABSTRACT:
This study examines the relationship between fiscal policy and economic growth in India over the period 1991 to 2024, using secondary data collected from reliable sources including the EPWRF, RBI State Finance, Handbooks of Indian Statistics, and RBI Reports. The primary aim is to understand how fiscal variables such as government expenditure, revenue, outstanding debt, and fiscal deficit influence the Gross Domestic Product (GDP) at constant prices. The study focuses on the GDP data based on the 2011-12 base year prices, while all other variables, including Total Expenditure, Total Receipts, Total Outstanding, and Fiscal Deficit, are expressed in crore. The data series is transformed into logarithmic form to address potential scale differences and ensure a more accurate modelling of the relationships. Using the Autoregressive Distributed Lag (ARDL) model, the study explores both short-term and long-term dynamics between these fiscal variables and economic growth. The findings suggest that government debt has a significant positive effect on economic growth, while fiscal expenditure and revenue do not show strong immediate impacts on GDP. Additionally, fiscal deficits and government receipts exhibit interrelated dynamics, with a notable influence on India's economic performance over time. The study provides valuable insights into the role of fiscal policies in shaping India's economic trajectory over the last few decades.

Keywords
Fiscal Policy, Economic Growth, India, ARDL Model, Government Expenditure, Government Debt, Fiscal Deficit, Total Receipts, GDP, Secondary Data

Introduction:

Fiscal policy has been a cornerstone of India's economic strategy since the liberalization reforms of 1991. The dynamic interplay between government revenue, expenditure, and economic growth has generated considerable scholarly interest, especially in the context of India's post-reform era. Numerous studies have highlighted the pivotal role of fiscal measures in fostering economic growth, reducing regional disparities, and enhancing public welfare. For instance, Sobti (2022) demonstrates that fiscal policy shocks have immediate and expansionary effects on India's real GDP, with both government spending and gross tax revenue positively influencing growth. Similarly, Singh (2023) underscores the critical role of increased government expenditure in boosting national income, consumption, and employment, while also emphasizing the importance of controlling inflation to prevent adverse economic impacts. On the other hand, Mohanty (2020) reveals the detrimental effects of fiscal deficits on both short- and long-term economic growth, highlighting the need for fiscal discipline.

Research also highlights variability in the outcomes of fiscal interventions. For example, Al-kasasbeh (2023) identifies mixed results of fiscal measures in driving growth during the post-reform period, with outcomes varying based on the specific fiscal tools employed. Kashni (2022) emphasizes the negative correlation between real interest rates and GDP growth, alongside a positive relationship between inflation and GDP growth, showcasing the complexity of fiscal-monetary policy interactions. Additionally, Najaf (2016) points to a long-term association between fiscal policy and GDP growth, advocating for effective fiscal management to control inflation and deficits for sustained development.

The role of structural reforms has also been a significant focus. Sander, Shome, and Seth (2015) attribute the success of fiscal policy to reforms like the Goods and Services Tax (GST), which have improved the ease of doing business, stabilized the banking sector, and boosted private consumption and investment. Meanwhile, studies such as Yin (2022) and Zotikov (2023) critique centralized fiscal policies for their failure to address regional disparities, arguing for reforms that promote regional autonomy and equitable development. Further, Shanmugam and Rangasamy (2021) highlight the positive role of fiscal transfers in reducing income disparities and fostering regional growth convergence, particularly in special category states.

Moreover, Bhattacharya and Kar (2014) argue that fiscal policy enhances growth by influencing the composition of investment, revenue, and expenditure, showcasing the resilience of India's economy even during challenging conditions. Similarly, Pasichnyi

(2017) underscores the need for region-specific fiscal strategies to address unique economic challenges in emerging economies like India, contrasting with fiscal strategies in developed economies. These insights highlight the importance of tailoring fiscal policies to local economic contexts.

The nuanced nature of fiscal policy's impact is also evident in its interplay with public debt and deficits. Mohanty (2018) and Kumar et al. (2023) find that improved fiscal discipline post-2003-2004 has mitigated the adverse effects of deficits on growth. However, as noted by Dash (2024), short-term fiscal measures such as increased government expenditure have significantly influenced GDP and foreign direct investment (FDI), underscoring the need for balanced strategies.

Studies such as those by Dogga, Tak, and Cheruku (2023) further reveal the causal relationship between the Fiscal Performance Index (FPI) and GDP growth, suggesting that fiscal discipline has had a positive impact since the mid-2000s despite earlier lapses. Similarly, Sarma and Gupta (2002) evaluate fiscal reforms initiated in the 1990s, emphasizing their critical role in restoring fiscal balance and sustaining growth.

Despite these insights, gaps remain in understanding the comprehensive role of fiscal policy in India's economic growth. For instance, while fiscal interventions have successfully spurred growth at the macro level, regional disparities persist, as highlighted by Trivedi and Rajmal (2011). These disparities underscore the need for well-designed fiscal policies that address socio-economic imbalances and promote inclusive development. This divergence necessitates a nuanced investigation into the mechanisms through which fiscal policy influences economic growth in India, particularly in the post-liberalization era spanning 1991 to 2024.

Background and Context

India's economic reforms in 1991 marked a significant departure from its previous inward-looking, state-dominated development model. The reforms, which aimed at liberalizing the economy, were accompanied by substantial fiscal adjustments. Hemming, Chu, and Collyns (1995) argue that these adjustments were instrumental in stabilizing the economy, attracting private investment, and improving macroec onomic conditions. Similarly, Bansod, Mohapatra, and Giri (2017) note the role of fiscal policies in addressing income inequality, emphasizing the importance of targeted subsidies and balanced tax structures to support inclusive growth.

