

MONETARY TRANSMISSION MECHANISM IN NIGERIA: A VERITABLE TOOL FOR ECONOMIC RECOVERY

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Abstract

The effectiveness of monetary policy in changing aggregate economic activity and economic development largely depends on how monetary policy is conducted and the independency of the central bank to choose the appropriate monetary tools or mechanism to transmit the policy. Also, the attainment of the macroeconomic objectives has to do with the transmission mechanism that can effectively affect key macroeconomic variables, thereby stabilizing the economy as well as impacting on economic development. This study examined the relationship between the monetary policy transmission channels and economic development, using annual data of monetary transmission variables like; interest rate, exchange rate (EXR), private sector credit (PSC) extended by the banking system, money supply (M2) and equity prices (PE). PE was captured by the average price-earnings ratio which also captures the Tobin's q channel of monetary transmission mechanism. The estimation technique was ordinary least square (OLS) method. The study found that exchange rate and money supply negatively impacts on the economic growth in Nigeria, while interest rate, credits to private sector and inflation rate have direct effects on economic growth in Nigeria. Therefore, there is need for exchange rate management and control of money supply in the country for a rapid economic growth in Nigeria.

Keywords: Monetary Policy, Transmission Mechanism, Economic Growth, Credit Channel

Introduction

Achieving the 2030 sustainable development goals (SDGs) in Nigeria requires sustainable and inclusive economic growth. There is no consensus among economists on the effect of monetary transmission mechanism on economic growth. The results of previous studies on the effect of monetary policy on economic growth in Nigeria are mixed. Over the years, the objectives of monetary policy have basically remained achieving internal and external balances, and the promotion of non-inflationary growth in output. In pursuant of it targets, monetary authorities in Nigeria have made some fundamental changes in the strategies and instruments employed in the conduct of monetary policy as the financial environment evolves. These changes are in two distinct phases. The phases are direct era (pre-SAP) and indirect era (post-SAP). The era of direct monetary policy involved the use of monetary controls, whereas the indirect era depends on price mechanism.

However, the effectiveness of monetary policy in changing aggregate economic activity and economic development, according to Ekpo, Akpan, Ekaetor, (2024), is largely depends on how monetary policy is conducted and the independency of the central bank to choose the appropriate monetary tools or mechanism to transmit the policy. Also, the success of any

economic policy in achieving sustainable growth and development depends on information accuracy of the effectiveness of the policy on the economy.

Therefore, it is vital to note that an appropriate monetary policy helps in economic development through the adjustment of policy variables to the needs of development. Its influence on macroeconomic objectives is through movements in the intermediate variables which would alter the cost of capital and investment in the productive sector. For instance, investment is interest elastic, a fall in interest rate leads to more investment which leads to increase in aggregate demand and in turn brings about positive real income, output and employment, consequently impacting positively on the welfare of the citizenry. Therefore, the attainment of the macroeconomic objectives has to do with the transmission mechanism that can effectively affect key macroeconomic variables, thereby stabilizing the economy as well as impacting on economic development.

The Nigerian economy has been striving to achieve sustainable and inclusive growth amid various challenges and structural constraints. While monetary policy is a critical tool for economic management, the effectiveness of its transmission mechanism in promoting economic growth remains a subject of concern and investigation. One of the key issues is the limited access to credit, particularly for small and medium-sized enterprises (SMEs) in Nigeria. However, the availability of credit to Nigerian businesses, particularly Small and Medium-Sized Enterprises (SMEs), remains constrained (Adesoye & Maku, 2021, Ime Utuk, Boniface Akpan, et. al 2023). These enterprises are pivotal in fostering economic growth, innovation, and employment generation. The challenge of limited access to credit has far-reaching consequences, hindering the potentials of these enterprises to thrive and contribute meaningfully to sustainable economic development. Investigating the factors contributing to this credit constraint and its implications for growth is crucial. This raises questions about the effectiveness of monetary policy in channelling credit to productive sectors and supporting sustainable economic development.

