

## Optimal Monetary Policy Transmission Mechanism for Economic Growth (In case of Developing Countries)

Gulnaz Hameed<sup>1</sup>, Muhammad Usman\*<sup>2</sup>, Hajra Bibi<sup>3</sup>, and Atta Muhammad Baber<sup>4</sup>

### ABSTRACT

This paper assesses the role of monetary policy on economic growth in selected developing countries and empirically estimates a dynamic model for exploring the performance of monetary policy in developing countries. The panel data is collected for 44 developing countries from 1974 to 2018. The analysis is carried out through the Generalized Method of Moment (GMM) which is efficient to handle the problem of endogeneity and serial correlation. The results of monetary indicators show that expansionary monetary policy is best suited for economic growth in developing countries. The results of the money supply and banks reserve ratio suggested that expansionary monetary is more appropriate for selected countries over contractionary monetary policy. In a similar line, population growth performs a negative impact on economic growth while the developing countries are labour-abundant, and analysis supports that the labor force has a positive role in economic growth. Based on empirics, it is suggested that expansionary monetary policy is more effective for economic growth and economic stability in selected countries.

### ملخص

ترمي هذه الورقة البحثية إلى تقييم دور السياسة النقدية في النمو الاقتصادي لبلدان نامية مختارة، كما تهدف إلى اعتماد نموذج دينامي لاستكشاف أداء السياسة النقدية في البلدان النامية. وتم تجميع لوحة البيانات الخاصة بأربعة وأربعين دولة نامية خلال الفترة الممتدة من 1974 إلى 2018. وأجري التحليل من خلال تطبيق أسلوب اللحظات المعمم (GMM) والذي

<sup>1</sup> Assistan Professor, Department of Economics, Arid Agriculture University Rawalpindi, Pakistan [gulnaz.hameed@uair.edu.pk](mailto:gulnaz.hameed@uair.edu.pk)

<sup>2</sup> \*2Visiting Research Scholar at Paul Engler College of Agriculture & Natural Sciences, WTAMU and Ph.D. Student, Department of Economics, Arid Agriculture University Rawalpindi, Pakistan [Usmanhsp56@gmail.com](mailto:Usmanhsp56@gmail.com)

<sup>3</sup> M.Phil Economics, Department of Economics, Arid Agriculture University Rawalpindi, Pakistan [hajraeco1234@gmail.com](mailto:hajraeco1234@gmail.com)

<sup>4</sup> Ph.D. Student, Department of Economics, Arid Agriculture University Rawalpindi, Pakistan [atta.muhammad@gmail.com](mailto:atta.muhammad@gmail.com)

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يعد فعالا لتجنب مشكلة انعدام التجانس والارتباط التسلسلي. وتبين نتائج المؤشرات النقدية أن السياسة النقدية التوسعية هي الأنسب للنمو الاقتصادي في البلدان النامية. كما أشارت نتائج نسبة العرض النقدي واحتياطي البنوك إلى أن النقد التوسعي أكثر ملاءمة للبلدان المختارة من السياسة النقدية الانكماشية. كما أشارت النتائج كذلك إلى أن النمو السكاني له أثر سلبي على النمو الاقتصادي، في حين أن البلدان النامية وفيرة باليد العاملة، ويدعم التحليل أن للقوى العاملة دورا إيجابيا في النمو الاقتصادي. استنادًا إلى التجارب، نرى أن السياسة النقدية التوسعية أكثر فعالية للنمو الاقتصادي والاستقرار الاقتصادي في البلدان المختارة.

### RÉSUMÉ

Cet article évalue le rôle de la politique monétaire sur la croissance économique dans certains pays en développement et estime empiriquement un modèle dynamique pour explorer la performance de la politique monétaire dans les pays en développement. Les données de panel sont collectées pour 44 pays en développement de 1974 à 2018. L'analyse est réalisée à l'aide de la méthode des moments généralisés (GMM) qui est efficace pour traiter le problème de l'endogénéité et de la corrélation sérielle. Les résultats des indicateurs monétaires montrent que la politique monétaire expansionniste est la mieux adaptée à la croissance économique des pays en développement. Les résultats de la masse monétaire et du taux de réserve des banques suggèrent que la politique monétaire expansionniste est plus appropriée pour les pays sélectionnés que la politique monétaire contractionniste. Dans le même ordre d'idées, la croissance démographique a un impact négatif sur la croissance économique, alors que les pays en développement disposent d'une main-d'œuvre abondante, et l'analyse montre que la main-d'œuvre joue un rôle positif dans la croissance économique. Sur la base des données empiriques, il est suggéré que la politique monétaire expansionniste est plus efficace pour la croissance économique et la stabilité économique dans les pays sélectionnés.

**Keywords:** Monetary Policy, Economic Growth, Developing Countries, GMM

### 1. Introduction

The goals of macroeconomic policies are to attain economic stability, price stability, high employment, and achieve sustainable economic growth (EG) for a long time. Sustainable EG in developing countries is essential to reduce poverty and enhance living standard. The monetarists agreed that various monetary instruments played an essential role in achieving several macroeconomic goals (Ayodeji & Oluwole, 2018; Berument et al., 2012; Inam & Ime, 2017). The fundamental objective of monetary policy is to

achieve price and economic stability, control the money supply, maintain the balance of payment, and stability in the value of a currency (exchange rate stability) (Awdeh, 2019; Bordo & Flandreau, 2003). The price instability affects the real EG cause less productivity because of less demand. The currency depreciation increases the profitability of tradable investment; meanwhile, the real exchange rate affects the balance of trade. The devaluation of the currency is steadily linked with higher EG (Ali et al., 2008; Ghosh et al., 2015). The central bank regulates the monetary policy and supply of money in the country, to stimulate social and economic welfare.