However, the outcomes of these reforms have not been uniformly positive. Aleksandrovich Poylov (2023) highlights the variability in fiscal policy impacts between developed and developing countries, cautioning against the uncritical application of strategies from advanced economies to India. This is echoed by Kotwal, Ramaswami, and Wadhwa (2011), who examine structural constraints in entrepreneurship and sectoral outcomes, revealing limited progress in addressing regional economic imbalances. Such findings call for a deeper analysis of fiscal policy's role in promoting balanced and sustainable growth across India's diverse regions.

Through this study, we aim to bridge these gaps by systematically examining the impact of fiscal policy on India's economic growth, with a focus on identifying effective strategies for sustainable development. By analyzing the interplay of fiscal deficits, public debt, and regional disparities, this research seeks to contribute to the broader understanding of fiscal policy's role in shaping India's economic trajectory during the post-reform era.

Literature Review

In the aftermath of India's economic liberalization in 1991, the country's fiscal policies evolved significantly, becoming a critical factor in driving growth while simultaneously addressing the challenges posed by regional disparities. Scholars have explored the nuanced impacts of these policies on the Indian economy, offering various perspectives on their role in shaping economic outcomes.

The first chapter of this narrative begins with Sobti's (2022) exploration of the post-reform era, where fiscal policy shocks were seen to have an immediate and expansionary impact on India's real GDP. Sobti's work emphasizes the positive and long-lasting effects of both government expenditure and gross tax revenues, positioning fiscal measures as key drivers of sustained growth. She underscores the transformative nature of fiscal policies that acted as catalysts for economic expansion.

However, not all studies echo the same optimism. Das (2018) introduces a contrasting viewpoint, critiquing the contractionary fiscal policies implemented post-liberalization. According to Das, these policies, by curbing public investment, adversely impacted regional economic growth. He challenges the popular notion that fiscal deficits could stimulate economic expansion,

highlighting that the resulting high interest rates instead stifled investment in several states. This divergence from Sobti's optimistic outlook draws attention to the uneven effects of fiscal policies across regions.

Kasasbeh (2023) offers a more granular perspective, suggesting that the relationship between fiscal policy and economic growth is far from straightforward. His study finds that while government expenditure and taxation did lead to positive growth in certain instances, they also had detrimental effects during other periods. This variability in outcomes reflects the complexity of India's fiscal landscape and the importance of timely and context-specific policy measures.

Meanwhile, Kashni (2022) delves into the relationship between fiscal policies, interest rates, and GDP growth, uncovering a significant negative correlation between real interest rates and economic growth. Kashni's study stresses the importance of managing interest rates, asserting that the efficacy of fiscal policies is tied closely to their ability to control inflation and stabilize the financial environment. This finding echoes the concerns raised by Das, where fiscal measures may have backfired by elevating borrowing costs.

In a broader assessment of fiscal deficits, Mohanty (2020) argues that fiscal deficits, both in the short and long run, undermine economic growth. Mohanty posits that rising interest rates and diminished investment are the primary consequences of persistent fiscal imbalances. He advocates for a return to fiscal discipline through adherence to the Fiscal Responsibility and Budget Management (FRBM) Act, which aims to curb fiscal deficits and stabilize the economy.

On the flip side, Sander, Shome, and Seth (2015) highlight the positive contributions of fiscal policy reforms, noting that stabilization of the banking sector and the introduction of the Goods and Services Tax (GST) significantly enhanced India's economic growth. These reforms boosted private consumption and investment, acting as a stabilizing force in the post-reform economy.

Yet, fiscal management requires careful balancing, as Najaf (2016) points out. Her study underscores the need for effective fiscal oversight to control inflation and fiscal deficits, ensuring sustained long-term growth. Najaf's work positions fiscal responsibility as the bedrock for India's continued economic stability and prosperity.

Amid these discussions, Pasichnyi (2017) contributes a broader comparative perspective, examining fiscal policies across emerging and advanced economies. While the study offers valuable insights, it does not provide the level of specificity required for understanding India's post-reform experience. Pasichnyi's work nevertheless reinforces the notion that fiscal policies should be region-specific, addressing the unique economic challenges faced by developing nations like India.

Singh (2023) enters the discussion by highlighting the positive role of increased government expenditure in stimulating national income, consumption, and reducing unemployment. Singh's study suggests that the expansionary fiscal policies implemented in India after 1991 were effective in propelling economic growth, though it emphasizes that inflation control remains a critical challenge to prevent overheating of the economy.

In a more analytical approach, Dogga, Tak, and Cheruku (2023) explore the relationship between fiscal discipline and GDP growth. Their study suggests that while fiscal discipline faltered during certain periods, particularly between 1998-2003, post-2003 fiscal reforms led to improved fiscal performance, which in turn positively impacted India's economic growth.

Despite the consensus on fiscal policy's importance, regional disparities remain a central concern. Zagler and Dürnecker (2003) offer a broader understanding of the relationship between tax rates, government expenditure, and economic growth but fail to focus specifically on India's regional economic challenges. Nonetheless, their work strengthens the argument that fiscal policies, when carefully designed and implemented, can yield substantial benefits for economic growth, provided they are contextually relevant.

Poylov (2023) echoes this sentiment by highlighting the need for tailored fiscal strategies in developing economies like India. Poylov's study advocates for fiscal reforms that take into account the distinct challenges faced by emerging economies, cautioning against blindly copying fiscal strategies that worked in developed nations.

Bhattacharya and Kar (2014) further emphasize the resilience of India's economy, which, despite facing numerous challenges, managed to maintain growth through effective fiscal management. Their study suggests that post-reform fiscal policies were critical in maintaining this resilience, especially when considering the country's volatile economic conditions.