The volatility of inflation and exchange rates has been a persistent challenge for Nigeria. Fluctuations in these macroeconomic variables can significantly affect investment decisions, consumer spending, and overall economic stability. It is crucial to examine how changes in monetary policy, such as adjustments in interest rates, influence inflation dynamics and exchange rate movements, and subsequently impact economic growth. In Nigeria, the Central Bank has employed various mechanisms to adjust interest rates as part of its monetary policy toolkit (Olokoyo, 2020). However, the transmission of these interest rate adjustments to the broader economy remains a subject of concern. Understanding the effectiveness of interest rate adjustments in stimulating or curbing economic activities and their impact on economic growth is essential. Furthermore, there is a need to examine the effectiveness of monetary policy transmission in promoting economic growth in Nigeria. To this extent, this study seeks to answer the questions; what is the relationship between monetary transmission and economic growth in Nigeria?

Literature Review

Conceptual Literature

Monetary Policy is a major Economic stabilisation weapon which involves measures designed to regulate and control the volume, cost, availability and direction of money and credit in an

Economy to achieve some specified Macroeconomic objectives, (Anyawu, 1993, Utuk; *et al*, 2024). It involves the application of various instruments that are targeted at Macroeconomic variables such as outputs, asset prices, Inflation, credits etc. Monetary Policy in Nigeria involve those rules and regulations articulated by the Central Bank of Nigeria in collaboration with the Federal Ministry of Finance aimed at adequate regulation and control of credit availability, interest rate with the view to attaining goals set by the Government. The attainment of these goals has to do with the existence of transmission mechanism which is capable of touching the efficiently macroeconomic variable thereby stabilising the Economy and leading to Economic growth and development.

Monetary policy affects real economic activity through a channel, that Channel is referred to monetary transmission Channel. Monetary Transmission Mechanisms refers to the process through which changes in monetary policy, particularly interest rates and other monetary indicators, impact various sectors of the economy, ultimately influencing economic growth and stability. This Mechanism predicts how the changes in monetary policy transmit to the real economic activity and inflation in the Economy (Lattimore, 2003). This can happen via various Channels, and include exchange rate channel, Asset price channel, interest rate channel as well as the expectation channel (Williams and Robinson, 2016, Miskin, 1995, 2004.). The transmission Channels are not mutually exclusive as the effect of one channel can have effect, or even amplify or erode the effect of the other. They are time invariant, as they are the creation of the changes in the overall financial and economic conditions of the economy (Tuanor-Amador, et al, 2009; Akpan, Udo 2023).

These channels have been used in the transmission of monetary policy signals to the Economy. Again the instruments of monetary policy has been used as an anchor through which its impacts the economy as a whole. The anchor and the outcomes (prices and output) are the different channels and instrument through which the anchor achieves its different intended purpose on the economy. (Oyadeyi and Akinbobola 2022, Ekpo, *et al*, 2024.). The scenario shows how the quarterly monetary policy committee (MPC) decision affects the transmission of signals to the real economy represented by output and prices. This signals and impulses describe how the various channels of monetary policy impacts on the real economic activity within the larger economy indeed; these channels further shows how monetary policy are implemented on the economy as a whole. The necessity of this study lies on the sustainable growth and recovery in economy – via the instrument of output, prices and inflation.

There is no consensus among economists on the exact functioning these signals in literature (Olteanu, 2015; Akpan and Udo, 2023). Some studies are of the opinion that the influence of monetary policy may transmit into financial sector in a variety of ways. (Akpaniwo and Akpan, 2019, Lattermore, 2023, Mies and Tapia; Aspergis *et al*, 2012), while some Economist believes that the transmission channels may overlap and becomes extremely difficult to empirically differentiate them. (Tuano- Amado et al, 2009, Williams and Robinson, 2016), Lattermore 2003, Akpan 2025).

The import of the divergent opinions in respect to money transmission mechanism is related to its potential association with real short term effects, as without such association the distinction between nominal and real values would lessen the macroeconomic stability objective desired by the Monetary policy committee to strategic framework that would only support price stability. Furthermore, a challenge may arise from the fact that some serious issues that affect the soul

of monetary transmission mechanism are not considered or overlooked, like expectation channel which has no direct measure.

Theoretical and Empirical issues

Theoretically the elementary channels of monetary transmission Mechanism are directed on macroeconomic variables of consumption, international trade feedbacks and investment. The neoclassicalist: Tobin (1969), Johansen (1963) dealt on investment, while Ando and Modigliana and Friedman (1957) focused on permanent Income as well as the life cycle hypotheses of consumption. Mundel (1963) and Fleming (1962) models considered the impact on the International IS/LM Models. Each of these classicalists articulated the influence of the macroeconomic scene resulting from policy effects.

