“Fiscal deficit and economic growth in Uzbekistan: Evidence from an ARDL model with structural reform considerations”

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FISCAL DEFICIT AND ECONOMIC GROWTH IN UZBEKISTAN: EVIDENCE FROM AN ARDL MODEL WITH STRUCTURAL REFORM CONSIDERATIONS

Abstract

This study examines the short-run and long-run relationship between fiscal deficit and economic growth in Uzbekistan over 2000–2025, with explicit attention to the structural reform dynamics introduced by the 2017 economic liberalization program. To achieve this aim, the Autoregressive Distributed Lag (ARDL) bounds testing approach is combined with the Zivot-Andrews endogenous structural break test. The bounds test confirms a stable cointegrating relationship (F = 8.947, exceeding the 1% upper bound), thereby fulfilling the study's aim of establishing a long-run equilibrium link between fiscal deficit and growth. The results show that the fiscal deficit exerts a positive and statistically significant effect on growth in both the short (β = 0.178) and the long run (β = 0.242): a one-percentage-point increase in the deficit raises long-run growth by about 0.24 percentage points. The 2017 reform dummy carries a significant negative coefficient (β = –6.196), quantifying the short-term adjustment cost of the transition, while the Zivot-Andrews test independently dates structural breaks in the exchange rate and domestic credit to 2017. Among the controls, domestic credit raises growth (β = 0.146), whereas inflation (β = –0.189) and exchange rate depreciation (β = –1.365) reduce it; the error-correction term (ω = –1.862) indicates rapid convergence to equilibrium. These findings confirm all research hypotheses and support the Keynesian view, while demonstrating that fiscal policy effectiveness in transition economies is conditional on accompanying structural reforms, macroeconomic stability, and financial development.

Keywords fiscal deficit, economic growth, ARDL model, cointegration, fiscal sustainability, transition economy, public finance, Central Asia

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INTRODUCTION

Fiscal policy occupies a central position in contemporary macroeconomic management, particularly in developing and transition economies where governments face the dual challenge of sustaining economic growth while ensuring long-term fiscal stability. The deliberate use of fiscal deficits to finance public expenditure has become one of the most widely employed instruments for stimulating aggregate demand, supporting infrastructure development, and advancing structural transformation. However, the intensification of fiscal imbalances in recent decades (accompanied by rising public debt levels, external vulnerabilities, and evolving global financial conditions) has renewed academic and policy attention toward understanding how fiscal deficits shape economic perfor-

mance. This relevance becomes even more pronounced in economies undergoing profound institutional and structural change, where the transmission mechanisms of fiscal policy are neither stable nor uniform across time.

Uzbekistan represents one of the most illustrative cases for examining these dynamics within the Central Asian region. Since the launch of comprehensive economic liberalization in 2017 (encompassing currency unification, financial sector restructuring, trade openness, tax modernization, and institutional reforms), the country has experienced substantial shifts in its macroeconomic architecture. Fiscal policy has correspondingly evolved from a traditionally conservative stance toward a more active role in financing reform-oriented public investment. In such a rapidly transforming environment, the question of whether fiscal deficits contribute to or hinder economic growth is of particular importance for both scholarly inquiry and evidence-based policymaking.

Despite the extensive body of international research on fiscal deficits and growth, the accumulated theoretical and empirical knowledge does not provide an unambiguous answer to this question. Competing theoretical traditions yield sharply divergent predictions regarding the macroeconomic consequences of fiscal imbalances, while empirical findings across countries remain notably heterogeneous and often contradictory. This inconsistency suggests that the fiscal deficit–growth nexus is fundamentally context-dependent, shaped by institutional quality, financial development, the composition of public expenditure, and the broader trajectory of structural reforms. Consequently, the scientific problem underlying this study lies in the absence of a theoretically coherent and empirically grounded understanding of how fiscal policy effectiveness is reshaped under conditions of deep institutional transformation in transition economies – a problem that current macroeconomic literature has addressed only partially and rarely within the Central Asian context. Uzbekistan, as a transition economy implementing large-scale structural reforms while simultaneously relying on fiscal instruments to support growth, represents a scientifically significant yet insufficiently studied environment within which this problem can be meaningfully investigated.

1. LITERATURE REVIEW AND HYPOTHESES

The relationship between fiscal deficits and economic growth is one of the most controversial areas of modern macroeconomic thought. The theoretical literature in this area has developed around three main schools of thought, each of which offers significantly different predictions about the impact of government spending and budget deficits on economic activity. The Keynesian approach views government spending financed by deficits as a means of stimulating aggregate demand in an economy that is not at full employment and expanding output through the multiplier effect (Keynes, 1936; Auerbach et al., 2022). Within this view, it has been suggested that productive public spending, particularly investments in infrastructure and human capital, can expand not only short-term demand but also long-term productive capacity (Aschauer, 1989; Mahfouz et al., 2002).

The neoclassical approach tends to reach completely different conclusions. According to this view, an increase in public debt reduces capital accumulation by crowding out private investment and has a negative impact on long-term growth (Yusupov et al., 2026a, 2026b). Empirically, a number of studies have shown that high levels of public debt are associated with lower growth rates in both developed and developing countries (Reinhart & Rogoff, 2010; Woo & Kumar, 2015). The third view, Ricardian equivalence, emphasizes the neutral effect of fiscal deficits, suggesting that rational economic agents perceive today's deficits as tomorrow's taxes and adjust their saving behavior accordingly (Barro, 1989). However, the strict assumptions underlying this approach (perfect capital markets, an infinite planning horizon, and an incorruptible tax system) rarely hold true in practice, especially in developing economies (Bernheim, 1987).