Monetary policy is duly endorsed by the central bank of the economy with the objective to attain economic sustainability and a targeted growth rate. The purpose of the monetary policy is to keep lowering unemployment, sustain currency value, inflation stability, and steady economic growth. The monetary policy aims can achieve through specific manipulation in interest rate, open market operation, bank reserve ratio, and exchange rate. In a broader sense, the monetary policy might be expansionary or contractionary. The expansionary monetary policy encourages business activities by lowering the interest rate and cheaper borrowing. Whereas the contractionary monetary policy target reducing the inflation rate by forcing lower spending and making expensive borrowings.

In developing countries, several studies determine the different scenario regarding the tight and slack monetary policy. Additionally, the monetary authorities target for the future expectations (like inflation) through the implementation of monetary tools. The variation in monetary tools affects the prices of goods and services, currency exchange value, asset prices, investment decision, aggregate demand (AD) and supply of goods. The interest rate channel performs a prime contribution in the monetary policy as a transmission mechanism (Estrella & Mishkin, 1995; Kandil, 2014). Nasko (2016) argued that the supply of money and the lower interest rate has a significant impact on EG. Further, the lower rate of interest positively influences investment activities, increase the for loans, investors are more willing to invest because of higher AD. In contrast, Anowor and Okorie, 2016 argued that the contractionary monetary policy stimulates EG by raising interest rates leads to reduce the money supply in the economy. So, variations in quantity money affect and change the AD and economic events in the economy (Ayodeji & Oluwole, 2018; Srithilat, et al., 2017).

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The developing nations have chosen the monetary policy tools, theories, and instruments for the financial adjustment that evolved for developed countries. The developing countries do not have the modern financial system that developed countries have, this is foremost reason for the failure of monetary policy instruments. The monetary policy theories or laws that are developed for advanced countries may not be suitable to achieve the long-term policy goals for developing countries (Page, 2013). Rational of this research is the inconclusive chosen between contractionary and expansionary monetary policy in developing countries (Anowor & Okorie, 2016; Evans et al., 2018; Kandil, 2014). In developing countries, the monetary policy is failed because of highly influence of public policies. Moreover, the monetary policy is not working independently in developing countries (Usman, 2016; Awdeh, 2019; Isakovna, 2021).

It is clear from existing literature, that the monetary policy transmitted into the real economy through numerous channels thereby affect EG. The channels include interest rate which affects the investment and existing money supply; issuance of a new currency that affects the AD and inflation; cash reserve ratio that cause the investment and AD through credit policy; the open market operation has a direct impact on trading commodities, government bonds and securities, investment, and aggregate output, finally, the exchange rate affects net trade and money demand in the economy (Mboweni et al., 2008). However, this study focused on the effectiveness of monetary policy in EG through panel analysis in the case of 44 developing countries. The main purpose of this research is to empirically examine the monetary policy transmission mechanism for EG in the selected developing countries. This research is also investigating which monetary policy channel has a substantial role in enhancing economic growth. Further, this study identifies the monetary policy narratives that are highly needed to improve. Finally, this study specifies the unanimous monetary policy (either expansionary or contractionary) that has a long-term effect on economic stability in developing countries.

## 2. Literature Review

The monetary policy is a permutation to design the structure of supply, exchange value, and money cost in the country, which concern to control economic activities (Folawewo & Osinubi, 2006). The stability in money supply is ensuring the consistency to target the long-term real economic growth, the non-inflationary growth is a key to economic successes, reduce

poverty, increase per capita GDP, and improve living standards (Ghosh et al., 2015; Srithilat et al., 2017). The monetary instruments influence the economic activities through AD, which depends on demand for money. The demand for money rises because of three key reasons defined by Keynesian such as, transactional needs, precautionary purpose and speculative demand. The monetary demand reflects in inflation rate, interest rate, exchange rate and unexpected market behavior. Change in rate of interest and money supply directly affect the monetary demand and investment decision, therefore, the AD responds to monetary instruments and adjust accordingly. The list of monetarists believes that the implementation of expansionary monetary tools for EG leads to higher inflation, having no impact on real EG (Akalpler & Duhok, 2018; Ali et al., 2008; Berument et al., 2012).

The analysis shows that the monetary policy instruments such as refinancing rate sterilization operations and the mandatory rate have a progressive impact on EG (Hakimov, 2020). Similarly, (Ayodeji & Oluwole, 2018) find the positive and significant relationship of money supply and exchange rate on EG while the rate of interest and liquidity ratios have a negative impact on EG, the results are supporting the of expansionary monetary is best suited for EG. In contrast, (Igharo et al., 2020) revealed that monetary policy has not been a significant impact on EG, meanwhile, the government intervention and lack of financial institutional independence cause the monetary policy ineffective. Supplementary, (Duskobilov, 2020) observed the positive effect of inflation and interest rate on the EG of Uzbekistan, the study suggested that mix monetary policy is suitable for EG.