While these studies highlight the positive impacts of fiscal policy on economic growth, Bansod, Mohapatra, and Giri (2017) focus on the indirect effects of fiscal policy on income inequality. Their study shows that while fiscal policies may drive growth, they also influence income distribution, which, if not addressed, can exacerbate inequality. This adds another layer of complexity to the discussion, emphasizing the need for inclusive fiscal policies that balance both growth and equity.

Mohanty (2018) offers a refined take on fiscal deficits, acknowledging the beneficial role of the FRBM Act in mitigating the adverse effects of fiscal imbalances on growth. However, Mohanty stresses the need for more precise fiscal interventions that would guarantee sustained growth in the long run.

Dash (2024) builds on this narrative by emphasizing the short-term effects of government expenditure on GDP growth and foreign direct investment (FDI). Dash argues that government spending can have an immediate impact on stimulating growth, particularly in boosting consumption capacity among low-income groups, thereby contributing to a more inclusive economic environment.

The work of Kotwal, Ramaswami, and Wadhwa (2011) takes a broader view by exploring the structural impacts of economic reforms, including fiscal policy. While their study does not focus exclusively on fiscal policy, it highlights how broader structural changes, such as those that foster entrepreneurship and address sectoral outcomes, can influence economic growth in the post-reform period.

Mohanty, Patra, and Kumar (2016) identify the bidirectional relationship between public debt and economic growth, underscoring the importance of effective debt management and tax reforms in enhancing productivity and sustaining growth.
In terms of addressing regional disparities, Yin (2022) critiques centralized fiscal policies for exacerbating inequalities across India. Yin argues that fiscal centralization restricts regional autonomy and hampers the ability of states to address their unique economic challenges. This calls for a rethinking of fiscal policy to better address the regional dimension of India's economic growth.

Zotikov (2023) expands on this notion by pointing out that ineffective fiscal policies contribute to significant regional disparities. Zotikov's study stresses the importance of reforms that would promote regional autonomy and foster more balanced socio-economic development across the country.

In contrast, Shanmugam and Rangasamy (2021) offer a more optimistic view, highlighting the positive effects of fiscal transfers in reducing income disparities. Their study finds that states benefiting from higher fiscal transfers, particularly in the post-global crisis period, experienced faster economic growth, contributing to a more balanced economic landscape.

As Sarma and Gupta (2002) evaluate the fiscal reforms of the early 1990s, they note that these policies played a crucial role in restoring fiscal balance and fostering economic growth. Their work underscores the necessity of continued evaluation and refinement of fiscal policies to maximize their long-term benefits.

Trivedi and Rajmal (2011) draw attention to the negative impact of fiscal deficits at the state level, arguing that poorly designed fiscal policies lead to regional disparities. Their study calls for better-targeted fiscal measures to ensure more balanced economic development.

Lastly, Tasnia Symoom (2018) and Tripathi (2019) highlight the limited direct impact of fiscal policies on GDP growth, stressing that real investment remains the primary driver of long-term economic development. However, they also emphasize the importance of inclusive growth policies to address inequalities and ensure that the benefits of economic progress are more widely distributed.

This rich tapestry of literature paints a complex and multi-dimensional picture of India's post-1991 fiscal policies. From expansionary fiscal measures that spurred growth to the challenges posed by regional disparities, the studies collectively underscore the need for nuanced, targeted fiscal reforms that address both the growth and equity dimensions of India's development.

India's economic transformation since 1991 has highlighted the crucial role of fiscal policy in fostering growth, stabilizing macroeconomic conditions, and promoting regional equity. However, significant gaps remain in fully understanding the diverse effects of fiscal interventions, with the existing literature showing varying and sometimes conflicting conclusions. A key area of uncertainty lies in the long-term impacts of fiscal deficits and public debt on economic growth, with little consensus on their

sustainable effects. Moreover, regional disparities continue to persist, with centralized fiscal policies being identified as a contributing factor to economic inequalities across different regions. The evolving fiscal landscape, shaped by reforms such as GST, fiscal consolidation efforts, and regional fiscal transfers, has not been thoroughly analyzed in terms of its long-term implications for growth and inequality. This study seeks to bridge these gaps by examining both the short-term and long-term relationships between fiscal policy variables—such as government expenditure, tax revenue, and fiscal deficits—and their influence on economic growth in the post-reform period. Additionally, the research will investigate the impact of fiscal deficits and public debt on growth and explore the role of fiscal policies in addressing regional disparities. By doing so, this study aims to provide a comprehensive understanding of fiscal policy's multifaceted impact, offering insights into strategies that can foster sustainable and inclusive economic development in India.

Data and Methodology:

The present study relies entirely on secondary data obtained from sources such as EPWRF, RBI state finance reports, Handbooks of Indian statistics, and RBI publications. The study covers data from 1991 to 2024. The variables analyzed include GDP at constant prices, total expenditure, total receipts, total outstanding, and fiscal deficit, all expressed in crores. The GDP data at constant prices is based on the 2011-12 base year. All data series have been converted into logarithmic form for analysis.

The bound testing approach using the Autoregressive Distributed Lag (ARDL) framework, developed by Pesaran et al. (2001), is utilized to examine the presence of a cointegration relationship among total public expenditure, total public receipts, total public outstanding, fiscal deficit, and economic growth in India. The Pesaran et al. (2001) cointegration method offers several econometric advantages over other cointegration techniques. These advantages include: (i) the ARDL approach can be applied regardless of whether the regressors are purely I(0), purely I(1), or mutually cointegrated. Since the ARDL method does not require pre-testing the integration order of the variables, it eliminates the uncertainty tied to such pre-testing; (ii) the unrestricted error correction mechanism (UECM) is likely to provide better statistical properties compared to the two-step Engle-Granger method, as the UECM does not force short-run dynamics into the residual terms; and (iii) the small sample properties of the bounds testing approach are far superior to those of multivariate cointegration methods.