An important aspect of the empirical literature is that it does not unanimously support any of these

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three theoretical streams, but rather shows that the impact of fiscal deficits on growth varies considerably across countries and over time. Studies on emerging Asian economies have largely found a negative relationship, explaining these results by crowding out the private sector, increasing debt burdens, and the dominance of current consumption spending over productive investment (Amgain & Dhakal, 2017; Tung, 2018). Evidence from Africa and the MENA regions shows similar heterogeneity. Some countries have identified negative long-term impacts (Adama et al., 2019; Arjomand et al., 2016; Onwioduokit & Inam, 2018), while others have short-term positive, long-term negative asymmetric impacts (Nkrumah et al., 2016; Sabr et al., 2021). In addition, a statistically insignificant relationship was recorded (Al-Tamimi, 2020). This diversity suggests that the impact of fiscal policy is not universal but determined by country-specific structural conditions (Halmuratov et al., 2025b).

This context-specific issue is particularly crucial in transition economies. During the transition from central planning to market mechanisms, the public sector performs not only the function of macroeconomic stabilization, but also the function of forming new institutional frameworks; as a result, the effectiveness of fiscal policy is directly related to the stage of structural reforms in the country (Égert, 2015; Fischer et al., 1996). Studies on the transition economies of Southeastern Europe show that these countries have experienced a positive impact of fiscal deficits, which is due to the productive nature of public spending and the impact of institutional modernization on the investment climate (Hennach & Echaoui, 2025). At the same time, economic liberalization and structural reforms change the mechanisms by which fiscal policy influences economic activity, incur adjustment costs in the initial stages, but increase the efficiency of resource allocation in the long run (Blanchard, 2019; Kouamé & Tapsoba, 2018).

Another important factor determining the effectiveness of fiscal policy is the level of financial development. Financial intermediation, as an independent factor of economic growth, plays an important role not only in the efficient allocation of resources, but also in strengthening the transmission channels of fiscal policy (King & Levine, 1993; Levine, 2005). In economies with high financial depth, the impact of productive government spending on growth is stronger, while in economies with low depth, the public sector may play a role that partially compensates for the limited credit capacity of the private sector (Koh, 2017). Furthermore, institutional quality and financial development together shape fiscal policy outcomes, suggesting that the deficit-growth relationship is relatively more favorable in countries with stronger institutional environments (Ricky Okine et al., 2023; Sore et al., 2024).

In summary, the existing literature strongly suggests that the impact of fiscal deficits on economic growth is not uniform and is determined by a number of interrelated factors: expenditure composition, institutional quality, financial development, and the stage of structural reforms. However, empirical studies examining this relationship in Central Asian transition economies, particularly Uzbekistan, are extremely limited, and the question of how fiscal policy effectiveness changes during deep structural transformation remains poorly explored empirically (Halmuratov et al., 2025a). Most existing studies do not account for structural disruptions and regime shifts induced by reforms, which increases the risk of bias in results for transition economies.

In order to fill the literature gaps identified above, this study aims to empirically examine the short-run and long-run relationship between fiscal deficit and economic growth in Uzbekistan over the period 2000–2025, taking into account the structural impact of the 2017 economic liberalization period. To this end, the following hypotheses are put forward:

H1: Fiscal deficit has a statistically significant short-run impact on economic growth in Uzbekistan.

H2: Fiscal deficit has a statistically significant long-run impact on economic growth in Uzbekistan.

H3: There is a stable cointegrating relationship between fiscal deficit and economic growth.

In addition, the inclusion of a dummy variable representing the 2017 reform period in the analysis allows us to assess the impact of structural transformation on the nature of macroeconomic relations.

2. METHODS

To examine the relationship between fiscal deficit and economic growth in Uzbekistan, while explicitly accounting for the structural reforms initiated in 2017, the empirical analysis specifies the following baseline functional relationship:

$$GR_t = f\begin{pmatrix} FD_t, INF_t, LNEXG_t, \\ GI_t, CRD_t, REFORM_t \end{pmatrix}, \quad (1)$$

where GR_t is the economic growth rate; FD_t is the fiscal deficit (% of GDP); INF_t is the inflation rate; $LNEXG_t$ is the natural logarithm of the official exchange rate; GI_t is gross investment (% of GDP); GRD_t is domestic credit to the private sector (% of GDP); and $REFORM_t$ is a structural reform dummy variable. The exchange rate is transformed into logarithmic form to reduce skewness and to interpret coefficients as elasticities.

The reform dummy variable is defined as follows to capture the structural transformation associated with Uzbekistan's economic liberalization program:

$$REFORM_t = \begin{cases} 0, t < 2017 \\ 1, t \geq 2017 \end{cases}. \quad (2)$$

The selection of the appropriate econometric framework is guided by the statistical properties of the variables. Since preliminary unit root analysis indicates a mixed order of integration among the series – some variables are stationary at level (I(0)), while others become stationary after first differencing (I(1)) – the Autoregressive Distributed Lag (ARDL) bounds testing approach developed by Pesaran et al. (2001) is employed. The ARDL framework offers three key advantages relevant to the present study: it accommodates variables of mixed integration order, performs reliably with relatively small samples, and simultaneously estimates short-run dynamics and long-run equilibrium relationships within a single specification.

The general ARDL (p, q1, q2, ..., qk) representation of the model is expressed as:

$$\begin{aligned} GR_t &= \alpha_0 + \sum_{i=1}^{p}\alpha_i GR_{t-i} + \sum_{j=0}^{q_1}\beta_j FD_{t-j} \\ &+ \sum_{j=0}^{q_2}\gamma_j INF_{t-j} + \sum_{j=0}^{q_3}\delta_j LNEXG_{t-j} \\ &+ \sum_{j=0}^{q_4}\theta_j GI_{t-j} + \sum_{j=0}^{q_5}\phi_j CRD_{t-j} \\ &+ \psi REFORM_t + \varepsilon_t, \end{aligned} \quad (3)$$

where ε_t denotes the white-noise error term and the lag orders (p, q1, ..., q5) are determined endogenously based on the Akaike Information Criterion (AIC), with a maximum lag length of two given the limited number of annual observations.