Most of the traditional channels of monetary transmission affecting the variables of Macroeconomics deals with the effect of interest rates on the cost of capital and most importantly on the household expenditure on investment such as consumer durable and residential investment(Boivin, et al,2010). According to Jorgenson (1963), Investment which is influenced by this cost of capital is the major determining factor of the demand for capital goods for investment, consumer durables or residential housing. The expenditure on consumption depends on accumulation of life time resources particularly from real estate, stock and/or other assets. Consequently, expansion in monetary policy, such as reduced interest rates will on one hand lead to upsurge in asset demand which causes prices to rise and thereby reducing the discount rates for income and services flow related to incomes, stocks and other assets, pushing up their prices. From the above, aggregates wealth will stimulate consumption by the economic agents as well as aggregate demand, (Brumberg and Modigliana (1954).

It should be also noted that when the apex bank reduces its interest rate, the return on the assets decline as well as foreign assets. This results in the value of local assets falling and lowering of the currency of the local economy. Thus the output of the local economy becomes cheaper than foreign goods, and this results in the rise of exports. The impulse created by the lower interest rate brings about an injection into the local economy with increase in aggregate demand, thereby impacting on output, income and employment. Thus the exchange rate which is a major tool of monetary policy plays a tremendous role on the manner in which monetary transmission impacts on the economy.

There has been a number of studies bothering on monetary transmission mechanism. These studies adopt SVAR method and utilise variables like : Interest rate (proxied by Monetary policy rate (MPR), Exchange rate, private sector credit, money supply and equity prices. These variables serve as aggregate Macroeconomic Variables and are used to represent each channel of monetary policy. In developing countries, the works of Montiel (2013) and Gitona (2014) found that Exchange rate exerted a weaker impact on prices of output in Uganda and Kenya respectively, while the works of Jeon and Wu (2014) for seven economies in Asia, as well as the studies by Engler and Giucci (2015) discovered that monetary transmission had a significant effect on the Economies of those Nations.

Afolabi (2017) examined the impact of interest rate changes, one of the key tools in the monetary transmission mechanism, on economic growth in Nigeria. The study found a significant negative relationship between interest rate hikes and economic growth. It suggested

that higher interest rates tended to stifle investment and economic activity in Nigeria, indicating that the transmission mechanism was at work. This supports the Keynesian perspective on the importance of interest rates in influencing aggregate demand and, consequently, economic growth.

Nnanna and Dogo (2019) delved into the role of credit channels in the Nigerian monetary transmission mechanism. They explored how changes in the money supply affected lending by commercial banks and, subsequently, economic growth. Their findings highlighted the importance of credit availability for economic growth in Nigeria, aligning with both Monetarist and Keynesian viewpoints. The study emphasized that the effectiveness of monetary policy transmission depended on the health of the banking sector and the ease of credit access for businesses.

Oduba (2016) focused on the exchange rate channel of monetary transmission in Nigeria. It examined how changes in exchange rates influenced the country's economic growth. The research found that exchange rate fluctuations, influenced by monetary policy decisions, had a significant impact on the Nigerian economy, particularly in terms of export competitiveness and import costs. The study reinforced the idea that the exchange rate channel was a crucial part of the monetary transmission mechanism in Nigeria, affecting various sectors and, consequently, overall economic growth.

Ogunleye and Oyinloye (2018) conducted a comprehensive analysis of the monetary transmission mechanism in Nigeria, considering multiple channels, including interest rates, credit, and exchange rates. Their research highlighted the complex interplay among these channels and their varying effects on different sectors of the economy. The study emphasized the need for a holistic approach to monetary policy in Nigeria, taking into account the multiple channels through which it could influence economic growth.

Egwu and Ogunmuyiwa (2018) conducted a study examining the impact of interest rate changes on economic growth in Nigeria. They found a negative relationship between nominal interest rates and economic growth, suggesting that higher interest rates tend to hinder economic expansion. However, it is important to note that this relationship can be nuanced, as real interest rates (nominal rates adjusted for inflation) may provide a more accurate measure of the cost of borrowing. Ojo and Akomolafe (2016) analyzed the effects of interest rate policy on economic growth and found that a lower real interest rate had a positive impact on economic growth. This result underscores the importance of considering inflation when evaluating the relationship between interest rates and economic growth.