### **2.1 Monetary Policy Scenario for Developing Countries**

In developing countries, typically, the monetary policy is not working independently which is influenced through the financial decision and government policies that are reasons for the failure of monetary policy in developing countries (Alavinasab, 2016). Generally, the institutional and financial underdevelopment creates hurdles in the implementation, transmission, and effectiveness of monetary stability in developing countries over advanced countries (Ghatak & Sánchez-Fung, 2007). Monetary economists strongly believe that monetary policy exerts an unanticipated effect on international and external economic activity. The change money supply and circulation affect output and EG i.e., the money

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supply unexpectedly increases by the central bank will promote EG (Baghebo & Stephen, 2014; Evans et al., 2018; Ogunmuyiwa & Ekone, 2010). Conversely, numerous monetarists argued that the increasing money supply has no effect on output or EG, but higher money supply cause the inflation rate in the economy (Awdeh, 2019; Igharo et al., 2020). Besides, (Gul et al., 2012) concluded that tight monetary policy has a stable and noteworthy impact on EG. (Khan, 2011) observed that objectives of monetary policy are anxious with the implementation of multiple targets consisting of stable inflation, EG, full employment, prevent financial crises, interest rate stability, and stable exchange rate.

Additionally, Apere and Karimo (2014) empirically found the behavior of monetary policy in Nigeria and concluded that money supply is indicator for EG in short period while interest rate is important channel for price stability economic growth. Similarly, Anowor (2016) highlights that cash reserve ratio is superior tools to achieve the balanced price level and economic growth, whereas broad money is weak instrument for EG in Nigeria. The monetary policy is long run phenomena for sustain the economic development in the economy, Gul et al., (2012) analytically found that tight monetary policy is not working for economic development. The money supply with acceptable interest rate can accomplish the monetary policy goals with lower influencing form the fiscal institutions. In contradiction, Kamaan (2014) argued that contractionary monetary policy is more suited to achieve the monetary policy targets. The interest rate and exchange rate shock are the key reasons for weak performance in accomplishing the desire outcome of the monetary policy.

The enormous empirical and theoretical literature has primarily focused on monetary policy transmission in the case of developed countries. Such studies focus on price-side (nominal) behavior over quantities (real), while the in developing countries, monetary policy transmission has focused on quantity (reals) behavior over prices (nominal) fluctuations. A monetary policy designed to regulate the money value, supply, and inflation rate in an economy, with an anticipated economic fluctuations for economic stability (Folawewo & Osinubi, 2006). In developing countries, typically, the monetary policy is not working independently which is influenced through the financial decision and government policies that are reasons for the failure of monetary policy in developing countries (Alavinasab, 2016). Generally, the institutional and financial underdevelopment creates

hurdles in the implementation, transmission, and effectiveness of monetary stability in developing countries over advanced countries (Ghatak & Sánchez-Fung, 2007). Consequently, the cost and gains of monetary policy differ in attaining price and economic stability in developing countries (Ayodeji & Oluwole, 2018; da Silva & Vieira, 2017; Dao, 2012).

The monetary condition index plays an essential role to influence the economic output and supply and exchange rate shocks are more dominant over interest rate shock for economic stability (Khan & Qayyum, 2007). The real money supply plays a fundamental role in GDP growth in Egypt (Obaid, 2007), the expansionary monetary policy is a key phenomenon for GDP growth. Grauwe & Polan (2005) investigated the statement quantity theory of money and found a positive and significant association among inflation and money supply for economic output. Waliullah and Rabbi (2011) funds a remarkable influence of monetary policy on EG in Pakistan. Further, the Pakistan stock market and international trade are sensitive to monetary policy (Alam & Waheed, 2006). Also, Qayyum & Anwar (2011) argued that the in developed countries, the stock market price index is fundamental indicators which affected through the variation in monetary policy factors. Similarly, Akalpler & Duhok (2018) demonstrated that the financial crisis has a negative impact on the economies both in developing and developed countries, meanwhile, the capitalistic market system is favorable for developed countries but such countries show ambiguous results because of the high reliability of banking system over the stock market.

## **2.2 Monetary Policy Role in Developed Countries**

Since the 1990s, a list of developed countries transformed their inflation-targeting policies monetary explicitly. Currently, most of the developed countries adopted regime-wise inflation targeting through implementing the monetary policy instruments. Under inflation-targeting, the independent decision of the central bank maintains the inflation rate closer to the well-defined level by avoiding the unnecessary fluctuations in the economy, which is delegated to monetary policy tools (Svensson, 2002). Additionally, Ball and Sheridan (2005) argued that the OECD may have reduced the inflation rate and variability through adopting the Taylor rule but such countries have not reached a better performance compared to non-adopting countries. Based on monetary policy targets for macroeconomic stability, numerous developed countries were not achieved the monetary

targets significantly, where the actual inflation was influenced by expected inflation rate (Levin et al., 2004). On the other hand, Gali and Monacelli (2005) and Divino (2009) theoretically suggested that the exchange rate consideration under an open economy does not affect the interest rate and other domestic monetary policy instruments. The exchange rate has an indirect effect on monetary instruments and monetary policy goals.

The soundness of financial institutions performs a crucial role to achieve the monetary policy targets. In developed countries, the macroeconomic targets are attainable due to reliable financial institutions. The central bank's misguided decision pays a large cost in the form of macroeconomic instability (Orphanides & Williams, 2013). Monetary policy has a long-lasting and significant impact on macroeconomic targets like price and economic stability, employment rate, and higher EG (Jorda et al., 2020). Cantore et al. (2019) found that the Taylor rule is an optimal monetary policy determinant and provides the higher intermediate response to achieve output and inflation sustainability. Dungey and Fry (2007) concluded that monetary policy is failed to accomplish the desired targets due to influence from fiscal policy. With the absence of direct political interference in the monetary policy adoption and deliberation phase, the central bank's achieving the macroeconomic targets depends on the policy stakeholders of the nations (Rieder, 2021).

