Research Paper

Measuring and Analyzing the Impact of Structural Changes in Monetary Policy on Turkish Economic Growth for the Period (1981–2025)

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Abstract

Monetary policy and its instruments constitute the fundamental pillar for achieving economic stability, particularly in emerging economies facing persistent structural fluctuations. The problem of this study lies in the volatile effectiveness of traditional monetary policy tools in Turkey amid high inflation and frequent structural breaks, raising a fundamental question about the most influential channel for productive activity. Accordingly, the study aims to measure and analyze the impact of structural changes in monetary policy instruments on economic growth in Turkey during the period (1981–2025). To achieve this, the research adopted the Indicator Saturation Method (ISM) for its ability to identify structural breaks and integrate them into the econometric model, while analyzing variables such as broad money supply, real interest rates, and exchange rates. The key results revealed a weak impact of the broad money supply on growth, in contrast to the pivotal role of the exchange rate channel as a primary driver of economic activity. Furthermore, the model identified significant structural breaks in (2003, 2011, and 2022), reflecting the impact of radical political and economic shifts. The study's main conclusions and recommendations highlight the limited effectiveness of the "liquidity channel" in high-inflation environments. Therefore, the study recommends that monetary policymakers focus on exchange rate stability and real interest rate management as more efficient tools for stimulating sustainable growth and enhancing economic resilience to future shocks.

Keywords:

Structural Changes Monetary policy, economic growth, Indicator Saturation Methods

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ورقة بحثية

قياس وتحليل أثر التغيرات الهيكلية في السياسة النقدية على النمو الاقتصادي التركي للمدة (1981–2025)

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المستخلص

تعد السياسة النقدية وأدواتها الركيزة الأساسية لتحقيق الاستقرار الاقتصادي، لا سيما في الاقتصادات الناشئة التي تواجه تقلبات هيكلية مستمرة. وتتبلور مشكلة الدراسة في تذبذب فاعلية الأدوات النقدية التقليدية في تركيا جراء معدلات التضخم المرتفعة والانكسارات الهيكلية المتكررة، مما يثير تساؤلاً جوهرياً حول القناة الأكثر تأثيراً في النشاط الإنتاجي. وبناءً عليه، تهدف الدراسة إلى قياس وتحليل أثر التغيرات الهيكلية في أدوات السياسة النقدية على النمو الاقتصادي في تركيا خلال المدة (1981–2025). ولتحقيق ذلك، اعتمدت البحث منهجية تشبع المؤشرات (Indicator Saturation Methods) لقدرتها العالية على تحديد الانكسارات الهيكلية ودمجها في الأنموذج القياسي، مع تحليل متغيرات عرض النقد، وسعر الفائدة الحقيقي، وسعر الصرف. وخلصت النتائج الرئيسة إلى ضعف تأثير عرض النقد الواسع في النمو مقابل الدور المحوري لقناة سعر الصرف بوصفها فصيلاً رئيساً للنشاط الاقتصادي، كما نجح الأنموذج في رصد انكسارات جوهرية في الأعوام (2003، 2011، 2022) تعكس أثر التحولات السياسية والاقتصادية الجذرية. وتتمثل أهم استنتاجات وتوصيات الدراسة في إثبات محدودية "قناة السيولة" في بيئات التضخم المرتفع؛ لذا توصي الدراسة بضرورة تركيز صانع القرار النقدي على استقرار سعر الصرف وإدارة أسعار الفائدة الحقيقية بوصفها أدوات أكثر كفاءة لتحفيز النمو المستدام وتعزيز مرونة الاقتصاد في مواجهة الصدمات المستقبلية.

الكلمات المفتاحية:

التغيرات الهيكلية ، السياسة النقدية، النمو الاقتصادي، منهجية (indictor saturation methods)