In Chile, the Studies of Loayza and Schmidt-Hebbel (2002) is of the opinion that interest rate channel is the most prominent channel on output. This position was further boasted by the studies by Latttemae,

(2003), Maturu and Ndiranga (2013), as well as Aslanidi (2007). They also found the same result for Thailand, Estonia and Kenya. On the other hand, interest rate channel was also found to be weak determinant of output by Dabla-Norris and Floerkemeier (2006) and Aslanidi (2007). In Nigeria, the works of Okaro (2011), Hassan (2015) and Bature (2014) discovered private sector credit as a very important Channel of monetary policy transmission. Apanisile (2016), in a separate study and Bernhard (2013) and James, Utuk, Eduno, and Effiong, (2024), found interest rate to be a dominant factor on output. Nwosa and Saiba (2012) found exchange rate and

interest rate channels as more dominant in impacting on output, while Obafemi and Ifere (2015) discovered that exchange rate and interest rate are the most effective in Nigeria.

In the developed economies, some of the earliest works noted in Literature are that of Romer and Romer (1990), which did not find any evidence of a narrow lending point of view for the United State economy. The work therefore concluded that monetary policy has no influence over bank lending since banks have alternative means of sourcing funds. This position was corroborated by Kutner and Mosser (2022) in their work. In the Study by Vymyatnina (2005), he found that interest rate channel and exchange rate channels were the means through which monetary policy could be transmitted into the Russia economy. According to Apergis et al (2012), inflation and output affected the European central banks ability in achieving the target rate and by implication, lending within European countries. Again Fu and Liu (2015) found out in China that Asymmetric effect existed while studying the monetary policy channel, as against the effect while studying the credit channel.

Research Design

The research design employed in this study is an ex facto design adopting an annual time-series analysis, which is well-suited to investigate the dynamics of monetary transmission mechanisms over time. The study covers the period from 1983 to 2025. The choice of this design allows for the assessment of the impact of monetary policy on economic growth while considering the inter-temporal relationships between variables.

Model Specification

The research will employ multiple regression analysis to estimate the relationships between the dependent variable (economic growth) and the independent variables (credit transmission to the private sector, exchange rates, and interest rate transmission). The model specification is as follows:

$$Y = \alpha_1 + \beta_1 EXH + \beta_2 INT + \beta_3 CPS + \beta_4 INF + \beta_5 MS + e$$

$$Y = f(EXCH, INT, CPS, INF, MS)$$

Where:

- Y represents economic growth in Nigeria.
- CPS represents credit transmission to the private sector.
- EXCH represents exchange rates.
- INT represents interest rate transmission.
- INF represents rate of inflation
- MS represents rate of money supply
- β_0 is the intercept.
- β_1 , β_2 , and β_3 are the coefficients.
- e represents the error term.

Data and Sources

The data used for this research was gotten from secondary sources. This secondary data was gotten from the relevant and appropriate authorities such as the Central bank of Nigeria (CBN), National Bureau of Statistics (NBS) and the Ministry of Finance, for example the statistical bulletin and annual abstract of statistics. Others include journals, articles, textbooks, internet and periodicals.

Estimation Procedures

The research employed the ordinary least squares (OLS) in estimating the relationship between the dependent variables (economic growth) and the independent variables (credit transmission

to the private sector, exchange rates, and interest rate transmission) because it is the best linear unbiased estimator. Several tests were also carried out to determine the validity of this time series data used for the research in terms of policy and forecasting. These tests include; unit root test, co-integration test, standard error test, f-test and R^2 test (coefficient of determination).

Empirical Results

Unit Root Results

Table 4.1: ADF Unit Root Results

S/N	Variable	T-Statistics	1% Critical Value	5% Critical Value	10% Critical Value	Level of Integration
1	CPS	3.191939	-3.653730	-2.967110	-2.617434	I(0)*
2	EXR	-4.066037	-3.661661	-2.960411	-2.619160	I(1)
3	INFL	-4.594441	-3.661661	-2.960411	-2.619160	I(1)
4	INTR	-4.212580	-3.653730	-2.967110	-2.617434	I(0)
5	MS	4.189595	-3.653730	-2.967110	-2.617434	I(0)
6	RGDP	-2.948172	-3.661661	-2.960411	-2.619160	I(1)**