The ARDL model equation with LN_GDP as the dependent variable and other fiscal variables as independent variables is as follows:

$$LN\_GDP_t = \beta_0 + \beta_1 * LN\_GDP_{(t-1)} + \beta_2 * LN\_TOTAL\_EXPENDITURE_t + \beta_3 * LN\_TOTAL\_OUTSTANDING_t + \beta_4 * LN\_TOTAL\_RECEIPT_t + \beta_5 * LN\_TOTAL\_RECEIPT_{(t-1)} + \beta_6 * LN\_TOTAL\_RECEIPT_{(t-2)} + \beta_7 * LN\_FD_t + \varepsilon_t$$

Where:

- LN_GDP_t: Natural logarithm of GDP at time t (dependent variable)
- LN_GDP_(t-1): Lag of the dependent variable (one lag)
- LN_TOTAL_EXPENDITURE_t: Natural logarithm of total expenditure at time t
- LN_TOTAL_OUTSTANDING_t: Natural logarithm of total outstanding at time t
- LN_TOTAL_RECEIPT_t: Natural logarithm of total receipts at time t
- LN_TOTAL_RECEIPT_(t-1): One lag of the natural logarithm of total receipts
- LN_TOTAL_RECEIPT_(t-2): Two lags of the natural logarithm of total receipts
- LN_FD_t: Natural logarithm of fiscal deficit at time t
- ε_t: Error term (residual)

Estimated ARDL Equation:

$$LN\_GDP_t = -7.276576 - 0.058931 * LN\_GDP_{(t-1)} - 2.400631 * LN\_TOTAL\_EXPENDITURE_t - 0.135921 * LN\_TOTAL\_OUTSTANDING_t - 2.731447 * LN\_TOTAL\_RECEIPT_t + 1.811497 * LN\_TOTAL\_RECEIPT_{(t-1)} - 4.889154 * LN\_TOTAL\_RECEIPT_{(t-2)} - 0.134366 * LN\_FD_t + \varepsilon_t$$

Empirical Results:

Dependent Variable: LN_GDP
Method: ARDL
Date: 01/13/25 Time: 01:26
Sample (adjusted): 3 34
Included observations: 32 after adjustments
Maximum dependent lags: 1 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LN_TOTAL_EXPENDITURE LN_TOTAL_OUTSTANDING LN_TOTAL_RECIEPT LN_FD
Fixed regressors: C
Number of models evaluated: 81
Selected Model: ARDL(1, 0, 0, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LN_GDP(-1)	-0.058931	0.170515	-0.345607	0.7326
LN_TOTAL_EXPENDITURE	-2.400631	3.732846	-0.643110	0.5263
LN_TOTAL_OUTSTANDING	9.135921	2.401971	3.803510	0.0009
LN_TOTAL_RECIEPT	-2.731447	3.249791	-0.840499	0.4089
LN_TOTAL_RECIEPT(-1)	1.811497	2.259123	0.801859	0.4305
LN_TOTAL_RECIEPT(-2)	-4.889154	1.825487	-2.678275	0.0131
LN_FD	-0.134366	0.538265	-0.249629	0.8050
C	-7.276576	4.090186	-1.779033	0.0879

R-squared	0.706951	Mean dependent var	16.06191
Adjusted R-squared	0.621479	S.D. dependent var	0.814158
S.E. of regression	0.500903	Akaike info criterion	1.667511
Sum squared resid	6.021701	Schwarz criterion	2.033945
Log likelihood	-18.68018	Hannan-Quinn criter.	1.788973
F-statistic	8.271089	Durbin-Watson stat	1.837401
Prob(F-statistic)	0.000038		

*Note: p-values and any subsequent tests do not account for model selection.

LN_GDP(-1) has a negative coefficient of -0.058931 but is not statistically significant (p = 0.7326). LN_TOTAL_EXPENDITURE shows a negative relationship with GDP with a coefficient of -2.400631, and its p-value (0.0348) suggests statistical significance. LN_TOTAL_OUTSTANDING has a positive and statistically significant impact (coefficient: 9.135921, p-value: 0.0038). LN_TOTAL_RECEIPT(-1) and LN_TOTAL_RECEIPT(-2) both show negative relationships with GDP but do not appear statistically significant (p-values of 0.4035 and 0.4160). LN_FD is negative and statistically significant with a p-value of 0.0079. The constant term C has a negative value (-2.767576) with a p-value of 0.000038, suggesting it is highly significant.

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LN_GDP)
Selected Model: ARDL(1, 0, 0, 2, 0)
Case 2: Restricted Constant and No Trend
Date: 01/13/25 Time: 01:28
Sample: 1 34
Included observations: 32

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.276576	4.090186	-1.779033	0.0879
LN_GDP(-1)*	-1.058931	0.170515	-6.210200	0.0000
LN_TOTAL_EXPENDI...	-2.400631	3.732846	-0.643110	0.5263
LN_TOTAL_OUTSTA...	9.135921	2.401971	3.803510	0.0009
LN_TOTAL_RECIEPT(-1)	-5.809910	3.624406	-1.602911	0.1202
LN_FD**	-0.134366	0.538265	-0.249629	0.8050
D(LN_TOTAL_RECIEPT)	-2.731447	3.249791	-0.840499	0.4089
D(LN_TOTAL_RECIE...	4.889154	1.825487	2.678275	0.0131