The existence of a long-run equilibrium relationship among the variables is examined using the bounds testing procedure based on the unrestricted error correction representation of equation (3):

$$\begin{aligned} \Delta GR_t &= \alpha_0 + \sum_{i=1}^{p-1}\alpha_i \Delta GR_{t-i} + \sum_{j=0}^{q_1-1}\beta_j \Delta FD_{t-j} \\ &+ \sum_{j=0}^{q_2-1}\gamma_j \Delta INF_{t-j} + \sum_{j=0}^{q_3-1}\delta_j \Delta LNEXG_{t-j} \\ &+ \sum_{j=0}^{q_4-1}\theta_j \Delta GI_{t-j} + \sum_{j=0}^{q_5-1}\phi_j \Delta CRD_{t-j} + \lambda_1 GR_{t-1} + \\ &\lambda_2 FD_{t-1} + \lambda_3 INF_{t-1} + \lambda_4 LNEXG_{t-1} \\ &+ \lambda_5 GI_{t-1} + \lambda_6 CRD_{t-1} + \psi REFORM_t + \varepsilon_t \ . \end{aligned} \quad (4)$$

The null hypothesis of no cointegration, *H0:* $\lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0$, is tested against the alternative of cointegration using the *F*-statistic proposed by Pesaran et al. (2001). If the calculated *F*-statistic exceeds the upper bound critical value, the null hypothesis is rejected, confirming the existence of a stable long-run relationship. Once cointegration is established, the short-run dynamics are obtained from the error correction model:

$$\Delta GR_t = \alpha_0 + \sum \alpha_i \Delta X_{t-i} + \omega ECM_{t-1} + \varepsilon_t, \quad (5)$$

where the error correction term ECM_{t-1} captures deviations from the long-run equilibrium and is constructed as:

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$$ECM_{t-1} = GR_{t-1} - \hat{\beta}_1 FD_{t-1} - \hat{\beta}_2 INF_{t-1} - \hat{\beta}_3 LNEXG_{t-1} - \hat{\beta}_4 GI_{t-1} - \hat{\beta}_5 CRD_{t-1}. \quad (6)$$

The coefficient ω measures the speed of adjustment toward long-run equilibrium following short-term shocks; it is expected to be negative and statistically significant, with larger absolute values indicating faster convergence.

Prior to ARDL estimation, the stationarity properties of the variables are examined using the Augmented Dickey-Fuller (ADF) unit root test. However, conventional unit root tests may produce biased results when structural breaks are present in the data. Given Uzbekistan's economic liberalization program implemented in 2017 and other macroeconomic shocks during the sample period – including the 2008–2009 global financial crisis and the 2020 COVID-19 pandemic – the analysis is supplemented with the Zivot-Andrews structural breakpoint test (Qodirov et al., 2024). This test allows for the endogenous identification of a single structural break within the time series and is specified as:

$$\Delta Y_t = \mu + \beta t + \theta DU_t + \gamma DT_t + \alpha Y_{t-1} + \sum_{i=1}^{k} c_i \Delta Y_{t-i} + \varepsilon_t, \quad (7)$$

where DU_t is an intercept dummy capturing the break in the level, DU_t is a trend dummy capturing the break in the slope, and the break date is determined endogenously by selecting the date that minimizes the t-statistic on α.

To account explicitly for the structural transformation associated with the 2017 economic reforms, including currency liberalization, financial sector restructuring, trade openness, tax modernization, and institutional changes, a reform dummy variable is incorporated directly into the ARDL specification. This approach captures regime-dependent effects and improves the robustness of the empirical estimates against misspecification arising from unmodeled structural changes.

The empirical analysis is based on annual time-series data covering the period 2000–2025, drawn from multiple official sources to ensure reliability and consistency. Macroeconomic indicators including the GDP growth rate, inflation rate, gross investment, and exchange rate are obtained from the World Bank's World Development Indicators (WDI) database. Data on fiscal deficit, defined as general government net lending/borrowing as a percentage of GDP, are sourced from the International Monetary Fund's World Economic Outlook (WEO) database. Domestic credit to the private sector is obtained from the World Bank's Global Financial Development Database. A detailed description of the variables, units of measurement, and sources is presented in Table 1.

All econometric estimates are performed using EViews 12. The robustness of the estimated model is verified through a battery of diagnostic tests, including the Breusch-Pagan-Godfrey test for heteroskedasticity, the Durbin–Watson statistic for first-order serial correlation, and the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests for parameter stability. Together, these procedures ensure that the empirical inferences drawn from the ARDL framework are statistically reliable and structurally consistent.

Table 1. Description of variables, units of measurement, and data sources

Variable	Symbol	Description	Unit	Source
Economic Growth	GR	Annual growth rate of real GDP	Percent	WDI Database
Fiscal Deficit	FD	General government net lending/borrowing	% of GDP	IMF WEO Database
Inflation	INF	Consumer price index, annual change	Percent	WDI Database
Exchange Rate	LN_EXG	Natural logarithm of official exchange rate (LCU per USD)	Log	WDI Database
Gross Investment	GI	Gross capital formation	% of GDP	WDI Database
Domestic Credit	CRD	Domestic credit to private sector	% of GDP	WDI Database

Note: LCU = Local Currency Unit; GDP = Gross Domestic Product; WDI = World Development Indicators; IMF WEO = International Monetary Fund World Economic Outlook.

