| **RESEARCH ARTICLE**

Evaluating the Efficacy of Monetary Policy in Driving Economic Growth in Turkey

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| **ABSTRACT**

This paper examines the efficacy of monetary policy in fostering output growth in Turkey by analyzing annual time-series data sourced from the Central Bank of the Republic of Turkey (CBRT) spanning from 2005 to 2023. The research employs the Autoregressive Distributed Lag (ARDL) bounds testing procedure. The findings reveal that money supply, considered an indicator of monetary policy in the context of this study, exerts a positive and statistically significant influence on output growth in Turkey in both the short and long term. Additionally, government expenditure has a positive and statistically significant impact on growth in the long term, albeit weaker than the impact of money supply. Lastly, in the long term, inflation negatively affects growth, with statistical significance observed at the 10% level.

1. Introduction

Monetary policy involves the use of monetary instruments by monetary authorities, such as central banks, with the aim of achieving macroeconomic stability (Dwivedi, 2005). Since the recognition of the impact of monetary policy on macroeconomic goals like economic expansion, price stability, balance of payments equilibrium, and other objectives, monetary authorities are entrusted with the responsibility of using monetary policy to stimulate their economies.

Economic theories suggest that implementing less restrictive monetary policy, which often involves reducing interest rates and increasing the money supply, can result in higher inflation, posing potential challenges for long-term economic growth. Therefore, central banks usually strive to preserve price stability by managing both the money supply and interest rates. However, their capacity to achieve this objective may be restricted by their pursuit of other goals, the effectiveness of monetary policy transmission mechanisms, or external factors like fiscal and broader economic policies (Adweh, 2019).

Money supply represents the overall amount of money circulating within an economy. It is a crucial factor in determining inflation, economic growth, and interest rates. Turkey has adopted an explicit inflation-targeting policy since 2006, wherein the central bank endeavors to maintain inflation at a specific level. To achieve this objective, it is essential for the central bank to understand the impact of variations in the money supply on inflation. This aspect is integral to macroeconomic policy, which constitutes the strategy of the government for overseeing the economy to attain specific objectives, including full employment, price stability, and economic growth. Using the Autoregressive Distributed Lag (ARDL) cointegration method and M2 as an indicator of monetary policy, this study aims to examine whether the implementation of monetary policy in Turkey has yielded adverse or favorable impacts on economic growth.

The rest of the paper is structured as follows. Section two focuses on reviewing the existing literature. Section three outlines the methodology of the study, and the empirical findings are analyzed in section four. Section five provides the conclusion.

2. Literature Review

Many studies have been carried out to assess the effectiveness of monetary policy. However, these studies have produced inconclusive outcomes. In this section, we analyze the relevant empirical literature to provide insight into our research. In their study, Romer & Romer (2002) examined the monetary policies of 110 countries and observed that in most economies, money supply growth rates were quite high, but they found no relationship between money supply and output. Employing the vector autoregressive (VAR) model to evaluate the influence of monetary policy on economic growth in Kenya, Kamaan (2014) discovered that monetary policy exerts no effect on economic growth. Mutuku & Koech (2014), using the recursive VAR methodology with time series data spanning from 1997 to 2010, assessed the effects of monetary and fiscal policy shocks on economic growth in Kenya. Their findings indicated that monetary policy had an insignificant influence on real output.

Several empirical studies validate the significance of monetary policy for economic growth. Vinayagathasan (2013) assessed the influence of monetary policy on the real economy by employing a seven-variable structural VAR model. This analysis used monthly time series data from Sri Lanka spanning from January 1978 to December 2011. The research revealed that interest rate shocks had a notable impact on output. Onyeiwu (2012) investigated the influence of monetary policy on the Nigerian economy through the use of the OLS method, analyzing data from 1981 to 2008. The study concluded that monetary policy, represented by money supply, has a positive effect on GDP growth. Chaudhry et al. (2012) examined the long-term and short-term connections between monetary policy, inflation, and economic growth in Pakistan. They employed cointegration techniques and the Error Correction Model (ECM) for the period spanning from 1972 to 2010. The study indicated that the monetary policy variable, specifically call money, had no significant impact in the short term but was positively significant in the long term. Srithilat & Sun (2017) conducted an empirical study to assess the effectiveness of monetary policy from 1989 to 2016. They found a positive relationship between money supply and per capita real GDP in both the short and long run.