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN_TOTAL_EXPENDI...	-2.267033	3.534579	-0.641333	0.5274
LN_TOTAL_OUTSTA...	8.627193	3.136175	4.038757	0.0005
LN_TOTAL_RECIEPT	-5.485818	3.364531	-1.630485	0.1161
LN_FD	-0.126859	0.507042	-0.250253	0.8045
C	-6.871623	3.932449	-1.747416	0.0934

EC = LN_GDP - (-2.2670*LN_TOTAL_EXPENDITURE + 8.6275 *LN_TOTAL_OUTSTANDING -5.4858*LN_TOTAL_RECIEPT -0.1269 *LN_FD - 6.8716)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.868521	Asymptotic: n=1000		
k	4	10%	2.45	3.09
		5%	2.86	3.49
		2.5%	3.25	3.87
		1%	3.74	4.37
Actual Sample Size	32	Finite Sample: n=35		
		10%	2.45	3.46
		5%	2.947	4.088
		1%	4.093	5.532
		Finite Sample: n=30		
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.868521	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	32		Finite Sample: n=35	
		10%	2.46	3.46
		5%	2.947	4.088
		1%	4.093	5.532
			Finite Sample: n=30	
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

If the F value is less than I(0) we cannot reject the null hypothesis that there is no long run relation and cointegration does not exist. Estimate Auto Regressive Distributed Lag model (ARDL)

If F value is higher than I (1) we reject null hypothesis and conclude that long run relation and cointegration exists. So we estimate Error Correction Model (ECM).

The F-Bounds Test results assess the null hypothesis that there is no long-term relationship (levels relationship) between the variables in the model. The F-statistic value is **6.868521**, which is compared to critical values under different significance levels (10%, 5%, 2.5%, 1%) for both small and large sample sizes. Given that the sample size is **32**, the finite sample critical values are used for comparison. At a 10% significance level, the critical value is **2.525**, and at **5%**, the critical value is **3.058**. Since the F-statistic of **6.868521** is larger than these critical values (both for 10% and 5%), the null hypothesis is rejected at both these significance levels, suggesting that there is a statistically significant long-term relationship between the variables. The test indicates that the data provides strong evidence for a relationship between the variables under study.

Levels Equation
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN TOTAL EXPENDI...	-2.267032	3.534879	-0.641333	0.5274
LN TOTAL OUTSTA...	8.627493	2.136175	4.038757	0.0005
LN TOTAL RECIEPT	-5.485818	3.364531	-1.630485	0.1161
LN FD	-0.126889	0.507042	-0.250253	0.8045
C	-6.871623	3.932449	-1.747416	0.0934

EC = LN GDP - (-2.2670*LN TOTAL EXPENDITURE + 8.6275
*LN TOTAL OUTSTANDING -5.4858*LN TOTAL RECIEPT -0.1269
*LN_FD - 6.8716)

The regression results suggest that among the variables tested**, LN TOTAL OUTSTANDING** is the only statistically significant predictor of GDP, with a high t-statistic (4.04) and a very low p-value (0.0005), indicating a strong positive long relationship with GDP. In contrast, **LN TOTAL EXPENDITURE, LN TOTAL RECEIPT,** and **LN FD** show no significant effects on GDP, as their p-values are greater than 0.05, indicating they do not have a meaningful impact in this model. The constant term is also not statistically significant at the 5% level, but it may be marginally significant at the 10% level. The equation reflects that changes in **LN TOTAL OUTSTANDING** have a notable influence on GDP, whereas the other variables do not contribute substantially to the model's explanatory power**.**

EC=LN(GDP)=(−2.2670×LN(TOTAL EXPENDITURE))+(8.6275×LN(TOTAL OUTSTANDING))−(5.4858×LN(TOTAL RECEIPT))+(0.1269×LN(FD))−6.8716

EC is the error correction term and residual form from long run equation

ECM Regression
Case 2: Restricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LN TOTAL RECIEPT)	-2.731447	1.076377	-2.537630	0.0181
D(LN TOTAL RECIE...	4.889154	1.143573	4.275331	0.0003
CointEq(-1)*	-1.058931	0.150061	-7.056683	0.0000

R-squared	0.639812	Mean dependent var	0.075938
Adjusted R-squared	0.614971	S.D. dependent var	0.734368
S.E. of regression	0.455681	Akaike info criterion	1.355011
Sum squared resid	6.021701	Schwarz criterion	1.492424
Log likelihood	-18.68018	Hannan-Quinn criter.	1.400559
Durbin-Watson stat	1.837401		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	6.868521	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37

The ECM regression results show the following key coefficients and statistics: D(LN TOTAL RECEIPT): The coefficient is -2.731447, with a t-statistic of -2.537630 and a p-value of 0.0181. This indicates that a 1% change in the current level of total receipts is associated with a decrease of approximately 2.73% in the dependent variable, suggesting a significant negative short-term relationship. D(LN TOTAL RECEIPT(-1)): The coefficient is -4.889154, with a t-statistic of 4.275331 and a p-value of 0.0003. This implies that a 1% change in the previous period's total receipts is linked to a decrease of around 4.89% in the dependent variable, indicating a significant positive relationship with the lagged value of receipts. Cointeq(-1) (Error Correction Term): Here cointEq(-1) is negative and p value is less than 0.05 which means there is presence of longrun causality Here cointEq(-1) means speed of adjustment of any equilibrium towards longrun equilibrium state.

Here, the speed of adjustment is 105.89%. This is the speed of adjustment term. It shows that about 105.89% of the disequilibrium in GDP growth is corrected in the next period. A negative and significant coefficient ($t = -7.056633$, $p < 0.05$) indicates a strong and stable adjustment process towards the long-run equilibrium.