A well-established segment of literature for both developed and developing countries have discussed about the role of monetary policy for economic stability and growth in the economy. A constructive role of monetary policy in provoking the economic stability have been stressed in list of studies (Anowor & Okorie, 2016; da Silva & Vieira, 2017; Duskobilov, 2020; Evans et al., 2018; Igharo et al., 2020; Kandil, 2014). The monetary policy is predominantly responsible for further key challenges like price stability, control over unemployment rate, and other internal and external social and political norms. The existing studies, Precious & Palesa (2014) and Epstein & Heintz (2005) argued that monetary instruments have encouraging role for economic growth, whereas money supply, repo rate, and exchange are key instruments to maintain the long run economic stability. Precious & Palesa (2014) suggested that the expansionary monetary policy with rational level of inflation rate perform constructive role higher economic growth. Consequently, the monetary instruments are direct indicators to sustain the economic stability and price level in economy (Alavinasab, 2016).



The price and economy stability is a fundamental goal to implement the monetary policy, sometime, the monetarists agreed to implement to expansionary policy (Akalpler & Duhok, 2018; Kandil, 2014; Khan & Qayyum, 2007; Sulaiman & Migiro, 2014; Waliullah & Rabbi, 2011) in contrast others are suggested to appliance the contractionary monetary policy (Ayodeji & Oluwole, 2018; Nouri & Samimi, 2011; Srithilat et al., 2017). The developed and developing countries are witnessed to implement the expansion and contractionary policy tools, but sustainable growth is questionable to achieve. The question here is, could sustainable EG attribute to expansionary or contractionary monetary policy? Could the usage of the money supply be important to non-inflationary economic growth? What monetary measures to be considered for sustainable EG and development? Which monetary policy is appropriate for developing counties for economic growth? Which monetary channel is more effective to attain sustainable economic growth? These are the questions that remain unsolved in literature in the case of developing countries. This study would answer such questions based on empirical evidence. The present study has superiority among reviewed literature, as no study focused such 44 number of developing countries collectively and worked on panel analysis tools to investigate the monetary policy behavior.

### **3 Research Methodology**

For macroeconomic stability, choosing accurate monetary policy tools is a serious discussion among numerous economists. Adoption of the factual monetary tools at a right time is a target for economists to get policy fruit. The monetary expansion path provides a fundamental contribution to all economic activities in the economy. The monetary policy choice is an essential matter to achieve economic stability, control inflation, reduce unemployment and achieve high EG. In developing countries, typically, the monetary policy is not working independently which is influenced through the financial decision and government policies that are reasons for the failure of monetary policy in developing countries (Alavinasab, 2016). Generally, the institutional and financial underdevelopment creates hurdles in the implementation, transmission, and effectiveness of monetary stability in developing countries over advanced countries (Ghatak & Sánchez-Fung, 2007).

Monetary economists strongly believe that monetary policy exerts an unanticipated effect on internal and external economic activity. The

change money supply has circulation effect on output and EG i.e., the money supply unpredictably increases by the central bank will promote EG (Baghebo & Stephen, 2014; Chowdhury & Afzal, 2015; Evans et al., 2018; Igharo, Osabohien, Onyemariechi, & Ibidapo, 2020; Ogunmuyiwa & Ekone, 2010). Conversely, numerous monetarists argued that the increasing money supply has no effect on output or EG, but higher money supply cause the inflation in the economy (Awdeh, 2019; Igharo et al., 2020; Usman, 2016). Besides, Gul et al., (2012) concluded that tight monetary policy has a stable and noteworthy impact on EG. Khan (2011) observed that objectives of monetary policy are anxious with the implementation of multiple targets consisting of stable inflation, EG, full employment, prevent financial crises, interest rate stability, and stable exchange rate.

This research tests the theoretical hypothesis about the role of monetary policy for EG in selected developing countries. The tested hypothesis is that the expansionary monetary policy has more productive role in EG of selected developing countries (Dao, 2012; Mboweni et al., 2008). The significant objective of this study is to explore the effects of monetary tools on EG in selected countries (see Appendix C). To achieve the objectives of this research the dynamic panel model was developed. To achieve the theoretical hypothesis this research adopted empirical model by showing the dependency relationship among EG and monetary policy instruments. Furthermore, the real Gross Domestic Product (GDP) is a dependent variable, whereas the Unemployment rate (UN), Population Growth (POP), Inflation Rate (INF), the Labor Force (LF), Money Supply (MS), Interest Rate (IR), the Exchange Rate (ER), and Bank Reserve Ratio (BR) are independent variables. Econometrically estimated model is as following:

$$EG_{it} = \beta_0 + \beta_1 IR_{it} + \beta_2 ER_{it} + \beta_3 MS_{it} + \beta_4 BR_{it} + \beta_5 X_{it} + u_i + v_t + \epsilon_{it}$$

Here, EG is economic growth, which is captured through growth rate of GDP, while  $IR_{it}$  is the interest rate,  $ER_{it}$  is the Exchange Rate, MS is Money Supply,  $BR_{it}$  is Banks' Reserve Ratio and  $X_{it}$  represents the control variables such as population growth (POP), inflation rate (INF), labor force (LF) and unemployment rate (UN). Whereas  $v_t$  and  $u_i$  denote time-specific effects and unobserved cross-sectional respectively, while  $\epsilon_{it}$  is the residual term. Description and measuring units of all policy and control variables are given in table 1. All the variables in different models are in

logarithmic form. In macroeconomic theories believe that as the interest rate reduces, people borrowed more money for investment purposes. In contrast, as the interest rate increase, consumers tend to save as returns on saving are higher over profit form investment (Alavinasab, 2016; da Silva & Vieira, 2017; Dao, 2012; Mboweni et al., 2008).