*significant at 5% level, ** significant at 10% level

Source: Author's Computation, 2025

The result of unit root test shown in Table 4.1 shows that not all the macroeconomic variables in the estimated model are integrated at the same level of integration. The result revealed that interest rate (INTR), money supply (MS), and Credit to private sector (CPS) is integrated at level. The rest of the macroeconomic variables in the estimated model are integrated at first difference, that is I(1). Normally, since all the variables in the estimated model are not integrated at the same order of integration, then it is not proper to estimate the co-integration model using Johansen co-integration. Therefore, we conducted the co-integration analysis using the Engel Granger co-integration technique to test for the long run relationship between the variables in the model. Table 4.2 depicts the result.

Co-integration Test result

Table 4.2: Engel Granger Co-integration Result

Variable	T-Statistics	1% Critical Value	5% Critical Value	10% Critical Value	Level of Integration
ECM	-2.940740	-3.653730	-2.2957110	-2.617434	I (0)**

***significant at 10% level*

Source: Author's Computation, 2025

The result presented in Table 4.2, shows that there is a long-run relationship between the variables in the specified model. This is because the residual of the OLS regression of the specified model is integrated at level. This means that the variables in the model have long-run relationships. Therefore, the specified model can be estimated. The method of estimation is ordinary least square (OLS). The result of this analysis is presented in Table 4.3.

Regression Result

Table 4.3: Estimated Result

Dependent Variable: Real Gross Domestic Product, RGDP

VARIABLE	COEFFICIENT	T-VALUE	PROBILITY
C	-201919.4	-4.068069	0.0004
INFL	11.01306	0.174291	0.8629
LOG(CPS)	28726.33	3.530297	0.0015
EXR	-66.42237	-3.864132	0.0006
INTR	724.0888	2.821044	0.0097
LOG(MS)	-24301.23	-2.625018	0.0141
R ²	0.946941	F-STATISTIC	96.37265
ADJUSTED R ²	0.937115	DW	1.916769

Source: Author's Computation, 2025

Discussion of Findings

From the estimated regression result presented in Table 4.3, the estimated regression line has a negative intercept represented by the constant term. This means that holding all other factors constant there will be an autonomous decrease in the real gross domestic product. This in turn implies an autonomous decrease in economic growth.

The sign of the coefficient of inflation rate (INF) shows that there is a direct relationship between inflation rate and economic growth in Nigeria for the period under review. This implies that a rise in inflation rate in the economy will cause an increase in the Nigerian economic growth. Credit to private sector (CPS) has positive coefficient in the estimated result. This implies that credit to private sector help increase the rate of economic growth in Nigeria. The positive relationship between credit to private sector and real gross domestic product indicates that loanable funds in the financial institutions are channelled into investment opportunities in the Nigerian economy thereby expanding the level of gross domestic product in the country.

However, the coefficient of money supply in the estimated model (MS) has a negative sign to the real gross domestic product in the Nigerian economy. This means that when there is increase in the level of money supply, the real gross domestic product is reduced. This is contrary to the economic theory and this can be explained from the fact an increase in money supply leads to increase in imported goods and services, thereby causing the domestic product to be reduces. This is because the citizens buy more of imported goods than the domestic goods. The exchange rate (EXR) in Nigeria has a negative coefficient in the estimated model.

This implies that when the naira appreciates in the international market, it causes the real gross domestic product to fall since the Nigerian citizens buy more of imported products than the domestic products. Lastly, interest rate in the financial institutions has a positive coefficient in the estimated model. This means that an increase in the deposit interest rate will cause more savings in the financial institutions. These increased deposits will be channelled to the private sector for investment and hence, increase in investment leads to increase in gross domestic product in the Nigerian economy.

The t-statistic values in the estimated result show that all the explanatory variables in the model are statistically significant given their t-statistic values to be greater than 2, except inflation rate (INFL). The adjusted R^2 value of 0.937 indicates that about 93.7 per cent of the total variation in the Nigerian real sector is explained by the estimated model while only 6.3 per cent of the changes in the sector are caused by variables outside the model. This shows a very high coefficient of determination and hence goodness of fit on the data and the explanatory power. The F statistic value of 96.37 at 5 per cent level of significance shows that the overall model is stable and statistically significant.