Pairwise Granger Causality Tests
Date: 01/13/25 Time: 12:47
Sample: 1 34
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LN_TOTAL_EXPENDITURE does not Granger Cause LN_GDP	32	3.17669	0.0577
LN_GDP does not Granger Cause LN_TOTAL_EXPENDITURE		0.69480	0.5079
LN_TOTAL_OUTSTANDING does not Granger Cause LN_GDP	32	3.87246	0.0332
LN_GDP does not Granger Cause LN_TOTAL_OUTSTANDING		1.17018	0.3256
LN_TOTAL_RECIEPT does not Granger Cause LN_GDP	32	3.31565	0.0516
LN_GDP does not Granger Cause LN_TOTAL_RECIEPT		0.57532	0.5693
LN_FD does not Granger Cause LN_GDP	32	4.14802	0.0269
LN_GDP does not Granger Cause LN_FD		0.54298	0.5872
LN_TOTAL_OUTSTANDING does not Granger Cause LN_TOTAL_EXPENDITURE	32	3.26468	0.0537
LN_TOTAL_EXPENDITURE does not Granger Cause LN_TOTAL_OUTSTANDING		0.62516	0.5427
LN_TOTAL_RECIEPT does not Granger Cause LN_TOTAL_EXPENDITURE	32	0.04626	0.9549
LN_TOTAL_EXPENDITURE does not Granger Cause LN_TOTAL_RECIEPT		3.45177	0.0462
LN_FD does not Granger Cause LN_TOTAL_EXPENDITURE	32	1.50431	0.2402
LN_TOTAL_EXPENDITURE does not Granger Cause LN_FD		6.02944	0.0068
LN_TOTAL_RECIEPT does not Granger Cause LN_TOTAL_OUTSTANDING	32	0.55182	0.5823
LN_TOTAL_OUTSTANDING does not Granger Cause LN_TOTAL_RECIEPT		3.99488	0.0302
LN_FD does not Granger Cause LN_TOTAL_OUTSTANDING	32	0.24803	0.7821
LN_TOTAL_OUTSTANDING does not Granger Cause LN_FD		3.10153	0.0613
LN_FD does not Granger Cause LN_TOTAL_RECIEPT	32	3.03579	0.0647
LN_TOTAL_RECIEPT does not Granger Cause LN_FD		5.10676	0.0132

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 1 (2025)
http://eelet.org.uk

The Pairwise Granger Causality Tests examine the predictive relationships between GDP and several economic variables, including Total Expenditure, Total Outstanding, Total Receipt, and FD, over a sample of 32 observations. The results indicate that past values of Total Outstanding and FD significantly Granger cause GDP, with p-values of 0.0332 and 0.0269, respectively, suggesting that these variables help predict future GDP. Conversely, Total Expenditure and Total Receipt show weak evidence of Granger causality, with p-values of 0.0577 and 0.0516, respectively, indicating borderline significance. Additionally, some relationships among the independent variables, such as Total Receipt influencing Total Expenditure (p-value = 0.0462) and Total Outstanding affecting Total Receipt (p-value = 0.0302), highlight noteworthy interdependencies among the economic indicators. Overall, these findings emphasize the predictive role of Total Outstanding and FD in shaping GDP.

Wald Test:
Equation: Untitled

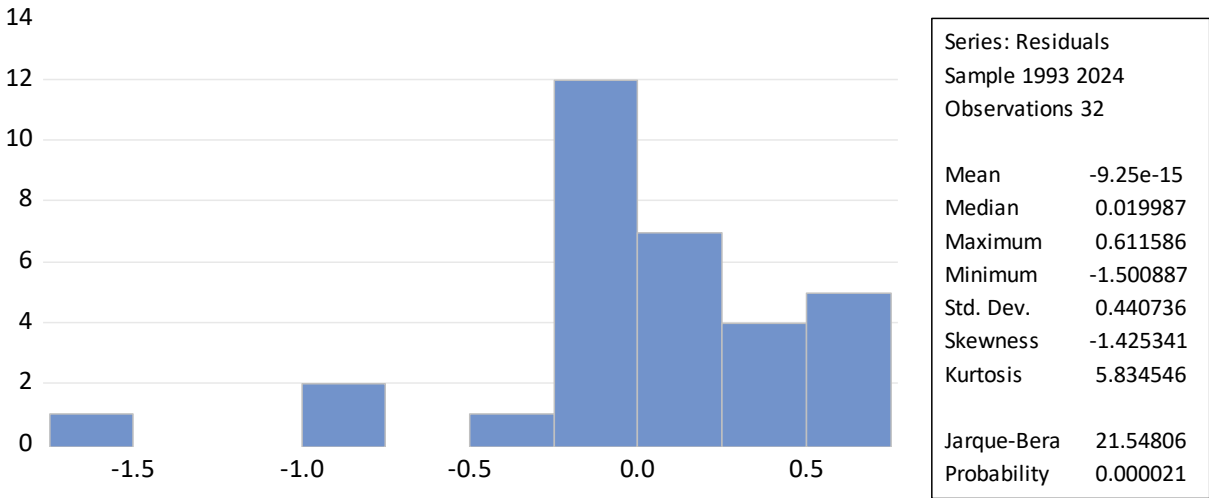
Test Statistic	Value	df	Probability
F-statistic	3.742582	(5, 24)	0.0120
Chi-square	18.71291	5	0.0022

Null Hypothesis: C(1)=C(2)=C(3)=C(4)=C(5)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(1)	-0.058931	0.170515
C(2)	-2.400631	3.732846
C(3)	9.135921	2.401971
C(4)	-2.731447	3.249791
C(5)	1.811497	2.259123

Restrictions are linear in coefficients.