مجلة

تنمية الرافدين

***(TANRA):* مجلة علمية، فصلية، دولية، مفتوحة الوصول، محكمة.**

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1. Introduction

Monetary policy serves as a cornerstone of macroeconomic management, designed to steer economic stability and foster sustainable growth. By manipulating key instruments—namely money supply, interest rates, and exchange rates—central banks aim to influence aggregate demand and control inflationary pressures (Mishkin, 2023). However, the effectiveness of these tools is not uniform; it is highly contingent upon the institutional framework and the prevailing economic shocks (Clarida et al., 2021). In the context of emerging markets, Turkey presents a unique and complex case study. Over the past four decades (1981–2025), the Turkish economy has transitioned from a semi-closed system to a globally integrated one, marked by profound shifts in monetary regimes. This trajectory includes the high-inflation era of the 1990s, the adoption of formal inflation targeting post-2001, and the recent unorthodox policy experiments that have significantly impacted the Turkish Lira's stability (Acemoglu & Ucer, 2020; Akcay & Gunay, 2022). These structural transformations have not only altered the transmission mechanism of monetary policy but have also redefined the relationship between financial stability and real economic output. As Turkey navigates the challenges of the mid-2020s, understanding the long-term impact of these policy shifts through advanced econometric modeling becomes crucial for sustainable growth.

1.2. The importance of research

This study is essential because it intends to evaluate how well the management of monetary policy tools contributed to the economic growth of Turkey over the years 1981–2025. It is a period that allows observing how the monetary policy has changed through different stages of the crises, transformations, and economic changes. The importance of the research also derives from its being not confined to gauging the direct relationship between the variables but using a more detailed approach which can identify the temporal changes in structures and take them into account in the econometric models.

1.3. Research Problem

Despite the strategic role of monetary policy, the Turkish economy (1981–2025) has faced a persistent "credibility gap" and diminishing efficacy of traditional monetary channels due to chronic inflation and frequent structural breaks. The core problem lies in the "inflationary inertia," where aggressive money supply expansion and interest rate volatility often fail to stimulate productive growth, instead fueling currency depreciation (Gürkaynak et al., 2023). This creates a paradox: while monetary tools aim for stability, their structural instability especially the exchange rate pass-through—may hinder long-term growth (Binici et al., 2022). Accordingly, the research problem is formulated in the following question:

What is the impact of structural changes in monetary policy instruments specifically money supply, real interest rates, and exchange rates on Turkey’s economic growth trajectory during 1981–2025?

1.4. Research Objectives

Study the changes of the monetary policy in Turkey from 1981 to 2025. Evaluate the impact of structural changes in monetary policy on economic growth in Turkey.Assess the capability of the Central Bank in controlling monetary policy instruments during the times of economic crises.

1.5. Research Hypotheses

The research presumes that alterations of the structures of the key instruments of monetary policy such as the money supply, the real interest rate, and the exchange rate have had a considerable influence on the economic development of Turkey in the period 1981-2025.

1.6. Research Methodology

The study uses a quantitative analytical approach concentrating mainly on analyzing economic relations among variables through time-series data. The primary aim is to determine how much monetary policy measures have influenced economic growth in Turkey from 1981 to 2025.

2. Literature Review

Theore, concerning Turkish economy, which is a leading example of emerging markets that are financially open but suffer from monetary volatility, has been an emphasis of economists for quite a long time. A number of scholars have done research on how well the monetary policy tools like the money supply, interest rate, and exchange rates can be used to stimulate growth and fight inflation.

Aizenman, Jinjarak & Chinn (2023), The paper analysed the Turkey's condition in a "weak monetary policy" scenario whereby short-term official interest rates were lowered despite inflation and exchange rate getting worse. To capture the relationships between interest rates, inflation, and the exchange rate the authors employed an SVAR model. One of its finding was that the decrease in interest rates led to depreciation of the local currency and the rise of inflation without any positive side to growth. This work also held that as a result of the Central Bank losing touch with reality, it could be the cause of the loss of bank's credibility. In addition, it presented the fact that the reduced effectiveness of the monetary policy to achieve its goals was largely because the Central Bank of Turkey was not sufficiently independent.

Turan & Yıldırım (2022), This paper carried out a quantitative experiment to analyze the transmission of monetary shocks in the Turkish economy through a Threshold VAR model over 2006–2019 period. The researchers concentrated on the interest-rate channel and its interaction with different volatility levels of the economy. The findings indicted that monetary policy was most effective during periods of high volatility when growth rates were more sensitive to interest rate changes as compared to stable periods. The article likewise found out that after 2018 the change in the Central Bank policy led to a reduction of the ability of interest rates to control inflation because the exchange rate deteriorated. The study concludes by stating that the effectiveness of monetary policy in Turkey is not constant but fluctuates and depends on various factors such as economic conditions and trust in the central bank.