3. RESULTS

Table 2 presents descriptive statistics for the variables used in the empirical analysis covering the period 2000–2025. The average economic growth rate (GR) in Uzbekistan was 6.34%, reflecting relatively stable macroeconomic performance over the study period. The fiscal deficit (FD) averaged –0.39% of GDP, indicating that fiscal policy remained broadly balanced, with periods of both deficit and surplus. Inflation (INF) exhibited considerable variability, with a mean of 13.23%, reflecting episodes of macroeconomic adjustment, particularly during the reform period. Gross investment (GI) averaged 26.86% of GDP, while domestic credit to the private sector (CRD) demonstrated substantial growth over time, consistent with financial sector development reforms.

The Jarque-Bera statistics indicate that most variables follow approximately normal distributions, except inflation, which displays some deviation due to episodic price adjustments associated with economic reforms.

Table 3 presents the correlation matrix. A moderate positive correlation is observed between fiscal deficit and economic growth (r = 0.56), suggesting a potential expansionary role of fiscal policy. Inflation exhibits a negative correlation with growth (r = –0.51), consistent with macroeconomic theory. High correlation between exchange rate and investment reflects structural changes following currency liberalization reforms.

Prior to ARDL estimation, the stationarity properties of the variables were examined using both the Augmented Dickey–Fuller (ADF) test and the Zivot–Andrews structural breakpoint test to account for potential endogenous structural changes associated with Uzbekistan's economic reforms.

The ADF results (Table 4) indicate that GR and INF are stationary at level, while FD, LN_EXG, GI, and CRD become stationary after first differencing. This mixed order of integration justifies the use of the ARDL bounds testing methodology.

To account for potential structural changes, the Zivot-Andrews test was applied (Table 5). The results confirm the presence of structural breaks in several variables, particularly around 2017, coinciding with Uzbekistan's currency liberalization and economic reform program. Importantly, none of the variables are integrated of order two, confirming the suitability of the ARDL approach.

The Zivot-Andrews results reveal several important patterns. First, the exchange rate variable (LN_EXG) shows a structural break precisely in 2017 at both level and first difference, coinciding with Uzbekistan's currency liberalization reform.

Table 2. Descriptive statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
GR	6.3397	6.8270	9.5000	1.5630	1.7830
FD	–0.3874	–0.2670	5.9710	–6.3150	3.5447
INF	13.2285	12.0990	27.2910	7.3250	5.3585
LN_EXG	7.8088	7.5468	9.4665	5.4664	1.1675
GI	26.8563	25.7420	36.4430	16.4880	6.1576
CRD	16.94654	11.87650	40.36100	6.0000	10.51597

Note: GR = GDP growth rate (%); FD = Fiscal deficit (% of GDP); INF = Inflation rate (%); LN_EXG = Natural logarithm of exchange rate; GI = Gross investment (% of GDP); CRD = Domestic credit to private sector (% of GDP).

Table 3. Correlation matrix

Variable	GR	FD	INF	LN_EXG	CRD	GI
GR	1.000000	0.565311	–0.506275	–0.011403	–0.077446	0.137475
FD	0.565311	1.000000	–0.262096	–0.074958	–0.293085	0.155280
INF	–0.506275	–0.262096	1.000000	–0.513697	–0.344882	–0.448456
LN_EXG	–0.011403	–0.074958	–0.513697	1.000000	0.878534	0.901308
CRD	–0.077446	–0.293085	–0.344882	0.878534	1.000000	0.802877
GI	0.137475	0.155280	–0.448456	0.901308	0.802877	1.000000

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Table 4. Augmented Dickey-Fuller unit root test results

Variable	Level		First Difference		Order of Integration
	t-Statistic	Prob.	t-Statistic	Prob.	
GR	–3.5344	0.0154**	–	–	I(0)
INF	–4.4716	0.0018***	–	–	I(0)
FD	–1.6680	0.4345	–4.7539	0.0009***	I(1)
LN_EXG	1.3543	0.9513	–2.2411	0.0269**	I(1)
GI	–1.3902	0.5706	–5.3865	0.0002***	I(1)
CRD	1.1295	0.9966	–3.0446	0.0449**	I(1)

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. Lag length selected automatically based on Schwarz Information Criterion (SIC).

Table 5. Zivot–Andrews structural break unit root test

Variable	Level t-stat	Break Year	First Difference t-stat	Break Year
GR	–5.8276***	2009	–10.6627***	2020
INF	–4.5596	2008	–5.5283***	2016
FD	–6.2402***	2010	–6.3349***	2008
LN_EXG	–5.7080***	2017	–7.6548***	2017
GI	–4.6744*	2014	–8.6522***	2018
CRD	–4.1387	2015	–5.3999***	2017

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The Zivot-Andrews test allows for one endogenous structural break in both the intercept and trend.

Second, domestic credit (CRD) exhibits a break in 2017 at first difference, reflecting banking sector restructuring. Third, economic growth (GR) shows breaks in 2009 and 2020, corresponding to the global financial crisis and COVID-19 pandemic, respectively. These endogenously identified breakpoints validate the inclusion of the 2017 reform dummy in the empirical specification.

The ARDL bounds testing procedure was employed to examine the existence of a long-run relationship among the variables. The results presented in Table 6 indicate that the calculated *F*-statistic exceeds the upper bound critical value at conventional significance levels, confirming the presence of a stable cointegrating relationship between fiscal deficit and economic growth.