Khabo & Harmse (2005) conducted a study on the impact of monetary policy on economic growth in South Africa. They used ordinary least squares (OLS) regression on annual data from 1960 to 1997 and found that changes in money supply (M3) and inflation were significantly associated with variations in the economic growth rate of the country.

Jawaid et al. (2011) explored the influence of monetary, fiscal, and trade policies on economic growth in Pakistan, utilizing annual time series data from 1981 to 2009. They applied cointegration and the Error Correction Model (ECM), which unveiled the presence of statistically significant positive long-term and short-term relationships between monetary policy (money supply) and economic growth.

Senbet (2011) examined the comparative impact of fiscal and monetary measures on output in the USA using the VAR approach. Senbet's study revealed a notably positive influence of money supply on economic growth. These results are in alignment with the findings of Adefeso & Mobolaji (2010), who also investigated the relative effectiveness of fiscal and monetary policies on economic growth in Nigeria. They employed the cointegration technique and the error correction mechanism with annual data spanning from 1970 to 2007, reaching similar conclusions.

Ogunmuyiwa & Ekone (2010) examined the correlation between money supply and economic growth in Nigeria between 1980 and 2006. Their application of the OLS and ECM techniques revealed a favorable impact of money supply on economic growth in both the short run and long run.

Moursi & El Mossallamy (2010) conducted an analysis of monetary policy in Egypt and its influence on inflation and growth. They employed the Bayesian approach to estimate a dynamic stochastic general equilibrium (DSGE) model for a small closed economy. The study used monthly time series data covering the period from 2002 to 2008. Their findings indicated that the effect of a negative monetary policy shock had a more pronounced impact on output compared to inflation. This suggests that an expansionary monetary policy has the potential to promote economic growth without exerting excessive pressure on prices.

Amarasekara (2009) examined the effects of monetary policy on economic growth and inflation in the small, open, developing economy of Sri Lanka. The study utilized both the recursive VAR and semi-structural VAR methodologies, analyzing monthly data from 1978 to 2005. The results obtained from the recursive VAR were in line with those from the semi-structural VAR, revealing a significant negative impact of interest rates on growth. Positive innovations in interest rates were associated with a decrease in GDP growth. However, when money growth and exchange rates were used as policy indicators, the impact on economic growth differed from the established findings and economic theory.

3. Methodology

The explicit configuration of our model for economic growth can be articulated as follows:

$$lnGDP = \alpha_0 + \alpha_1 lnM2 + \alpha_2 lnER + \alpha_3 lnINF + \alpha_4 lnGE + \mu_t \tag{1}$$

In Equation (1), ln denotes the natural logarithm; the variables include real gross domestic Product (GDP), money supply (M2), Exchange rate (ER), Consumer price index (INF), and government expenditures (GE). The coefficients α_1, α_2, α_3, α_4 are expected to be positive. The error term (μ_t) is assumed to follow a normal distribution.

3.1 ARDL model

Numerous techniques have been developed and put into practice for conducting cointegration tests among variables. The two most frequently employed techniques are the residual-based test, as outlined by Engle and Granger (1987), and the maximum likelihood-based test presented by Johansen & Juselius (1990). However, due to their limitations, such as low statistical power and other issues, the OLS-based ARDL cointegration method, also recognized as the bound cointegration method in academic literature, has gained popularity in recent times.

To investigate the cointegration characteristics of the estimated equation, we employ the ARDL cointegration procedure introduced by Pesaran et al. (2001). This approach eliminates the common pre-testing issues associated with traditional methods. Furthermore, the concern of endogeneity is less significant, provided that there is no residual correlation in the model.