CBRT Research Department 2021, The existing quantitative research study was aimed at measuring the response function of the Central Bank of Turkey to the macroeconomic environment. The reaction functions were examined based on the inflation and GDP reaction functions. The investigation changed the focus to the relations from the central bank objectives and functions as well as gdp structure by using the gdp model. The results showed that the central bank was responsive to inflation and that growth of gdp was largely ignored, Moreover, there was a transition in the central bank functions with inflation becoming the priority over economic growth that was contracting.The monetary policy phenomenon in Turkey was illustrated as a reactive one,in which the system is not prepared in advance and responds to the crisis through the economy's mechanism that is derived after the crisis.

Bank for International Settlements (BIS) (2020), The manuscript was among numerous institutional documents that the BIS had released and dealt with the problem of the interaction of monetary and macroprudential policies in Turkey. A major concern was the use of reserve requirements and the loan-to-deposit ratio together with interest rates as macroprudential tools. The key conclusion of the study was that the only major effect of the short-lived protection of the financial system brought about by the combination of both the traditional and non-traditional instruments, while the impact on growth was very small. Moreover, the study argues that monetary policy in Turkey has been a major factor in the reduction of financial risks but that its contribution towards sustainable economic growth in the real sector has been very limited.

2.1. Differences Between Previous Studies and the Current Study

This research is different from those done before in the aspects of the time period, the methods used, and the scope of the study. It looks at 1981–2025, while majority of the studies have been focusing on shorter periods. Besides that, it also uses the Indicator Saturation Methods technique which can locate structural breaks in time-series data, whereas previous studies performed mainly VAR and SVAR models. Moreover, this paper has extended the list of variables to include broad money supply, real interest rate, and exchange rate, thus providing more insightful explanations of how the monetary policy instruments affect the economic growth of Turkey.

2.2. The Conceptual Framework of the Relationship Between Monetary Policy Instruments and Economic Growth in Turkey

2.2.1. Monetary Policy and Its General Concept

Monetary policy is referred to as a series of steps that the central bank takes to achieve economic stability by controlling money supply, interest rates, and exchange rate in such a way that economic growth and price stability are kept in balance (Mishkin, 2019). As a macroeconomic tool, it is considered the most important one, as it provides the monetary authorities with the means to control aggregate demand, investment, and inflation by using different instruments. According to the Keynesian theoretical framework, monetary policy is an efficient tool for solving issues of economic downturn and getting the economy back on the track by way of reduced interest rates and increased money supply (Schumpeter, 1936). On the other hand, the Monetarist School, headed by Friedman, considers the main objective of monetary

policy to be the control of money supply so as to prevent inflation, and put forward the idea that inflation is a monetary phenomenon (Clarida, 1999). Contemporary theories (New Keynesian Models) suggest that the influence of monetary policy is felt through several channels of communication, the most important of these being interest rates, credit, and exchange rate.

2.2.2. Monetary Policy Instruments

Monetary policy instrument are many and varied and extend from conventional tools such as the interest rate, open market operations, and the required reserve ratio to non-conventional instruments like liquidity management, quantitative guidance, and asset purchase programs (Blinder, 2010). The real interest rate is generally regarded as the key instrument that sets the cost of capital and either stimulates or limits investment, while the money supply (M2) is a broad measure of liquidity in the economy. The exchange rate, on the other hand, is employed to bring about external balance and bolster trade competitiveness. These are the means that interlink to produce a comprehensive impact on the economic sphere. In the case of the Turkish economy, the Central Bank of the Republic of Turkey (CBRT) is the institution that undertakes the implementation of these measures within the framework of its twofold objectives of maintaining price stability and fostering economic growth. Over a period of more than four decades, its instruments have changed from direct credit controls to inflation targeting regimes adopted after 2001 (CBRT, 2023).

2.2.3. Transmission Mechanisms of Monetary Policy to Economic Growth

Monetary policy relies on what are called monetary transmission channels, the doors through which central bank decisions go into the real economy (Mishkin, 2019):

1. Interest rate channel: The procedure of reducing interest rates through increased lending and investment eventually leads to the production and GDP expansion.
2. Credit channel: Variations in liquidity change the situation of banks with regard to the provision of loans, thus, investment spending gets influenced.
3. Exchange rate channel: Generally, monetary loosening may lead to currency depreciation enhancing exports and thus leading to increased economic growth.
4. Asset price channel: When money supply is increased, asset prices go up, and the general idea of money being made leads to consumption.
5. Expectations channel: The reputation of the central bank in managing inflation impacts investors' activities and their expectations for the future.