Table 7 reports the estimated long-run coefficients derived from the ARDL model. The fiscal deficit (FD) exhibits a positive and statistically significant coefficient of 0.2418 ($p = 0.0038$), indicating that a one percentage point increase in the fiscal deficit is associated with a 0.24 percentage point increase in economic growth in the long run. The exchange rate (LN_EXG) shows a negative coefficient of –1.3652 ($p = 0.0568$), while domestic credit to the private sector (CRD) demonstrates a positive and significant effect ($\beta = 0.1462$, $p = 0.0174$). Inflation (INF) has a negative coefficient of –0.1891 ($p = 0.0746$), and gross investment (GI) shows a negative but statistically insignificant effect ($\beta = -0.0613$, $p = 0.3904$).

The short-run dynamics are presented in Table 8. The error correction term is negative and highly significant (–1.8620), confirming the existence of a long-run equilibrium relationship and indicating rapid adjustment toward equilibrium following short-term shocks.

Table 6. ARDL bounds test results

Test Statistic	Value	Significance Level	I(0) Bound	I(1) Bound
F-statistic	8.9471	10%	1.75	2.87
k	6	5%	2.04	3.24
		2.5%	2.32	3.59
		1%	2.66	4.05

Note: k represents the number of regressors. Critical values are based on Pesaran et al. (2001).

Table 7. Estimated long-run coefficients of the ARDL model: Dependent variable – Economic growth (GR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FD	0.2418	0.0647	3.7396	0.0038***
INF	–0.1891	0.0950	–1.9901	0.0746*
LN_EXG	–1.3652	0.6342	–2.1528	0.0568*
CRD	0.1462	0.0514	2.8457	0.0174**
GI	–0.0613	0.0682	–0.8979	0.3904
REFORM2017	–6.1963	2.3363	–2.6522	0.0225**

Note: ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Table 8. Short-run dynamics and Error Correction Model (ECM) results: Dependent variable – D(GR)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FD)	0.1778	0.0737	2.4130	0.0365**
D(INF)	0.0128	0.0694	0.1849	0.8570
D(INF(–1))	0.1982	0.0573	3.4589	0.0061***
D(LN_EXG)	–5.9898	1.1844	–5.0572	0.0005***
D(LN_EXG(–1))	5.6154	1.6249	3.4558	0.0062***
CointEq(–1)	–1.8620	0.2480	–7.5074	0.0000***

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

Fiscal deficit exhibits a positive and statistically significant short-run effect on growth, supporting the expansionary fiscal policy hypothesis.

The overall explanatory power of the model is reported in Table 9. The R-squared value of 0.9039 indicates that approximately 90% of the variation in economic growth is explained by the model, while the adjusted R-squared (0.8619) confirms a strong fit after accounting for the number of regressors. The Durbin–Watson statistic of 2.2451 suggests no serious first-order serial correlation.

Table 9. Model fit statistics

Statistic	Value
R-squared	0.9039
Adjusted R-squared	0.8619
S.E. of regression	0.7673
Durbin-Watson statistic	2.2451
Akaike info criterion	2.5692
Schwarz criterion	2.9619

The Breusch-Pagan-Godfrey test was employed to examine the presence of heteroskedasticity in the model residuals. The results presented in Table 10 indicate that the null hypothesis of homoskedasticity cannot be rejected at conventional significance levels, suggesting that the residuals are homoskedastic.

Table 10. Breusch-Pagan-Godfrey heteroskedasticity test

Test	Statistic	Prob.
F-statistic	0.6597	0.7624
Obs*R-squared	11.0802	0.6041
Scaled explained SS	1.2769	1.0000

The Durbin-Watson statistic of 2.2451 indicates no evidence of first-order serial correlation in the model residuals.

The stability of the ARDL model parameters was assessed using the Cumulative Sum (CUSUM) and Cumulative Sum of Squares (CUSUMSQ) tests. As illustrated in Figure 1, the CUSUM statistics remain within the 5% critical bounds throughout the sample period, confirming that the estimated parameters are stable over time.

All three hypotheses are supported by the empirical results. The short-run ($\beta = 0.178$) and long-run ($\beta = 0.242$) coefficients of the fiscal deficit are positive and statistically significant, confirming H1 and H2, while the bounds test F-statistic (8.947), exceeding the 1% upper critical bound, confirms the cointegrating relationship postulated in H3.

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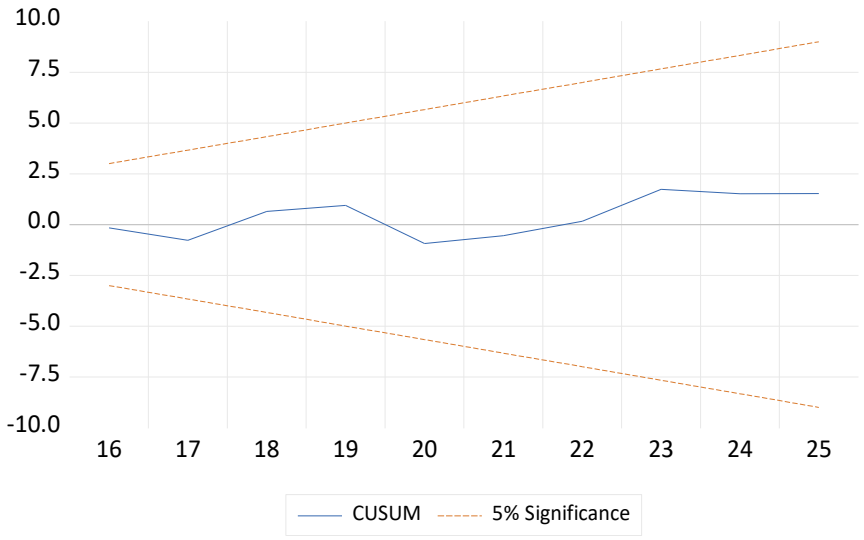