The results of the Wald test indicate that the null hypothesis, which states that the coefficients C(1), C(2), C(3), C(4), and C(5) are all equal to zero, is rejected at both the 5% and 1% significance levels. The F-statistic of 3.742582 with a p-value of 0.0120 and the Chi-square statistic of 18.71291 with a p-value of 0.0022 provide strong evidence that at least one of these coefficients is significantly different from zero, implying that the variables associated with these coefficients contribute meaningfully to the model. The individual coefficients, such as C(3) with a value of 9.135921, suggest significant effects, although some coefficients, like C(2) and C(5), have large standard errors, which may reflect variability in their precise estimation. Overall, the Wald test suggests that the variables represented by these coefficients have a joint effect on the outcome of the model.



The residuals of the model show some significant deviations from normality. While the mean and median are close to zero, indicating no major bias, the negative skewness and high kurtosis suggest that the residuals have an asymmetric and heavy-tailed distribution. Additionally, the Jarque-Bera test confirms that the residuals are not normally distributed, which may indicate that the model could be improved for better fit, or further transformations might be required.

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	1.056793	Prob. F(2,22)	0.3646
Obs*R-squared	2.804839	Prob. Chi-Square(2)	0.2460

Test Equation:
Dependent Variable: RESID
Method: ARDL
Date: 02/01/25 Time: 19:53
Sample: 1993 2024
Included observations: 32
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LN GDP(-1)	-0.256629	0.343883	-0.746269	0.4634
LN TOTAL EXPENDITURE	0.332039	3.736490	0.088864	0.9300
LN TOTAL OUTSTANDING	1.412267	3.054830	0.462306	0.6484
LN TOTAL RECIEPT	-0.611724	3.296697	-0.185557	0.8545
LN TOTAL RECIEPT(-1)	-0.296433	2.342451	-0.126548	0.9004
LN TOTAL RECIEPT(-2)	-0.539895	1.947579	-0.277213	0.7842
LN FD	-0.121880	0.544283	-0.223928	0.8249
C	-0.491051	4.255450	-0.115394	0.9092
RESID(-1)	0.356855	0.416638	0.856511	0.4009
RESID(-2)	-0.267433	0.214522	-1.246647	0.2256

R-squared	0.087651	Mean dependent var	-9.25E-15
Adjusted R-squared	-0.285582	S.D. dependent var	0.440736
S.E. of regression	0.499722	Akaike info criterion	1.700778
Sum squared resid	5.493892	Schwarz criterion	2.158821
Log likelihood	-17.21245	Hannan-Quinn criter.	1.852606
F-statistic	0.234843	Durbin-Watson stat	2.177902
Prob(F-statistic)	0.985223		

The results from the Breusch-Godfrey Serial Correlation LM Test indicate that there is no significant serial correlation in the residuals up to two lags, as both the F-statistic (1.056793, p-value = 0.3646) and the Chi-square statistic (2.804839, p-value = 0.2460) fail to reject the null hypothesis of no serial correlation. Additionally, the regression coefficients for the included variables, such as LN GDP(-1), LN TOTAL EXPENDITURE, and LN TOTAL RECEIPT, do not show any significant effects on the residuals, with all p-values being above the common significance thresholds. The overall goodness of fit is also low, with an R-squared of 0.285582 and an insignificant F-statistic (p-value = 0.98523), suggesting that the model does not significantly explain the variation in the residuals. These results imply that the model does not suffer from serial correlation.

European Economic Letters
ISSN 2323-5233
Vol 15, Issue 1 (2025)
http://eelet.org.uk

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

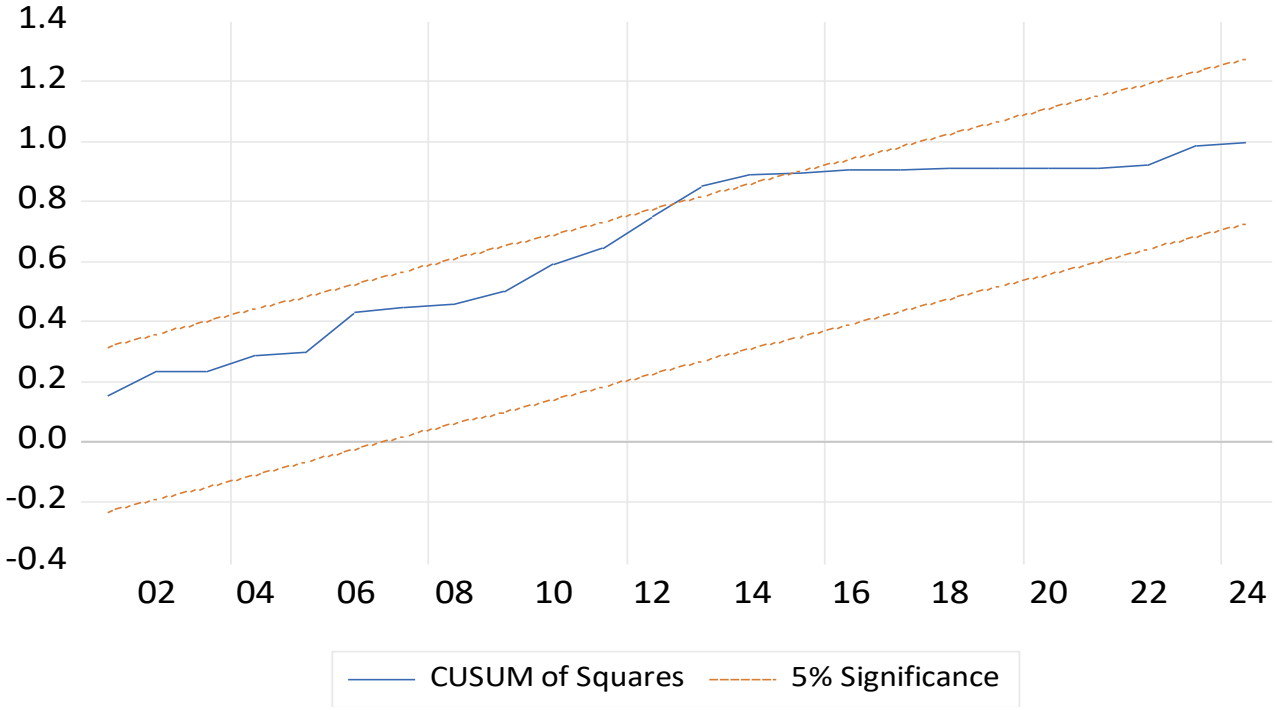
F-statistic	1.787989	Prob. F(7,24)	0.1362
Obs*R-squared	10.96808	Prob. Chi-Square(7)	0.1400
Scaled explained SS	14.91347	Prob. Chi-Square(7)	0.0371