**Table 1:** Variables and Discussion

Abbreviations	Description of variables	Measuring Units
LGD <sub>it</sub>	Log of Gross Domestic Product	Real GDP growth rate
LUN <sub>it</sub>	Log of Unemployment	Unemployment rate
LPOP <sub>it</sub>	Log of Population	Population growth rate
LINF <sub>it</sub>	Log of Inflation rate	Rate of Inflation
LLF <sub>it</sub>	Log of Labor Force	Labor Force in total
LMS <sub>it</sub>	Log of Money Supply	Broad Money which includes M1, M2, and M3 in US dollars
LIR <sub>it</sub>	Log of Interest Rate	Real Interest rate
LER <sub>it</sub>	Log of Exchange Rate	Real Rate of exchange with US dollar
LBR <sub>it</sub>	Log of Bank Reserve Ratio	Bank Reserves in US dollars

Source: Authors own

### 3.1 Data and Data Sources

To analyze the role of monetary tools in EG of selected developing countries, data is collected from different sources. The data set varies for the periods of 1974 to 2018. The panel data set is collected from World Development Indicators (WDI), Pane World Table 9.1, Uncomtrade, and International Monetary Fund (IMF). The collected data is compiled and cleaned using the Ms-Excel, while the final estimation is carried through STATA software.

### 3.2 Estimation Technique

In this study, different models are estimated to develop the relationship between EG and monetary policy tools. The variables in different models are in logarithmic form. Initially, the summary statistics are calculated to summarize the data and investigate the initial behavior of the given variables. For the dependency relationship, the Pool OLS is estimated to

check the relationship between monetary tools and EG. The value of F-statistics shows all regressed models are statistically significant. Further, the test for heteroscedasticity and serial correlation tests shows the existence of heteroscedasticity and serial correlation in all estimated models, this highlights the results of Pool OLS are not efficient for policy perspectives (results are given in appendix A). In a similar line, the results of Fixed Effect, Random Effect and Housman test are calculated (see appendix B and C). The results of Fixed Effect are recommended by the Housman test and preferred over random effect, while the Brush and Godfrey test for serial correlation shows that there is a problem of serial correlation in the estimated models. Moreover, the fixed effect results are also not efficient for policy recommendation (Haq et al., 2016).

Theoretical and empirical analysis suggested that the estimated model of this research is dynamic nature. For this purpose, the Generalized Method of Moments (GMM) is adopted which developed in a pioneer study Arellano & Bond (1991). The dynamic panel models have advantages over other estimated models, the GMM is allowed to estimate the dynamic model below the restrictions that are sustained with the theory and there is no need for any additional supposition and assumption to reflect the basis of the model. Secondly, the problem of serial correlation in panel data is highly occurring, so estimation through GMM is efficient despite supplementary moment's condition. Thirdly, analysis through GMM influences the unobserved estimates through differencing of the regression as well as instruments. To resolve the endogeneity problem, one-year lag of highly correlated variables is taken as instrumental variables in the GMM estimation technique (Siller et al., 2021), which is helpful in endogeneity problem. Through presenting the instrumental variables in GMM the endogeneity problem can resolve efficiently and avoid the spurious analysis (Orji et al., 2010). The Sargan test is applied for validation of instrumental variables. In all specification, the probability values of Sargan test are greater than 0.05, which indicates the rejection of null hypothesis of "*over-identifying restrictions are valid*", and highlights that the instrumental variables are valid for further analysis.

#### **4 Results and Discussion**

To develop the empirical narrative and investigate the effectiveness of monetary policy in EG in selected developing countries, the panel data

from 1974 to 2018 is utilized. The data estimation process is carried out by using panel estimation techniques.

#### **4.1 Summary Statistics**

The calculated values of the summary statistics of panel variables are given in table 2. The summary statistic tables include minimum, maximum, mean, and standard deviation. The summary statistic estimates show that mean of all given variables is greater than the standard deviation of that respective variable. The average GDP growth rate in selected countries is 1.43, which is intermediate in maximum and minimum values. The standard deviation of GDP is 0.781 which is closer and less than the mean value, so there is no outlier in GDP. Similarly, the summary statistic values of all independent variables except inflation show that there not no outlier in panel data. The mean value of inflation is (2.51) less than the standard deviation (3.44). However, in panel data, this problem may arise because of different cross countries, which is not having any significant impact on estimates.

The estimated value of diagnostic tests shows the existence of heteroscedasticity, serial correlation, and endogeneity problems in estimated models. The calculated value of heteroscedasticity test is higher and significant, which is evidence of existence of heteroskedasticity in estimated models. Similarly, the calculated value of serial correlation test is significant which demonstrated to reject the null hypothesis of no serial correlation. The endogeneity problem was detected through Hansen's (1982) J-test (Semadeni et al., (2014)). The null hypothesis of the endogeneity test is the given variables behave endogenously in the estimated models. The results of endogeneity test (J-stat) in all models are insignificant, which is evidence of the endogeneity problem in the estimated models.