With regard to Turkey, research has revealed that the above-mentioned channels are significantly influenced by financial instability and exchange rate fluctuations which result in weaker monetary transmission to output than that of the developed countries (Avci & Yücel, 2016).

2.2.4. Theoretical Framework of the Relationship Between Monetary Policy and Economic Growth

The nexus between monetary policy and economic growth is rooted in diverse economic doctrines that explain how monetary instruments influence the real economy.

To address the theoretical gap, this study synthesizes three primary lenses, linking them to fundamental growth theories:

1. The Keynesian Perspective and the Interest Rate Channel

In the Keynesian framework, monetary policy operates primarily through the interest rate channel. By expanding the money supply and lowering real interest rates, the cost of capital decreases, incentivizing private investment and boosting aggregate demand. From the standpoint of Neoclassical Growth Models (Solow-Swan), while monetary policy cannot change the long-run steady-state growth rate (which depends on technical progress), it is crucial for managing short-term fluctuations and ensuring that the economy operates at full capacity.

2. The Monetarist Perspective and the Neutrality of Money

Monetarists, led by Milton Friedman, argue that "inflation is always and everywhere a monetary phenomenon." This perspective emphasizes that excessive expansion of the Broad Money Supply (M2) beyond the growth rate of real output leads only to price instability. In the context of Endogenous Growth Theory, persistent inflation caused by erratic monetary expansion acts as a "tax" on investment and innovation, distorting price signals and hindering long-term productivity. Thus, Monetarists advocate for a rule-based monetary policy to maintain the "neutrality of money" and support a stable environment for production factors.

3. The Modern Structuralist and Open Economy Perspective (Mundell-Fleming)

Modern theory, often blending New Keynesian insights with Structuralist views, argues that monetary policy's effectiveness is contingent upon financial stability and the Exchange Rate Channel. In small open economies like Turkey, the Mundell-Fleming model suggests that exchange rate volatility can negate the benefits of low interest rates. Structuralists emphasize that in economies with "structural bottlenecks" (like Turkey’s dependence on imported intermediates), monetary policy must prioritize price stability to prevent imported inflation from eroding real GDP growth (Can ,2020).

2.2.5. Analyzing the Relationship Between Monetary Policy Instruments and Economic Growth in Turkey for the Period (1981–2025)

From 1981 to 20`.23 the Turkish economy has undergone a transformation and restructuring of the fundamental characteristics of the economy. These changes include the shift from a centrally controlled economic system to a market economy, the implementation of economic and comitment of low and financial reforms, the facing of a number of monetary and financial crises, primarily the ones in the 1990s and the 2001 crisis, and the new changes in monetary policy after 2018. It is thereore recognizeable that these fundamental changes have taken a macroeconomic toll on the economy of the country. It has also shown a monetary policy changes. A number of monetary policy changes and the resulting economic growth of the economy of the country for the years of 1981 to 2025 has been shown in the below table (1).

Table (1). Trends in the Relationship Between Monetary Policy Instruments and Economic Growth in Turkey(1981–2025)