Figure 1. CUSUM test for parameter stability of the ARDL model, 2000–2025

4. DISCUSSION

The empirical results of this study provide a new understanding of the relationship between fiscal deficit and economic growth in Uzbekistan, in the context of structural reforms that began in 2017. A positive and statistically significant short-run ($\beta = 0.178$) and long-run ($\beta = 0.242$) effect of fiscal deficit supports the Keynesian theoretical view and confirms the hypothesis of the stimulating role of deficit-financed public spending in economic activity. This result is close to the conclusions obtained by Gllogjani and Balaj (2021) for six transition economies of South-Eastern Europe, and reinforces the general rule that the productive nature of public spending in economies undergoing structural transformation ensures the positive impact of fiscal expansion on growth. Similarly, the evidence from Fischer et al. (1996) for Central and Eastern Europe is consistent with the Uzbek experience, suggesting that fiscal discipline and structural reforms act as complementary tools to support growth.

However, the results are in contrast to many studies conducted in emerging economies in Asia and South Asia. Amgain and Dhakal (2017) found a negative effect of fiscal deficits in a panel ARDL analysis of 20 Asian countries; Tung (2018) found a similar negative relationship for Vietnam over the period 1986–2015; and Hyder (2001) found a strong effect of crowding-out mechanisms in the case of Pakistan. Several contextual factors play an important role in explaining the contrast between the positive result in the Uzbek context and this negative evidence. First, the budget deficit in Uzbekistan remained relatively moderate (on average, –0.39%) during the period under study and did not lead to a sharp increase in the debt burden, unlike the chronic, high deficits in many emerging economies. Second, the composition of government spending-particularly investments in infrastructure, industrial modernization, and human capital-has been more dominant than current consumption spending. Tung (2018) identified the dominance of current spending as the main reason for the negative outcome for Vietnam. Third, the structural features of Uzbekistan's financial system (the complementarity of public sector activity with private sector activity) may have weakened the classical crowding-out effect.

The negative and statistically significant coefficient of the 2017 reform dummy variable ($\beta = -6.196$) deserves special attention. This result may seem paradoxical at first glance, but it is fully consistent with the theoretical and empirical literature on transition economies. As Blanchard (2019) and Égert (2015) have noted, structural reforms impose adjustment costs in the early stages: price liberalization, exchange rate devaluation, and institutional restructuring create short-term macroeconomic instability. Kouamé and Tapsoba (2018) also show that the impact of reforms on productivity is not immediate, but rather occurs after a certain time lag. Therefore, this coefficient should

be interpreted as a natural cost of the transition period, rather than as an inefficiency of the reforms. Moreover, the fact that the Zivot-Andrews test identified a structural break in the exchange rate (LN_EXG) and domestic credit (CRD) variables in 2017 further substantiates this interpretation. It confirms that the reforms led to a regime change in some macroeconomic parameters.

The long-run positive coefficient of domestic credit (β = 0.146) supports the classic thesis of the role of financial intermediation in economic growth (King & Levine, 1993; Levine, 2005; Xolmurotov et al., 2025). This result is consistent with Koh (2017) that financial development acts as a strengthening agent for fiscal policy transmission. Evidence from emerging economies by Ricky Okine et al. (2023) also supports the Uzbek experience, suggesting that institutional quality and financial depth jointly shape fiscal policy outcomes. Meanwhile, the existence of financial development as an independent growth factor suggests that the complementary relationship between the public sector and private financial intermediation is working effectively; this provides an empirical explanation for the weak crowding-out effect.

The negative long-run effect of inflation (β = –0.189) and the negative effect of exchange rate depreciation on growth (β = –1.365) provide empirical evidence that macroeconomic stability is a condition for the effectiveness of fiscal policy. These results are consistent with the general conclusion of Reinhart and Rogoff (2010) that high inflation is negatively related to growth, and also replicate the evidence of the negative long-run effect of macroeconomic instability on economic performance established by Woo and Kumar (2015). For Uzbekistan, this result is particularly relevant, as it suggests that the large devaluation of the som and high inflation after the 2017 currency liberalization partially undermined the effectiveness of fiscal expansion. Therefore, coordinated implementation of fiscal and monetary policies becomes an important condition for the transition period.

The large and negative value of the coefficient in the error correction model (ω = –1.862) indicates a high speed of return to long-run equilibrium. This result, compared with the relatively slow adjustment speed obtained by Gllogjani and Balaj (2021) for Southeastern European countries, allows us to speculate that Uzbekistan's institutional features (centralized policy implementation capacity and coordination mechanisms inherited from central planning) enhance the speed of response to macroeconomic shocks. At the same time, such a high speed of adjustment empirically supports the robustness and correctness of the model's specification.

The overall results support all three hypotheses of the study: *H1* and *H2* confirm the significant short- and long-run effects of fiscal deficits, respectively. At the same time, *H3* strongly suggests the cointegrating relationship, as the *F*-statistic of the ARDL linkage test (8.947) clearly exceeds the critical upper bound. Overall, the experience of Uzbekistan confirms the view advanced by modern economic thought that the relationship between fiscal deficits and economic growth is determined not by universal, but by country-specific institutional, financial, and structural conditions. The positive effect of deficits is not an automatic outcome, but rather the result of the interaction of a productive expenditure structure, a moderate deficit level, active structural reforms, and a developing financial sector. This finding is consistent with the finding by Sore et al. (2024) using a systematic GMM method for sub-Saharan African countries that fiscal policy outcomes are strongly dependent on the quality of governance, and reiterates the limitations of generalizing across countries.

CONCLUSION

This study aims to empirically examine the short-run and long-run relationship between fiscal deficit and economic growth in Uzbekistan over the period 2000–2025, taking into account the dynamics of structural reforms.