**Table 2:** Summary Statistics

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
LGDP <sub>it</sub>	1728	1.4375	.7815	3.0645	-3.3036
LUN <sub>it</sub>	1204	1.7362	0.6915	-0.9213	3.2003
LPOP <sub>it</sub>	1986	0.5794	0.5521	2.5923	1.5629
LINF <sub>it</sub>	1776	2.5128	3.4434	21.7527	7.9158
LLF <sub>it</sub>	1204	15.8621	1.7523	11.8124	20.4874
LMS <sub>it</sub>	1990	3.5412	0.5862	1.8970	5.3397
LIR <sub>it</sub>	754	4.7234	0.5115	3.5857	8.1456
LER <sub>it</sub>	1007	1.9728	1.0642	4.9161	7.0544
LBr <sub>it</sub>	596	2.9289	0.6244	1.2495	4.6276
	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>	<b>Model 4</b>	
<b>Heteroskedasticity Test</b>	50.38 (0.0000)	63.37 (0.0000)	11.51 (0.0007)	0.38 (0.5381)	
<b>Serial Correlation test</b>	0.0000***	0.0000***	0.0000***	0.0000***	
<b>Endogeneity Test (J-test)</b>	25.436 (0.1466)	19.337 (0.1209)	31.093 (0.3296)	39.597 (0.4370)	

Source: Author's Own calculations

## 4.2 Results of GMM Model

The empirical analysis conceded through the GMM. To test the consistency and proficiency in estimates firstly we analyzed the Pool OLS, Fixed and Random Effect (Results are presented Appendices A&B). The estimated results of dynamic GMM are given in table 3. The results indicated the monetary indicators have a significantly positive impact on EG of selected developing countries. In the first specification, the dependent variable is GDP<sub>it</sub>, while the unemployment rate (UN<sub>it</sub>), Inflation Rate (INF<sub>it</sub>), Population Growth (POP<sub>it</sub>) and Money Supply (MS<sub>it</sub>) are independent variables, MS<sub>it</sub> is a focused policy variable that reflects the behaviour of monetary policy in developing countries. The estimated results are following the theoretical background and provide the theoretical validation for research analysis. To resolve the endogeneity problem, one-year lag of highly correlated variables is taken as instrumental variables in the GMM estimation technique (Siller et al., 2021), which has efficiency to resolve the endogeneity problem (i-e labor force and unemployment). Through presenting the instrumental variables in GMM the endogeneity problem can resolve efficiently and avoid the spurious analysis (Orji et al., 2010).

In model 1, the lag coefficient of  $GDP_{it}$  has significant and positive impact on current GDP growth rate in selected developing countries. The significant value of lag coefficient indicates that in selected countries the previous year GDP growth has an essential contribution to boots the current GDP growth. The empirical results of  $UN_{it}$  show there is a negative and significant association between the unemployment rate and GDP growth. The slope coefficient of  $UN_{it}$  is -0.01928 which is significant at a one percent, this indicates that a one percent increase in  $UN_{it}$  leads to reduce the GDP growth by 1.9 percent in selected countries. The findings of  $UN_{it}$  are consistent with the results of Evans et al., (2018) argued that unemployment is a key determinant for economic instability and reduction of EG. Usman, (2016) argued that the greater the unemployment rate shows fewer opportunities to achieve high productivity and reduce the GDP growth in the long run. Besides, the  $POP_{it}$  has an insignificantly negative impact on EG in developing countries. The  $POP_{it}$  has a negative impact on EG because the selected countries are overpopulated with fewer resources. The results are harmonized with the findings of Savaş (2008), which concluded that overpopulation is a major cause of reduction of per capita GDP, while inconsistent with the findings of (Dao, 2012).

The statistical result of  $INF_{it}$  specifies a significant and negative relationship with GDP growth in selected countries. The coefficient value is -0.077 and significant at 1 percent, the increase in  $INF_{it}$  by one percent leads to reduce the GDP growth by 7 percent. The outcomes are consistent with the findings of Khan et al., (2001) and Umaru & Zubairu (2012) argued that a moderate level of inflation is better for the economy to encourage producer, flourishing economy and to achieve economic stability, whereas the higher rate has negative influence on GDP growth. The  $LF_{it}$  coefficient has a positive and significant impact on EG in selected developing countries and the coefficient value is 0.2262, which specify that one percent increase in  $LF_{it}$  causes the GDP growth to increase by 22 percent. The labor force performs a fundamental role in the production process and developing countries are highly labor abundant that has high share in productivity. The empirics are consistent with the findings of Rahman (2018) argued that  $LF_{it}$  is an essential production element for under develop countries.

The coefficient value of  $MS_{it}$  is positively significant this shows that an increase in  $MS_{it}$  has a positive impact on GDP growth in selected countries. The slope coefficient of  $MS_{it}$  is 0.0467 which shows that one percent

increase in  $MS_{it}$  affects the GDP growth by 4.6 percent positively. The narrative develops for  $MS_{it}$  results that expansionary monetary policy is more effective to boost the EG in developing countries. The results are confirmed through the findings of (Akalpler & Duhok, 2018; Awdeh, 2019; Srithilat et al., 2017; Usman, 2016), the increase in  $MS_{it}$  through sustaining policy instruments cause the EG positively. Risen the money supply in the economy will increase the AD which increases the aggregate output in long run.