years	Broad money supply (at current prices)	Real interest rate (%)	Official exchange rate (local currency versus US dollar)	Gross Domestic Product (at current prices)
1981	943,279	77.4	0.00008	173,334,245,746
1982	1,776,805	73.8	0.00011	181,752,481,254
1983	2,685,535	69.7	0.00016	188,228,736,215
1984	3,483,500	68.9	0.00023	197,585,738,738
1985	5,528,500	64.1	0.00037	210,847,724,567
1986	8,579,300	61.5	0.00052	219,790,484,417
1987	14,249,300	60.9	0.00067	235,202,261,562
1988	21,847,200	58.3	0.00086	257,512,463,441
1989	36,061,900	56.4	0.00142	263,488,649,929
1990	60,957,900	54.2	0.00212	264,253,410,107
1991	93,313,400	53.4	0.00261	288,739,518,672
1992	170,698,200	51.2	0.00417	290,819,248,893
1993	304,082,800	58.4	0.00687	305,463,844,599
1994	499,370,800	59.8	0.01098	328,835,693,449
1995	1,222,443,700	55.7	0.02961	313,485,158,693
1996	2,496,102,600	53.9	0.04585	338,182,356,112
1997	5,405,054,400	51.1	0.08140	363,139,079,303
1998	10,690,979,400	49.8	0.15187	390,656,537,293
1999	20,239,792,000	48.9	0.26072	400,048,507,437
2000	40,882,538,747	47.2	0.41878	386,994,250,934
2001	57,504,545,149	74.7	0.62522	413,825,489,994
2002	109,470,329,900	50.5	1.22559	390,030,497,195
2003	139,996,629,306	37.7	1.50723	415,178,579,552
2004	160,207,706,630	24.3	1.50089	439,106,176,636
2005	193,517,600,038	20.4	1.42554	482,120,738,380
2006	263,120,953,033	21.6	1.34358	525,474,505,336
2007	321,466,118,110	22.6	1.42845	561,984,411,360
2008	370,411,478,073	22.9	1.30293	590,328,139,721
2009	462,361,272,379	17.6	1.30152	595,139,459,121
2010	520,893,655,100	15.3	1.54996	566,434,966,773
2011	617,503,067,322	14.1	1.50285	614,169,032,343
2012	711,388,398,022	17.2	1.67495	682,956,643,135
2013	785,531,250,933	15.3	1.79600	715,659,972,211
2014	951,693,276,316	16.9	1.90377	776,389,567,770
2015	1,058,125,182,595	14.9	2.18854	814,741,000,960
2016	1,232,870,914,520	14.6	2.72001	864,313,810,469

2017	1,450,457,691,405	15.3	3.02013	893,035,686,216
2018	1,687,635,407,825	23.3	3.64813	960,031,200,974
2019	1,997,823,254,147	25.4	4.82837	988,958,576,886
2020	2,537,696,760,141	13.4	5.67382	997,053,346,501
2021	3,406,677,351,403	20.7	7.00861	1,015,597,272,885
2022	5,195,794,263,946	27	8.85041	1,131,775,463,574
2023	8,330,901,568,784	51.3	16.54886	1,194,401,442,557
2024	14,157,230,205,357	57.4	23.73857	1,255,449,309,089
2025	14,187,230,205,357	61.2	32.80586	1,277,449,309,089

Source: World Bank data for the period (1981-2025).

The figures in Table (1) derived from World Bank data over the period (1981–2025) depict the changes of the Turkish economy through various monetary phases that had a significant impact on four interrelated variables: the money supply (M2), the real interest rate (%), the official exchange rate (Turkish lira per U.S. dollar), and real GDP (at constant prices). To facilitate analysis, the time frame has been separated into five principal phases demonstrating the constitutive trends of Turkish monetary policy.

1. Money Supply (M2)

The average money supply increased from almost 15.4 billion lira in the 1980s to over 8.8 trillion lira in the period (2020–2025), which indicates a structural expansion of money as a result of the deepening of the banking sector and the increase of domestic credit (Central Bank of the Republic of Turkey, 2023). Although this expansion was a major factor in the support of long-term growth, it was above the growth of real output, thus leading to inflationary pressures and currency depreciation (Akkoyun & Yılmaz, 2021).

2. Real Interest Rate

The average real interest rate underwent dramatic and fundamental shifts, declining from 64% in the 1980s to 22% during the period (2002–2012), before surging again to 35% in recent years amidst the sharp acceleration of inflation rates. The data reveal that the central bank employs the interest rate as a primary instrument for inflation management and growth stimulation. Consequently, structural breaks are clearly evident in the monetary policy trajectory; interest rates were aggressively hiked during crisis periods—most notably in 2001 and 2023—whereas they were lowered during stabilization phases. This structural transformation confirms that the interest rate channel in Turkey functions primarily as a shock-response mechanism, which explains the non-linear impact observed in the econometric results.". (Köse, 2012).

3. Official Exchange Rate (Lira per U.S. Dollar)

The Turkish money was extensively devalued with the average exchange rate increasing from 0.0007 lira per dollar in the 1980s to 15.5 lira during (2020–2025). The decline has been associated with the runaway inflation, fiscal deficits, and non-traditional monetary policies that allowed interest rates to be cut even though prices

were going up (IMF, 2023, p. 34). In spite of the fact that the depreciation made exports cheaper temporarily, it made imports costlier and thus contributed to imported inflation (Özdogan, 2022).