Given the advantages of this cointegration technique, this study employs the ARDL cointegration method to explore potential cointegration among the variables under investigation. To assess the cointegration among the variables as described in Equation (1), a general ARDL can be represented as follows:

$$\Delta lnGDP_t = a_{01} + \sum_{i=1}^{n1} a_{11}\Delta lnGDP_{t-i} + \sum_{i=0}^{n2} a_{12}\Delta lnM2_{t-i} + \sum_{i=0}^{n3} a_{13}\Delta lnER_{t-i} + \sum_{i=0}^{n4} a_{14}\Delta lnINF_{t-i} + \sum_{i=0}^{n5} a_{15}\Delta lnGE_{t-i} + \beta_{11} lnGDP_{t-1}$$
$$+ \beta_{12} lnM2_{t-1} + \beta_{13} lnER_{t-1} + \beta_{14} lnINF_{t-1} + \beta_{15} lnGE_{t-1}$$
$$+ \mu_{t1} \tag{2}$$

In Equation (2), Δ represents the operation of taking the first difference, α_{01} is the constant term, and α_{11} through α_{15} denote the short-term coefficients. β_{11} through β_{15}, on the other hand, correspond to the long-term coefficients, and $n1, ..., n5$ stand for the lag lengths. The term μ_{t1} represents the error term, which follows a white noise distribution.

Pesaran et al. (2001) introduce a novel approach to test for the potential existence of a long-term relationship among variables. Their approach offers two asymptotic critical value boundaries for the F-test, suitable for large sample sizes. The F-statistic calculated in the test is compared to the upper and lower critical values provided by Pesaran et al. (2001). If the calculated F-value exceeds the upper critical value, it leads to the rejection of the null hypothesis, indicating the presence of cointegration.

We employ a two-step process to reveal the long-term relationship. In the initial step, we investigate whether there is a long-term relationship among the variables. In the second step, if the long-term relationship is confirmed in the first step, we proceed to estimate both the short-term and long-term parameters. Once we confirm the presence of cointegration among the variables, we move forward with estimating the Error Correction Model (ECM). The ECM formulation within the context of the ARDL cointegration approach is written as follows:

$$\Delta lnGDP_t = a_{01} + \sum_{i=1}^{n1} a_{11}\Delta lnGDP_{t-i} + \sum_{i=0}^{n2} a_{12}\Delta lnM2_{t-i} + \sum_{i=0}^{n3} a_{13}\Delta lnER_{t-i} + \sum_{i=0}^{n4} a_{14}\Delta lnINF_{t-i} + \sum_{i=0}^{n5} a_{15}\Delta lnGE_{t-i}$$
$$+ \alpha ECM_{t-1} \tag{3}$$

4. Results and Discussion

This section includes an examination of the empirical results. Initially, we provide a descriptive analysis to assess the normality of the data. Next, we evaluate the impact of monetary policy using the findings obtained from the ARDL analysis.

4.1. Descriptive Analysis

Descriptive analysis is a fundamental prerequisite before embarking on other statistical analyses, as it provides insight into the data and allows for the recognition of potential issues. Table 1 provides an overview of the statistical characteristics of the data.

Table 1. Descriptive statistics

Variables	Mean	Standard Dev.	Minimum	Maximum
lnGDP	21.5615	0.8885	20.3380	23.4321
lnM2	20.9068	1.1150	19.2875	23.2698
lnER	1.1215	0.8831	0.2568	3.1273
lnINF	5.6240	0.6734	4.7662	7.2584
lnGE	19.5874	0.8852	18.2331	21.2825

Figure 1. Graph illustrating the chosen variables
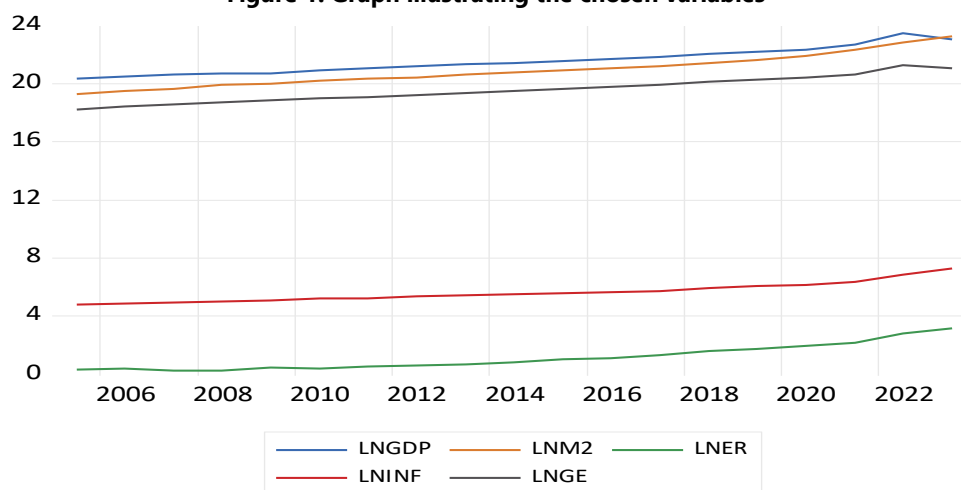
4.2. Lag length selection

We determine the appropriate lag length by examining an unrestricted VAR model, considering criteria such as the Akaike Information Criterion (AIC), Schwarz Information Criteria (SCIC), and Hannan-Quinn Information Criteria (HQ). The lag order selection criteria are presented in Table 2.