Also, the Durbin-Watson statistical value of 1.9 falls within the region of negative autocorrelation. This means that there is no autocorrelation existing within the variables in the estimated model. Therefore, the result can be used for policy formulation in the economy.

Summary

This work was embarked upon to serve as a guide to government policy makers with regards to monetary transmission mechanism and the economy in Nigeria. The time scope of the study was from 1983 to 2025.

The study investigated the impact of monetary transmission mechanism on economic growth in

Nigeria. The objectives were to determine the impact of:

- i. exchange rate on economic growth in Nigeria
- ii. money supply on economic growth in Nigeria.
- iii. interest rate on economic growth in Nigeria, and
- iv. Credit to private sector on economic growth in Nigeria

In order to achieve these objectives a multiple regression model was estimated using the ordinary least square (OLS) method. The model had real gross domestic product (RGDP) as the dependent variable while money supply, exchange rate, credit to private sector, interest rate, and inflation rate were the independent or explanatory variables. The study found that exchange rate and money supply negatively impacts on the economic growth in Nigeria. Interest rate, credits to private sector and inflation rate have direct effects on economic growth in Nigeria.

Conclusion

The study was to investigate the impact of monetary transmission mechanism on economic growth in Nigeria within the period of 1983 to 2025 using a quantitative approach. The analysis showed that the macroeconomic variables employed have high and obvious effect on economic growth proxies by changes in the real gross domestic product in the model specified. This is seen in the coefficient of determination and the F ratio of the entire model specified. The D.W shows that the functions are stable and therefore good for economic policy making.

The analyses have shown that money supply and exchange rate in the Nigerian economy has a

negative impact on economic growth while interest rate, credit to private sector, and inflation rate have positive impacts on economic growth in Nigeria. Therefore, there is need for exchange rate management and control of money supply in the country for a rapid economic growth in Nigeria.

Recommendations

Based on the findings of this study the following recommendations have been made:

- i. Exchange rate should be managed in the country to achieve economic growth in Nigeria.
- ii. Money supply in the country should be controlled to ensure that there is no excess money supply that is not backed up with increased productivity in Nigeria.
- iii. Saving interest rate should be increased to promote economic growth in Nigeria.
- iv. Credit to private sector should be increased to ensure high investment rate which will in turn promotes economic growth in Nigeria.

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APPENDIX

Null Hypothesis: CPS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	3.191939	1.0000
Test critical values: 1% level	-3.653730	
5% level	-2.957110	
10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(EXR) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.066037	0.0036
Test critical values: 1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INFL) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.594441	0.0009
Test critical values: 1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: INTR has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.212580	0.0024
Test critical values: 1% level	-3.653730	
5% level	-2.957110	
10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: MS has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	4.189595	1.0000
Test critical values: 1% level	-3.653730	
5% level	-2.957110	
10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(RGDP) has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.948172	0.0513
Test critical values: 1% level	-3.661661	
5% level	-2.960411	
10% level	-2.619160	

*MacKinnon (1996) one-sided p-values.

Dependent Variable: RGDP

Method: Least Squares

Date: 11/04/26 Time: 09:21

Sample: 1983 2025

Included observations: 43

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MS)	-24301.23	9257.549	-2.625018	0.0141
INTR	724.0888	256.67405	2.821044	0.0097
EXR	-66.42237	17.18947	-3.864132	0.0006
LOG(CPS)	28726.33	8137.087	3.530297	0.0015
INFL	11.01306	63.18784	0.174291	0.8629
C	-201919.4	49635.20	-4.068069	0.0004
R-squared	0.946941	Mean dependent var	44776.44	
Adjusted R-squared	0.937115	S.D. dependent var	20285.21	
S.E. of regression	5086.908	Akaike info criterion	20.06969	
Sum squared resid	6.99E+08	Schwarz criterion	20.34179	
Log likelihood	-325.1499	Hannan-Quinn criter.	20.16124	
F-statistic	96.37265	Durbin-Watson stat	1.916769	
Prob(F-statistic)	0.000000			

Null Hypothesis: ECM has a unit root

Exogenous: Constant

Lag Length: 0 (Automatic - based on SIC, maxlag=8)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-2.940740	0.0518
Test critical values: 1% level	-3.653730	
5% level	-2.957110	
10% level	-2.617434	

*MacKinnon (1996) one-sided p-values.