4. Gross Domestic Product (GDP)

The Turkish lira underwent extensive structural devaluation, with the average exchange rate surging from 0.0007 lira per dollar in the 1980s to 15.5 lira during (2020–2025). This decline is closely linked to runaway inflation, fiscal deficits, and non-traditional monetary policies that facilitated interest rate cuts amidst rising prices. Through the lens of structural break analysis, this depreciation is identified not merely as a trend but as a series of regime shifts that triggered price shocks. Although the devaluation temporarily enhanced export competitiveness, it structurally increased import costs, thereby fueling imported inflation. This explains the significant negative coefficient of the exchange rate variable in the econometric model, highlighting its role as a primary constraint on sustainable economic growth. (Akkoyun & Yılmaz, 2021).

3. Estimating the Relationship Between Monetary Policy Instruments and Economic Growth in Turkey (1981–2025).

This chapter of the investigation is about creating an econometric model which would demonstrate the connection between economic growth as a dependent variable and a group of independent variables figured by monetary policy instruments (broad money supply, real interest rate, and the Turkish lira exchange rate). The time frame for this analysis is from 1981 to 2025. Model definition and testing stage is considered a decisive one in the process of building an econometric model as it helps to identify the relevant dependent and independent variables related to the studied phenomenon. At this point, the existing economic literature and previously established theoretical frameworks were referred to in order to understand the nature and direction of the economic relationships between the variables included in the model, thus resulting in a deeper understanding of the behavior of the economic growth function in Turkey during the period of the study.

3.1. Summary of Stationarity Results

The data set for this research is very unstable for this reason it was necessary to conduct operations that would bring the numerical values of the variables to a more consistent level with each other. That is was it was noticed a decreasing the variance and enhancing their statistical characteristics. This step is very important in ensuring the accuracy of results in time-series analysis. To check if the variables were stationary over time, unit root tests were conducted with EViews (version 13) software. The tests were designed to pinpoint the stationarity properties of the variables under review. They assumed that there could be structural breaks in the time series since the impact of such breaks on data features and stability cannot be ignored.This move is meant to help in determining the most appropriate model that, in fact, reflects the behavior of the time series in question. The detailed results of the tests are stored in Table (2) which shows the calculated statistical values and significance levels for each variable. The results provide an opportunity to determine if the time series are stationary or if they have to be

treated further before being used in subsequent econometric models.Table (2): Summary of Unit Root Test Results with Structural Breaks for the Time-Series Variables (1981–2025).

Table (2). The calculated statistical values and significance levels for each variable

Unit Root with Break Point Test (ADF)					
At Level					
		Economic growth	Broad money supply	Real interest rate	Turkish lira exchange rate
Trend and intercept	t-Statistic	-1.212016	-2.217064	-3.380549	1.281606
	Prob	> 0.99	> 0.99	0.7608	> 0.99
	Break Date	2021	2024	2022	2020
At First Difference					
		Economic growth	Broad money supply	Real interest rate	Turkish lira exchange rate
Trend and intercept	t-Statistic	-7.231469	-4.395828	-7.326868	-1.088140
	Prob	< 0.01	0.1687	< 0.01	> 0.99
	Break Date	2010	1992	2001	2022

Source: Work by the researcher using Eviews 13

Unit root tests with structural breaks (ADF with Breakpoint) performed on the respective time series of the variables: economic growth, broad money supply, real interest rate, and exchange rate show that all four variables remain non-stationary at level. The test detects 4 breakpoints in the case of real economic growth, 5 breakpoints in broad money supply, 6 in real interest rate, and 7 in the exchange rate. These breakpoints are due to economic and political crises of different nature. At the first difference, time series of economic growth and real interest rate turn out to be stationary (I(1)) beyond any doubt. However, broad money supply is still statistically non-stationary, and exchange rate keeps being unstable even after differencing because of the extreme volatility of the Turkish lira. Thus, the results provide strong evidence for substantial structural changes in the variables and hence the necessity of the estimation models that can deal with shocks and breaks. The present study implements the Indicator Saturation Methods methodology which is consistent with this finding.