Table 2. Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	50.6577	NA	3.20e-09	-5.3715	-5.1264	-5.3471
1	157.2434	137.9343*	2.54e-13	-14.9698	-13.4994	-14.8236
2	206.6870	34.9013	4.19e-14*	-17.8455*	-15.1498*	-17.5775*

Note: * signifies the lag order chosen based on the following criteria: sequential modified LR test statistic (LR), final prediction error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quinn Information Criterion (HQ).

4.3. ARDL bounds testing

The presence of a cointegration relationship is examined using the bounds test, which assesses the null hypothesis of no cointegration relationship against an alternative hypothesis. The results of the cointegration test are provided in Table 3. According to the test results, the null hypothesis of no cointegration relationship is rejected with statistical significance levels of 1%, 5%, and 10%.

Table 3. Bounds cointegration test results

Lag length	F-statistic	
ARDL (2,0,0,1,1)	4.521	
Significance level (%)	**Lower bound I(0)**	**Upper bound I(1)**
1	3.29	4.37
5	2.56	3.49
10	2.2	3.09

Source: Authors' estimation.

After identifying the long-term relationship, we move forward to assess the ARDL estimates with a particular emphasis on evaluating the quality of the estimations. With the solid confirmation of cointegration in our model, we proceed to estimate both the long-term and short-term dynamics, utilizing the Schwarz Information Criterion (SCI) to determine the most suitable lag length.

Table 4. Estimated short run coefficient using ARDL approach

Variables	Coefficient	P-value
lnM2	1.1261	0.0058
lnER	0.1062	0.4479
lnINF	-0.1076	0.7742
lnGE	0.5413	0.0793

Source: Authors' estimation

The findings presented in Table 4 demonstrate that the money supply coefficient is both positive and highly significant at the 1% significance level. This outcome suggests that, in the short term, money supply has a positive effect on output growth in Turkey. On the other hand, the variables of exchange rate and inflation are not statistically significant and, consequently, do not influence short-term growth. The variable government expenditure has a positive impact on economic growth at a 10% significance level.

Table 5. Estimated long run coefficient using ARDL approach

Variables	Coefficient	P-value
lnM2	1.1143	0.0568
lnER	0.1050	0.4518
lnINF	-2.9360	0.0815
lnGE	1.3652	0.0060

Source: Authors' estimation

According to the results presented in Table 5, in the long term, the coefficients for money supply and government expenditure are both positive and statistically significant, at 10% and 1% levels of significance, respectively. This implies that over the long run, money supply and government expenditure are the key macroeconomic policy variables that have a positive effect on Turkey's GDP. In contrast, inflation has a negative impact on growth in the long term, but this effect is statistically significant only at the 10% level of significance. Finally, the exchange rate variable is not statistically significant and does not affect output growth in Turkey.