The ARDL linkage analysis revealed a positive and statistically significant impact of fiscal deficit on economic growth in the short run (β = 0.178) and the long run (β = 0.242), as well as the existence

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of a stable cointegrating relationship between the variables. The Zivot–Andrews test identified 2017 as the endogenous structural breakpoint for the exchange rate and domestic credit variables, empirically confirming the short-term adjustment costs of the transition period through the negative coefficient of the reform dummy (β = –6.196). Among the control variables, the positive impact of domestic credit and the negative impact of inflation and exchange rate depreciation were important determinants of the effectiveness of fiscal policy on macroeconomic stability and financial development.

These results suggest a number of implications for Uzbekistan and similar transition economies. First, a moderate fiscal deficit, when directed toward productive sectors (infrastructure, industrial modernization, and human capital), can be a growth-enhancing tool; that is, the impact of fiscal expansion is determined not by the size of the deficit but by the composition of expenditures and the institutional environment. Second, structural reforms should be viewed as an independent factor that changes the effectiveness of fiscal policy; initial adjustment costs are not a sign of reform inefficiency but rather a natural cost of long-term institutional transformation. Third, the positive effects of fiscal expansion will be fully realized only if macroeconomic stability (low and stable inflation and relative exchange rate stability) is maintained, which requires coordinated fiscal and monetary policies. Fourth, the development of the financial sector is an important factor in strengthening fiscal policy transmission channels, and the soundness of the banking system and the deepening of the credit market increase the effectiveness of fiscal measures.

There are some limitations to this study. The relatively short annual macroeconomic database may limit the precision of the econometric estimates. The use of aggregate indicators may obscure the differential effects between the structural components of government spending, current, capital, and social, in the following areas: assessing the disaggregated impact of fiscal spending by sector; examining the regime-dependence of the deficit-growth relationship using asymmetric models-such as NARDL or Markov-switching ARDL; and conducting comparative panel analyses covering Central Asian countries. Further research in this area may deepen understanding of the mechanisms that determine the effectiveness of fiscal policy in transition economies.

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REFERENCES

1. Adama, J., Ohwofasa, B., & Ayodele, V. (2019). Fiscal deficit and the growth of domestic output in Nigeria. *Theoretical and Practical Research in the Economic Fields, 10*(2), 150-158. Retrieved from https://ideas.repec.org/a/srs/jtpref/v10y2019i2p150-158.html
2. Al-Tamimi, K. A. M. (2020). The effect of budget deficit on the economy of Jordan. *WSEAS Transactions on Business and Economics, 17,* 753-758. https://doi.org/10.37394/23207.2020.17.73
3. Amgain, J., & Dhakal, N. K. (2017). Public revenue, fiscal deficit and economic growth: Evidence from Asian countries. *Journal of Economics and Political Economy, 4*(4), 329-342. Retrieved from https://journals.econsciences.com/index.php/JEPE/article/view/1482https://journals.econsciences.com/index.php/JEPE/article/view/1482
4. Arjomand, M., Emami, K., & Salimi, F. (2016). Growth and productivity; The role of budget deficit in the MENA selected countries. *Procedia Economics and Finance, 36,* 345-352. https://doi.org/10.1016/S2212-5671(16)30046-6
5. Aschauer, D. A. (1989). Is public expenditure productive? *Journal of Monetary Economics, 23*(2), 177-200. https://doi.org/10.1016/0304-3932(89)90047-0
6. Auerbach, A., Gorodnichenko, Y., McCrory, P. B., & Murphy, D. (2022). Fiscal multipliers in the COVID19 recession. *Journal of International Money and Finance, 126.* https://doi.org/10.1016/j.jimonfin.2022.102669
7. Barro, R. J. (1989). The Ricardian approach to budget deficits. *Journal of Economic Perspectives, 3*(2), 37-54. https://doi.org/10.1257/JEP.3.2.37
8. Bernheim, B. D. (1987). *Ricardian equivalence: An evaluation of theory and evidence* (NBER Working Paper No. w2330). Retrieved from https://papers.ssrn.com/abstract=227282
9. Blanchard, O. (2019). Public debt and low interest rates. *American Economic Review, 109*(4), 1197-1229. https://doi.org/10.1257/aer.109.4.1197
10. Égert, B. (2015). Public debt, economic growth and nonlinear effects: Myth or reality? *Journal of Macroeconomics, 43,* 226-238. https://doi.org/10.1016/j.jmacro.2014.11.006
11. Fischer, S., Sahay, R., & Végh, C. A. (1996). Stabilization and growth in transition economies: The early experience. *Journal of Economic Perspectives, 10*(2), 45-66. https://doi.org/10.1257/jep.10.2.45
12. Gllogjani, L., & Balaj, D. (2021). The assessment of fiscal deficit on economic growth in transition countries of South-Eastern Europe. *Journal of Liberty and International Affairs, 7*(3), 102-117. https://doi.org/10.47305/jlia2137102g
13. Halmuratov, G., Madraximov, Q., Zakirova, G., Xolmuratov, X., Djumabayeva, S., Yaqubova, Y., & Xolmurotov, F. (2025a). The impact of energy consumption and trade openness on economic growth in Uzbekistan: A Vecm approach. *International Journal of Energy Economics and Policy, 15*(2), 23-31. https://doi.org/10.32479/ijeep.17550
14. Halmuratov, G., Rustamov, K., Khankelov, T., Xolmuratov, X., Khudainazarov, S., Sabirjanov, T., & Xolmurotov, F. (2025b). The relationship between renewable energy production and economic growth: A short-term and long-term analysis in the case of Uzbekistan. *International Journal of Energy Economics and Policy*, *15*(3), 567-575. https://doi.org/10.32479/ijeep.18609
15. Hennach, M., & Echaoui, A. (2025). Assessing the short-and long-run relationships between fiscal deficit and economic growth in Morocco. *Public and Municipal Finance, 14*(4), 118-131. https://doi.org/10.21511/pmf.14(4).2025.09
16. Hyder, K. (2001). Crowding-out hypothesis in a vector error correction framework: A case study of Pakistan. *The Pakistan Development Review, 40*(4), 633-650. https://doi.org/10.30541/v40i4IIpp.633-650
17. Keynes, J. M. (1936). *The general theory of employment, interest, and money.* Palgrave Macmillan. Retrieved from https://www.marxists.org/reference/subject/economics/keynes/general-theory/
18. King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *Quarterly Journal of Economics, 108*(3), 717-737. https://doi.org/10.2307/2118406
19. Koh, W. C. (2017). Fiscal multipliers: New evidence from a large panel of countries. *Oxford Economic Papers, 69*(3), 569-590. https://doi.org/10.1093/oep/gpw066
20. Kouamé, W., & Tapsoba, S. (2018). *Structural reforms and firms' productivity: Evidence from developing countries* (IMF Working Papers No. WP/1863). Retrieved from https://www.imf.org/-/media/files/publications/wp/2018/wp1863.pdf
21. Levine, R. (2005). Chapter 12 Finance and growth: Theory and evidence. In P. Aghion & S. N. Durlauf (Eds.), *Handbook of Economic Growth* (vol. 1(part A), pp. 865-934). Elsevier. https://doi.org/10.1016/S1574-0684(05)01012-9
22. Mahfouz, S., Hemming, R., & Kell, M. (2002). *The effectiveness of fiscal policy in stimulating economic activity: A review of the literature* (IMF Working Papers No. 2002/208). International Monetary Fund. Retrieved from https://EconPapers.repec.org/RePEc:imf:imfwpa:2002/208
23. Nkrumah, K. O., Orkoh, E., & Owusu, A. M. (2016). Exploring the budget deficit-economic growth nexus: New evidence from Ghana. *Journal for the Advancement of Developing Economies, 5*(1), 4-18. Retrieved from https://digitalcommons.unl.edu/jade/3