In model 2, the control variables ( $UN_{it}$ ,  $POP_{it}$ ,  $LF_{it}$ , and  $INF_{it}$ ) perform similar reflection given in model one on EG with varied magnitude. However, the slope coefficient of interest rate ( $IR_{it}$ ) is negative and statistically significant at one percent level. This indicates that a higher interest rate means lower GDP growth. The slope coefficient of interest rate is -0.298, which means that one percent increase in interest rate leads to reduce the GDP growth by 29 percent through the channel of reduction in private investment. Interest rate policies directly affect investment in both the private and public sector. The higher level of  $IR_{it}$  discourages private investors and increases the cost of doing business. The estimated results are in line with the findings of (Anaripour, 2011; Awdeh, 2019; Srithilat et al., 2017). The expansionary monetary policy is favorable for developing countries to enhance EG.

In the third specification, the control variables show similar behavior to affect EG as explained in model 1, the policy variable  $IR_{it}$  interchange with  $ER_{it}$ . The exchange rate ( $ER_{it}$ ) has a positive and significant impact on EG in selected developing countries. The slope coefficient of the  $ER_{it}$  is 0.0557 which shows 1 percent increase in exchange rate the GDP growth will increase by 5.5 percent in developing countries. The  $ER_{it}$  shows positive and significant impact on EG, this shows the appreciation of domestic currency slower the growth GDP because of a decrease in net exports and reduction in foreign investment inflow (Kogid, Asid, Lily, Mulok, & Loganathan, 2012). This indicated that an appreciation of the domestic currency is not favorable for EG in developing countries.

In model 4, the policy variables  $ER_{it}$  replace with bank reserve ratio ( $BR_{it}$ ) by keeping the control variables the same. The behavior of control variables is the same as given in model 1. The value of  $BR_{it}$  coefficient is significantly negative at one percent level. The  $BR_{it}$  coefficient value is -0.1023 which means one percent increase in  $BR_{it}$  leads to reduce the GDP



growth by 10 percent in selected countries. The monetary authorities used the  $BR_{it}$  to control the circulation of money through credit changing policy in the economy. As the  $BR_{it}$  decrease, the private banks increase the loan amount to the investors through which the money in circulation increased. This highlights that expansionary monetary policy through lowering the  $BR_{it}$  has a significant impact on EG in selected developing countries. The estimates are consistent with the outcomes of (Evans et al., 2018; Kandil, 2014; Nasko, 2016; Okafor, Oshoke, & Thomas, 2015).

**Table 3:** Empirical Results of GMM

Variables	Model1	Model2	Model3	Model4
LGDP(-1)	0.01382 (0.0000)***	0.1592 (0.1403)	0.0131 (0.0019)***	0.2101 (0.0418)**
LUN <sub>it</sub>	-0.0192 (0.009)***	-0.0342 (0.000)***	-0.00917 (0.628)	-0.0298 (0.065)*
LPOP <sub>it</sub>	-0.0262 (0.256)	-0.0317 (0.003)***	-0.0149 (0.178)	-0.0023 (0.921)
LINF <sub>it</sub>	-0.077 (0.000)***	-0.022 (0.033)**	-0.101 (0.000)***	0.0159 (0.576)
LLF <sub>it</sub>	0.2262 (0.000)***	-0.028 (0.256)	0.1786 (0.000)***	0.5285 (0.013)**
LMS <sub>it</sub>	0.04677 (0.000)***			
LIR <sub>it</sub>		-0.2980 (0.000)***		
LER <sub>it</sub>			0.0553 (0.100)*	
LBR <sub>it</sub>				-0.1023 (0.044)**
No of Instruments	818	596	479	200
Wald chi-square	4975.04	4203.21	590.71	1128.51
Serial Correlation test	0.0000***	0.0000***	0.0000***	0.0000***
Sargan test	35.43755 (.9891)	28.538 (.8715)	12.467 (1.0000)	9.07838 (1.0000)

In the above table \*, \*\*, \*\*\* shows the significance level at 1, 5 and 10 percent level respectively. In the estimated models 1, 2, 3, and 4 EG is dependent variable. While the models are estimated through the GMM for across countries analysis.

Source: Author's Own Analysis

## **5 Conclusion and Policy Implications**

The purpose of this research is to investigate the role of monetary channel for EG in selected developing countries. Further, this research practice highlights the inconclusiveness of two fundamental policy adoptions either expansionary or contractionary monetary policy in developing countries. To meet the objectives, this study empirically estimated a dynamic model to examine the behavior of monetary policy in selected developing countries. This research analyzed the role of monetary policy through collecting the panel data of 44 developing countries and data spanning from 1974 to 2018. For empirical outcomes, this research applied the panel data techniques as initially the Pool OLS, fixed effect and random effect. The empirical results of fixed effect and random effect show that such estimates are not sufficient and highlight the problem of serial correlation and endogeneity in a given data set. Therefore, the final estimation is carried out through the Generalized Method of Moment (GMM), which is efficient to handle the endogeneity problem and serial correlation.