4.4. Stability diagnostics
To evaluate the consistency of the long-term relationship between the variables, we utilize the CUSUM and CUSUM-squared tests originally proposed by Brown et al. (1975). These tests are used to examine whether the long-term parameters remain constant. We apply these tests to the residuals of our model. The CUSUM test is built upon the cumulative sum of recursively calculated residuals based on the initial set of n observations. It is continually updated and plotted with reference to potential break points. If the CUSUM statistics plot remains within the 5% significance level, it indicates the stability of our parameter estimates. The same criterion applies to the CUSUM-squared statistics, which are constructed using the squared recursive residuals. As illustrated in Figures 2 and 3, both the CUSUM and CUSUM-squared statistics plots remain within the critical boundaries, affirming the stability of our model.
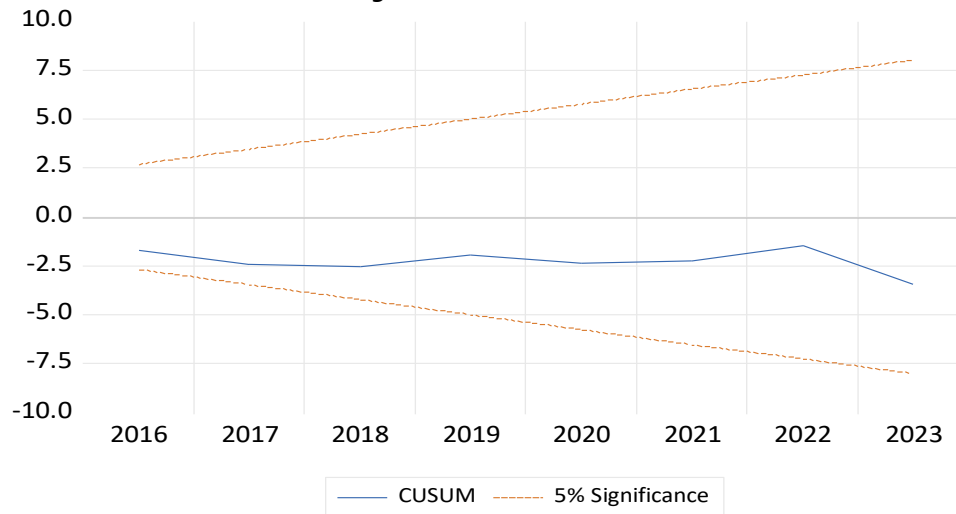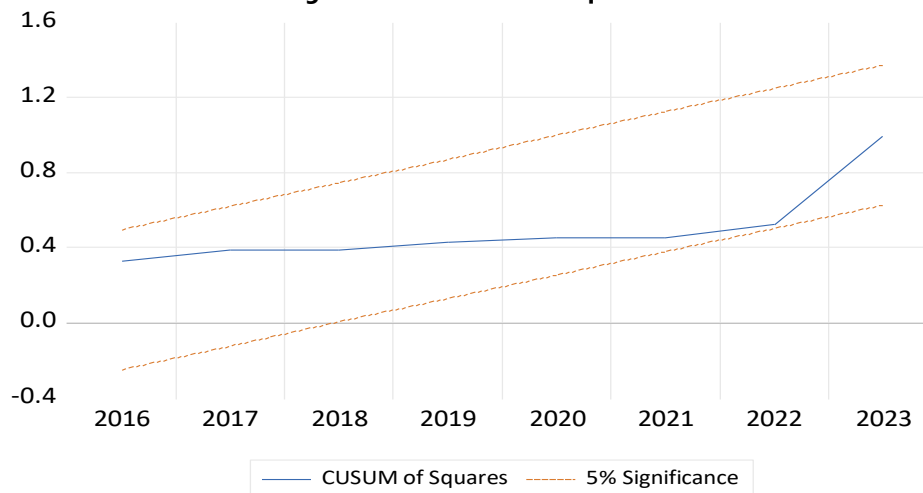
Figure 2. Plot of CUSUM.

Figure 3. Plot of CUSUM-squared.

5. Conclusion

This study uses the ARDL bounds testing procedure to examine the effectiveness of monetary policy in promoting output growth in Turkey using yearly time-series data from 2005 to 2023. The study found that money supply has a positive and statistically significant impact on output growth in Turkey. Government expenditure also has a positive and statistically significant impact on output growth in Turkey in the short and long run.

In light of these findings, we suggest that there should be effective coordination of monetary policy to support the Turkish economy. Without proper coordination, financial stability may remain elusive, resulting in high interest rates, low output growth, accelerating inflation, and volatile exchange rates. If monetary policy is aligned and supported by strong institutions, it has the potential to contribute to improved economic performance.

Future research may consider the factor of uncertainty. It is argued that uncertainty is a significant factor in monetary policy. Hence, for improved outcomes, it is essential for the Central Bank to consider uncertainty when implementing monetary policy. Uncertainty has the potential to impact the transmission of monetary policy, amplify the repercussions of economic shocks, and can lead to financial instability.

Conflicts of Interest: The authors declare no conflict of interest.
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References

[1] Adefeso, H. A. & Mobolaji, H.I. (2010). The fiscal-monetary policy and economic growth in Nigeria. *Pakistan Journal of social sciences*, 7(2), 137-142.