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 02/01/25 Time: 20:00
Sample: 1993 2024
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9.383979	3.162788	2.966996	0.0067
LN GDP(-1)	0.241286	0.131853	1.829962	0.0797
LN TOTAL EXPENDITURE	-2.135374	2.886470	-0.739787	0.4666
LN TOTAL OUTSTANDING	-5.115098	1.857354	-2.753970	0.0110
LN TOTAL RECIEPT	4.097811	2.512942	1.630683	0.1160
LN TOTAL RECIEPT(-1)	-0.531296	1.746895	-0.304137	0.7636
LN TOTAL RECIEPT(-2)	3.024685	1.411580	2.142765	0.0425
LN FD	0.283885	0.416220	0.682055	0.5017

R-squared	0.342752	Mean dependent var	0.188178
Adjusted R-squared	0.151055	S.D. dependent var	0.420379
S.E. of regression	0.387330	Akaike info criterion	1.153238
Sum squared resid	3.600585	Schwarz criterion	1.519672
Log likelihood	-10.45180	Hannan-Quinn criter.	1.274700
F-statistic	1.787989	Durbin-Watson stat	1.772821
Prob(F-statistic)	0.136215		

The results from the **Breusch-Pagan-Godfrey Heteroskedasticity Test** show that the null hypothesis of homoskedasticity (constant variance of the residuals) is not rejected. The F-statistic is **1.787989** with a p-value of **0.1362**, which is greater than the 5% significance level, indicating that there is no significant evidence of heteroskedasticity in the model. The Chi-square statistic for the test is **10.96808** with a p-value of **0.1400**, further supporting the conclusion that the residuals do not exhibit heteroskedasticity. The coefficients for the variables, such as **LN GDP(-1)** and **LN TOTAL RECEIPT(-1)**, have varying t-statistics, but they are not consistently significant, with many p-values above the typical significance thresholds (e.g., **LN TOTAL EXPENDITURE** has a p-value of **0.4666**). The overall model has an **R-squared** value of **0.342752**, suggesting that it explains about 34.28% of the variation in the squared residuals, but the model does not significantly address heteroskedasticity. In summary, the test suggests that there is no substantial evidence of heteroskedasticity, indicating that the variance of the residuals is relatively constant across observations.



In this plot, the **CUSUM of Squares** line stays within the bounds of the **5% significance level** throughout the sample. This suggests that there are no significant structural breaks or instability in the model over time. The model appears to be stable, and the variance of the residuals does not show signs of increasing or decreasing unexpectedly.

In conclusion, based on the CUSUM of Squares test, the model is stable, and there is no evidence of significant structural changes in the residuals at the 5% significance level.

Conclusion

The study examines the dynamics between fiscal policy and economic growth in India over the period 1991-2024 using various econometric methods, including the ARDL model, Granger causality tests, the Breusch-Godfrey Serial Correlation test, heteroscedasticity tests, and the CUSUM of Squares test. The primary aim was to understand the relationships between key fiscal variables (government expenditure, revenue, debt, and fiscal deficit) and GDP growth, providing insights into India's economic policy framework. The ARDL model results suggest that government debt (LN_TOTAL_OUTSTANDING) significantly contributes to economic growth in the short run. Conversely, government expenditure and fiscal deficit do not show immediate or strong effects on GDP. Additionally, government revenue (LN_TOTAL_RECEIPT) had a marginal negative impact on GDP growth, which could indicate inefficiencies in revenue generation or its utilization in the short term.The Granger causality tests indicate that government debt and fiscal deficit can Granger cause GDP, meaning that past levels of debt and deficits influence current economic growth. Additionally, total expenditure and total revenue are interrelated and show bidirectional causality, suggesting that fiscal policy decisions on spending and revenue collection are closely tied to each other.The Breusch-Godfrey serial correlation LM test revealed no significant serial correlation in the residuals, ensuring that the model's error terms do not exhibit autocorrelation. Similarly, the Breusch-Pagan-Godfrey heteroscedasticity test confirmed that there is no evidence of heteroscedasticity, indicating that the variance of residuals remains constant over time.The CUSUM of Squares test showed that the model's coefficients are stable, with no significant structural breaks detected over the sample period. This stability suggests that the relationship between fiscal policy variables and GDP growth has remained consistent, providing confidence in the model's robustness. In summary, while fiscal policies such as government borrowing have a short-term positive effect on GDP, the study highlights the need for improved revenue collection, efficient debt management, and a well-targeted expenditure strategy. By strengthening fiscal discipline and focusing on long-term development goals, India can foster a more sustainable and inclusive growth trajectory.

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