It is concluded from empirical results that the exchange rate channel is more suitable than the interest rate, and both channels are in the favor of the expansionary monetary policy. In a similar line, the results of money supply and banks reserve ratio suggested that expansionary monetary is best suited for selected countries over contractionary monetary policy. It is suggested that the exchange rate channel is suitable for policy purposes in developing countries. The bank reserve channel to control the economic activities is performing a negative impact on EG in selected countries. In a similar line, population growth performs a negative impact on EG. Most of the developing countries hold the maximum amount of population from the total population, that's why the labor force performs a positive role in economic growth. The developing countries are labor-abundant countries that why the labor force has a positive role in economic growth.

Based on quantitative analysis and results of GMM, this study suggests some policy recommendations for developing countries. It is recommended that expansionary monetary policy is more effective for economic growth and economic stability in selected countries. Economic stabilization is a key policy concern for monetarists, so in this context, the exchange rate channel is more suitable rather than the interest rate channel. The bank reserve channel to control economic activities is performing a negative impact on economic growth. The developing countries must

revise the bank reserve ratios policy to enhance the investment for economic growth. Population growth performs a negative impact on EG that requires a stable policy to control the population. The government and policymakers must focus on labor-abundant production policies. A large population also creates an unemployment problem; the government should develop a policy in favor of unemployment reduction.

### **5.1 Future Research Directions**

Research is required to investigate the effect of monetary policy shocks on EG through incorporating structural breaks for financial crisis 2007 to find the before and after financial crisis behavior on monetary policy. Further, a study is needed to find the comparative analysis of monetary shock for developing and developed countries.

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## Appendices

A)

Table: A, Results of Pool OLS

Variables	Model1	Model2	Model3	Model4
UN <sub>it</sub>	-0.1039*** (0.002)	-0.1905*** (0.000)	-0.0199*** (0.042)	0.0373 (0.173)
POP <sub>it</sub>	0.1179 (0.004)	0.2331*** (0.000)	0.1021** (0.013)	-0.1022 (0.579)
INF <sub>it</sub>	0.1041*** (0.000)	0.0266*** (0.571)	0.05895** (0.098)	0.01207*** (0.000)
LF <sub>it</sub>	0.0657*** (0.000)	0.0555*** (0.000)	0.04516* (0.010)	0.1508** (0.051)
MS <sub>it</sub>	0.1501*** (0.000)	-----	-----	----
IR <sub>it</sub>	----	-0.0991*** (0.000)	-----	-----
ER <sub>it</sub>	-----	-----	-0.0876** (0.603)	-----
BR <sub>it</sub>	-----	-----	-----	-0.36992** (0.035)
No of observation	913	674	467	574
F-stat	21.21 (0.0000)	22.13 (0.0000)	5.62 (0.0000)	4.60 (0.0004)
Hetero test (BP)	50.38 (0.0000)	63.37 (0.0000)	11.51 (0.0007)	0.38 (0.5381)

Source: Authors Calculation



**B)**

Table: B, Results of Fixed Effect

Variables	Model 1	Model 2	Model 3	Model 4
UN <sub>it</sub>	-.1549 (0.052)	-.2344 0.021	-.0651 0.001	-.0331 0.000
POP <sub>it</sub>	.2593 0.010	.0965 0.422	-.0265 0.830	-.0813 0.037
INF <sub>it</sub>	.05064 0.156	.1272 0.000	.0537 0.293	.0107 0.000
LF <sub>it</sub>	.3447 0.040	.0793 0.778	-.277 0.297	1.0769 0.000
MS <sub>it</sub>	.1272 0.000			
IR <sub>it</sub>		-.0547 0.114		
ER <sub>it</sub>			-.0769 0.647	
BR <sub>it</sub>				.0199 0.375
Observation.	913	674	467	574
F-statistics	6.92 (0.000)	1.93 (0.000)	2.60 (0.000)	919.33 (0.000)
Serial Correlation	4.97	4.10	5.90	7.62
Test	(0.000)	(0.000)	(0.000)	(0.000)

Source: Authors estimation

C)

Table: C, Results of Random Effect and Hausman test

Variables	Model 1	Model 2	Model 3	Model 4
UN <sub>it</sub>	-.1240 0.030	-.2055 0.002	-.0420 0.004	-.0338 0.000
POP <sub>it</sub>	.156370 .020	.1633 0.031	.0742 0.294	-.0842 0.031
INF <sub>it</sub>	.0869 0.001	.0239 0.625	.0266 0.460	.0114 0.000
LF <sub>it</sub>	.0582 0.044	.0499 0.092	.0223 0.554	.9522 0.000
MS <sub>it</sub>	.1281 0.000			
IR <sub>it</sub>		-.0693 0.027		
ER <sub>it</sub>			-.0920 0.577	
BR <sub>it</sub>				.0170 0.450
Observation.	913	674	467	574
F-stat	46.56	30.26	13.17	4526.01
Serial Correlation Test	4.97 (0.000)	4.10 (0.000)	5.90 (0.000)	7.62 (0.000)

Source: Authors calculations

D)

List of Selected Developing Countries			
Argentina	Bangladesh	Barbados	Bolivia
Botswana	Brazil	Cameroon	Chile
China	Colombia	Costa Rica	Ecuador
Egypt	El Salvador	Fiji	Ghana
Guatemala	Guyana	Haiti	Honduras
India	Indonesia	Iran	Jamaica
Kenya	Malaysia	Mali	Mexico
Mozambique	Pakistan	Panama	Paraguay
Peru	Philippines	Senegal	Sierra Leone
Sri Lanka	Thailand	Turkey	Uganda
Uruguay	Venezuela	Zambia	Zimbabwe

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