[2] Awdeh, A. (2019). Monetary policy and economic Growth in Lebanon. *Journal of central banking theory and practice*, 8(2), 147-171.

[3] Amarasekara, C. (2009). The impact of monetary policy on economic growth and inflation in Sri Lanka. *Central Bank of Sri Lanka Staff Studies*, 38, 1-44.

[4] Brown, R.L., Durbin, J. & Evans, J.M., (1975). Techniques for testing the constancy of regression relationships over time (with Discussion). J. Roy. Statist. Soc. B. 37, 149–192.

[5] Chaudhry, I.S., Qamber, Y. & Farooq, F. (2012). Monetary policy, inflation and economic growth in Pakistan: Exploring the co-integration and causality relationships. *Pakistan Journal of Commerce and Social Science*, 6(2), 332-347.

[6] Dwivedi, D.N. (2005). *Managerial Economics. 6th Edition*, VIKAS Publishing House PVT LTD., New Delhi.

[7] Ehigiamusoe, U. K. (2013). The link between money market and economic growth in Nigeria: Vector Error Correction Model Approach. *International journal of social behavioral, educational, economic*, 7(12).

[8] Engle, R. F., & Granger C. W. J. (1987). Cointegration and error correction: Representation, estimation, and testing. *Econometrica*, 55, 251-276.http://dx.doi.org/10.2307/1913236

[9] Jawaid, S.T., Quadri, F.S., & Ali, N. (2011). Monetary-fiscal-trade policy and economic growth in Pakistan: Time series empirical investigation. *International journal of economics and financial issues,* 1(3), 133-138.

[10] Johansen, S. & K. Juselius. (1990). Maximum likelihood estimation and inference on cointegration with applications to the demand for money. *Oxford Bulletin of Economics and Statistics*, 52(2), 169-210.

[11] Kamaan, C, K. (2014). The effect of monetary policy on economic growth in Kenya. *International Journal of Business and Commerce*, 3(8).

[12] Khabo, V. & Harmse, C. (2005). The impact of monetary policy on economic growth of a small open economy: the case of South Africa. *South African Journal of Economic and Management Sciences*, 8(3).

[13] Moursi, T, A. & El Mossallamy, M. (2010). Monetary policy analysis with New Keynesian Models for Egypt. Information and Decision Support Center (IDSC) of the Egyptian Cabinet Working paper.

[14] Mutuku C., & Koech E. (2014). Monetary and fiscal policy shocks and economic growth in Kenya: VAR econometric approach. *Journal of World Economic Research*, 3(6), 95–108.

[15] Ogunmuyiwa, M.S. & Ekone, A. F. (2010). Money supply - economic growth nexus in Nigeria. *Journal of Social Sciences*, 22(3), 199 –204.

[16] Onyeiwu, C. (2012). Monetary policy and economic growth of Nigeria. *Journal of Economics and Sustainable Development*, 3, 7.

[17] Pesaran, M. H. & Shin Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In econometrics and economic theory in the 20th century: The Ragnar Frisch centennial symposium, ed. Steinar Strøm. Cambridge, M. A.: Cambridge University Press. http://dx.doi.org/10.1017/CCOL521633230.011

[18] Pesaran, M. H., Y. Shin, & R. J. Smith. (2001). Bounds testing approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289-326. http://dx.doi.org/10.1002/jae.616

[19] Romer, C. D., & Romer, D. H. (2002). A Rehabilitation of Monetary Policy in the 1950, National Bureau of Economic Research, Retrieved from http://www.nber.org/papers/w8800.

[20] Senbet, D. (2011). The relative impact of fiscal versus monetary actions on output: VAR approach. Business and Economics Journal, 1, 1-11.

[21] Srithilat, K. & Sun, G. (2017). Impact of Monetary Policy on Economic Development: Evidence from Leo ADR. MPRA Paper No. 79369, posted 25 May 2017.

[22] Twinoburyo, E. N. & Odhiambo, N. M. (2018). Monetary policy and economic growth: A review of international literature. *Journal of central banking theory and practice*, 7 (2), 123-137.

[23] Vinayagathasan, T. (2013). Monetary policy and the real economy: A structural VAR approach for Sri Lanka. *National graduate institute for policy studies*, 13(13).