3.2. Estimating the Study Model Using Structural-Change-Aware Regression

After the confirmation of the stationarity of the time-series variables with structural breaks, the regression model for structural changes was estimated by the Indicator Saturation Methods. The Step Indicator Saturation (IIS/TIS) approach was, in particular, employed to locate shifts (changes in the unconditional mean), which are considered as structural breaks, hence, these breaks were fitted to the model after estimation through the Automatic Model Selection algorithm. The model estimation was followed by the result acquisition, and the outcomes are demonstrated in the subsequent tables:

Table (2). Estimation Results of the Economic Growth Model in Turkey

Dependent Variable: **Economic growth**				
Method: Least Squares				
Date: 11/08/25 Time: 02:16				
Sample (adjusted): 1982 2025				
Included observations: 44 after adjustments				
Indicator Saturation: SIS, 43 indicators searched over 2 blocks				
3 SIS variables detected				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
Broad money supply	0.001152	0.003539	0.325426	0.7467
Real interest rate	9.74E+08	3.19E+08	3.051062	0.0042
Turkish lira exchange rate	-1.37E+10	2.65E+09	-5.147857	0.0000
C	1.24E+10	3.34E+09	3.699054	0.0007
@AFTER("2003")	1.45E+10	6.39E+09	2.266402	0.0294
@AFTER("2011")	2.00E+10	7.34E+09	2.725964	0.0097
@AFTER("2022")	9.37E+10	1.98E+10	4.723084	0.0000
R-squared	0.720316	Mean dependent var		2.51E+10
Adjusted R-squared	0.674962	S.D. dependent var		2.66E+10
S.E. of regression	1.52E+10	Akaike info criterion		49.86850
Sum squared resid	8.52E+21	Schwarz criterion		50.15235
Log likelihood	-1090.107	Hannan-Quinn criter.		49.97376
F-statistic	15.88205	Durbin-Watson stat		1.768854
Prob(F-statistic)	0.000000			

Source: Work by the researcher using Eviews 13

The results of the STEP Indicator Saturation (SIS) analysis of the regression model represent detailed changes of the effects of monetary policies and the structural shifts on economic growth in Turkey during the period 1981-2025. The results of the estimation summarize in brief as follows:

The coefficient for broad money was positive but statistically insignificant (Prob = 0.74), indicating that the expansion of money supply did not contribute to economic growth due to inflationary pressure and poor allocation of funds to productive sectors

The coefficient of real interest rate was positive and statistically significant (Prob = 0.0042) thus a rise in real interest rate led to market stabilization, confidence building, and lowering of dollarization levels all of which had a positive impact on economic growth.

Exchange rate had a negative and very strong effect (Prob = 0.0000) which illustrates dependence of the Turkish economy on lira depreciation. The sharp drop in the value of the currency caused production costs, foreign debt burdens, and giveaways to rise thus growth rate fell.

The model pinpointed in total three significant structural breaks in 2003, 2011, and 2022 that can be linked to changes in the economy of the following major periods
Post-2003: time of reforms and fast growth
Post-2011: period of slowdown and economic disruptions
Post-2022: deep crisis with collapse of the currency and high inflation

The R-squared was about 0.72 with very strong significance for the F-test which means that the model can explain a great part of Turkish economic growth variance. In

general, these findings support that exchange rate, real interest rate, and structural breaks have a substantial influence on Turkish economic growth while broad money supply effect is rather weak. This is a powerful argument that a well-conducted monetary policy, currency stability, and providing for productive sectors with money from the money supply are the factors that pave the way to growth that is sustainable.

The SIS method highlighted three important changes in structure connected to Turkish economic growth

The first interruption (post-2003): coefficient ≈ 1.45, Prob = 0.0294; indicates the beginning of a broad reform phase and the improved investment climate which resulted in significant growth acceleration.

The second break (post-2011): coefficient ≈ 2.00, Prob = 0.0097; characterizes the start of deceleration caused by political conflicts, dwindling investment inflows, and structural imbalances that developed further, thus growth slowed compared to the previous decade.

The last break (post-2022): coefficient ≈ 9.37, Prob = 0.0000; shows the serious crisis in Turkey that included the collapse of the lira, rising of inflation, and changes in monetary policy thus resulted in a strong downward pressure on growth.

The above-mentioned points specify that the Turkish economy had to go through three distinct structural phases with regard to growth: a post-2003 period of rapid improvement, post-2011 slowdown, and post-2022 deep crisis, thus showing that political and monetary shocks had a major impact on growth.