http://dx.doi.org/10.21511/pmf.15(2).2026.09

24. Onwioduokit, E., & Inam, U. S. (2018). Budget deficit and economic growth in Liberia: An empirical investigation. *American Journal of Humanities and Social Sciences (AJHSS), 2*(6), 68-78. Retrieved from https://ajhssr.com/wp-content/uploads/2018/06/F18266878.pdf

25. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326. https://doi.org/10.1002/JAE.616

26. Qodirov, A., Urakova, D., Amonov, M., Masharipova, M., Ibadullaev, E., Xolmurotov, F., & Matkarimov, F. (2024). The dynamics of tourism, economic growth, and CO2 emissions in Uzbekistan: An ARDL approach. *International Journal of Energy Economics and Policy, 14*(6), 365-370. https://doi.org/10.32479/ijeep.16591

27. Reinhart, C. M., & Rogoff, K. S. (2010). Growth in a time of debt. *American Economic Review, 100*(2), 573-578. https://doi.org/10.1257/aer.100.2.573

28. Ricky Okine, C. K., Appiah, M., & Tetteh, D. (2023). The linkage between fiscal policy and financial development: Exploring the moderating role of institutional quality in emerging economies. *Organizations and Markets in Emerging Economies, 14*(3), 670-695. https://doi.org/10.15388/omee.2023.14.10

29. Sabr, S., Ahmed, Y., & Khan, T. (2021). Government budget deficit and economic growth: Evidence from Iraq 1980–2018. *The Arab Journal of Administration, 41*(1), 389-404. https://doi.org/10.21608/AJA.2021.151252

30. Sore, A. G., Ayana, I. D., & Demissie, W. M. (2024). On the fiscal deficit and economic growth in sub-Saharan Africa: A new evidence from system GMM. *PLOS ONE, 19*(7), Article e0303825. https://doi.org/10.1371/journal.pone.0303825

31. Tung, L. T. (2018). The effect of fiscal deficit on economic growth in an emerging economy: Evidence from Vietnam. *Journal of International Studies, 11*(3), 191-203. https://doi.org/10.14254/2071-8330.2018/11-3/16

32. Woo, J., & Kumar, M. S. (2015). Public debt and growth. *Economica, 82*(328), 705-739. https://doi.org/10.1111/ECCA.12138

33. Xolmurotov, F., Ibadullaev, E., Navruz-zoda, L., Narzullayeva, G., Ochilov, I., Rakhimova, G., & Xolmuratov, X. (2025). The role of renewable energy and trade openness in sustainable tourism development: Evidence from Uzbekistan. *Environmental Economics, 16*(3), 127-137. https://doi.org/10.21511/ee.16(3).2025.09

34. Yusupov, A., Gafurov, U., Xolmurotov, F., Ibadullaev, E., Berdiyarov, B., Islamkulov, A., & Xolmuratov, X. (2026a). Trade-environment nexus under export-oriented and import-driven regimes: Markov regime-switching regression evidence from Uzbekistan. *Environmental Economics, 17*(2), 41-51. https://doi.org/10.21511/ee.17(2).2026.04

35. Yusupov, A., Tukhtaeva, Z., Xolmurotov, F., Ishmuradov, S., Umirov, A., Karshiev, F., & Xolmuratov, X. (2026b). Trade openness, economic growth, and carbon emissions in Uzbekistan: Evidence from ARDL and WTO accession context. *Environmental Economics, 17*(1), 182-199. https://doi.org/10.21511/ee.17(1).2026.14