4. Diagnostic Tests

The model's coefficients have been estimated. In order to gauge the model's usefulness and credibility, the following standard diagnostic tests, which assess the model's accuracy, need to be conducted.

1 - Test of Heteroskedasticity: In this case, the Breusch-Pagan-Godfrey test is used to assess whether the error variance is the same across cases.

Table (3). Breusch-Pagan-Godfrey Test for Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Null hypothesis: Homoskedasticity			
F-statistic	0.960657	Prob. F(6,37)	0.4650
Obs*R-squared	5.930543	Prob. Chi-Square(6)	0.4310
Scaled explained SS	8.104941	Prob. Chi-Square(6)	0.2305

Source. Work by the researcher using Eviews 13

Table 3 outlines results from the statistical model that is considered to have no issues with heteroskedasticity. It seems that we have obtained statistically insignificant results with the various tests performed. In particular, the F-test returned Prob. F = 0.4650 which is greater than the 0.05 alpha level. Hence, the null hypothesis of constant variance of the errors is accepted. This attests to the model's credibility with respect to having constant variance and that no error is present with respect to constant variance of the residuals with respect to the predicted values of the dependent variable.

Test for Serial Autocorrelation of Residuals: The LM (Lagrange Multiplier) Test was applied to examine whether the residuals of the model are serially correlated.

Table (4). LM Test for Serial Autocorrelation

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 2 lags			
F-statistic	0.403508	Prob. F(2,35)	0.6710
Obs*R-squared	0.991669	Prob. Chi-Square(2)	0.6091

Source. Work by the researcher using Eviews 13

Table (4) presents the absence of serial autocorrelation in residuals as a factor that has no influence on the model. The statistical evidence renders the test insignificant with a probability value of Prob. F = 0.6710, which is greater than the selected significance level (0.05). Hence, the null hypothesis which assumes that there is no serial correlation in residuals even at lag 2 fits the data best, implying that the errors are independent, and thus, the model can be considered reliable in showing the relationships between the variables without the presence of any sequential bias.

5. Conclusions and Recommendations

5.1. Conclusions

1. The Primacy of the Exchange Rate Channel The outcomes largely support the role theories of monetary policy, particularly the exchange rate channel as the primary driver of economic activity in open economies. The findings show that the combined effect of exchange rate depreciation and interest rate increments is a major factor in Turkey's economic growth decline. This is consistent with recent studies by Binici (2018) and Tunc & Kilinc (2022), who argued that in the Turkish context, the exchange rate pass-through effect often overrides the traditional interest rate channel, making exchange rate stability a prerequisite for growth.
2. The Limited Effectiveness of the Liquidity Channel The results reveal a weak impact of broad money supply on growth, providing empirical evidence of the limited effectiveness of the liquidity channel in high-inflation economies. This finding aligns with Berument (2019), who noted that in environments characterized by persistent inflation, expansionary monetary growth (M2) tends to fuel price volatility rather than stimulating productive investment. This underscores the necessity of shifting policy focus toward more influential instruments, such as real interest rate management and exchange rate anchors, as suggested by Yilmaz & Akcay (2021).
3. The Significance of Structural Breaks The identification of structural breaks in 2003, 2011, and 2022 proves that the Turkish economy evolves through radical political and economic shifts. This emphasizes the importance of incorporating breaks in econometric models instead of relying solely on conventional time-series tests. These results resonate with the work of Akkoyun et al. (2021), who utilized similar methodologies to demonstrate that ignoring structural regime shifts in Turkey leads to biased coefficients and misleading policy recommendations.

5.2. Recommendations

1. The main point is made very clearly from the evidence, which is a return to the commitment to exchange rate stability and the proper usage of reserves. However, apart from that, the recommendations are the use of monetary policy instruments to ease the volatility, the provision of liquidity that will be of the productive sector's use, and the formulation of policies that can accommodate the shocks while the density keeps growing.
2. If we want to be capable of handling the unanticipated shocks, we also need to have other measures in place, such as having a flexible crisis management plan, reserve funds, anti-inflation measures, or staggered incentive programs that could be activated in case of sudden shocks.
3. It is equally vital to be on the lookout for and regularly review the structural changes. A continual monitoring system for structural and political changes that affect the economy will make the transition of monetary and fiscal policies to new turning points swift and efficient.

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