

Financial Inclusion and Monetary Policy Effectiveness: A Comparison of Developed and Under-developed Countries.



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CERTIFICATE

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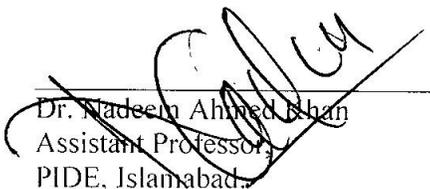


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DECLARATION

This material and information contained in this thesis in my original work. I have not previously presented any part of this work elsewhere for any other degree. Further it is submitted that material taken from other sources has been properly acknowledged.

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DEDICATION

This thesis is dedicated to my parents, for their unconditional love, support, continuous encouragement and efforts for providing me well education.

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Abstract

Financial inclusion has gained immense attention from researchers and policymakers. Many studies analyzed the relationship between financial inclusion and different macroeconomic variables. This study explores the relationship between financial inclusion and monetary policy effectiveness in developed and developing countries. Financial inclusion is measured by composing an index using three dimensions: access, usage, and barriers. The inflation rate is used as a proxy of monetary policy effectiveness. The study employed a panel structural vector autoregressive technique (SVAR) on data over the period of 2004-2018. The results suggest bidirectional relationship of financial inclusion and monetary policy effectiveness in developing countries however only inflation has an impact on financial inclusion in developing countries.

Keywords: financial inclusion, monetary policy effectiveness, structural Vector autoregressive

Chapter 1

Introduction

1.1 Background

The world's system is based on capitalism and the financial sector plays a key role in it. The modern economies could not have developed without financial sector. USA economy experienced rapid growth and industrialization in the 19th century. This is partly due to the expansion of financial intermediaries and banks. There were approximately 27,000 banks with a total assets of \$27.3 billion. Fierce banking competition helps potential investors as capital has been available at relatively low rates. Due to the immense importance of financial sector, Financial Inclusion became an intriguing issue in the 21st century and it is still creating a significant gap between the underdeveloped and developed nations. The emphasis of both the world's policymakers, academics, and professionals is to have maximum financial inclusiveness. “An inclusive financial system provides equal opportunities to individuals and businesses to get an easy and affordable financial product and services to meet their needs i.e. transaction, payments, saving and credit” (World Bank, 2013). It has transforming impacts at initial levels such as it spread awareness, improves financial knowledge, provides investment opportunities, helps people smoothen their consumption against shocks and empower women. All these initial impacts lead to a higher economic outcome i.e. escaping poverty, reduce income inequality and set the economy in the path of development. Besides, it is understandable through literature that financial inclusion influences monetary policy as well.

Monetary authorities of any country endorse monetary policy either by managing interest rate or money supply in the economy to achieve certain objectives i.e. price stability, promote

economic growth, financial stability and inflation control. These specific goals can only be achieved if monetary policy actions are transferred effectively in the economy. There are different transmission mechanisms through which the policy actions are transferred into the economy. This Monetary transmission mechanism connects the financial system to monetary theory (Mishkin, 2006). The higher level of financial inclusion increases the pace and coverage of transmission in the financial system and make monetary policy more effective. The available literature shows that monetary policy effectiveness has a significant and causal relation to financial inclusion. Mbutor and Uba (2013) infers that a higher degree of financial inclusion improves monetary policy effectiveness. Financial inclusion will make it possible to extend the monetary policy to financially exclude and helps policymakers to better forecasts inflationary movement (Lapukeni, 2015). Lenka and Bairwa (2015) analyze an inverse but significant relation between financial inclusion and inflation in the case of SAARC countries. Anarfoa *et al* (2019) examine the bi-causal link between financial inclusion and monetary policy. An increase in access to financial product and services give rise to investment expenditure which in turn increases aggregate demand and an increased interest elasticity make monetary policy more sensitive. At the same, monetary policy instruments like changes in the lending rate and saving rate promote financial inclusion.

There is a huge difference between the levels of financial inclusion in developed and developing countries. Developing countries face different demand side or supply side barriers. These barriers highlight the gap that why developing countries faces lower level of financial inclusion. Furthermore, the individuals of developing states face involuntary financial exclusion.

There are five major form of financial exclusion is identified by Sarma (2012).access exclusion, price exclusion, self-exclusion, marketing exclusion, and condition exclusion. Access exclusion is a first type, in which people prefer to be financially excluded because the bank

branches are too far way. Price exclusion, due to unaffordable financial products and services, self-exclusion, people exclude their self- due to psychological barriers or religious factors, marketing exclusion occurs when people are uninformed about the financial products and services and they do not how to use them. And lastly condition exclusion, when the condition of financial services find unacceptable by the people.

Financial exclusion builds a large informal sector in the economy. So, whenever the monetary policy is announced by the central bank; the financial decision taken by household and small business (informal sector) remains unaffected by policy actions and tends to hamper the transmission of the monetary policy. By removing barriers more people can be included financially and this will enhance the monetary policy effectiveness (Khan, 2012).

The nexus of financial inclusion and monetary policy in the above-mentioned studies have been done in the case of underdeveloped countries but does this relationship stays the same in developed nations? This study tries to fill this gap in the literature by taking in account developed countries (United States, Australia, Austria, Belgium, Chile, Czech Republic, Hungary, Latvia, Seychelles and New Zealand) and developing countries (Algeria, Armenia, Bangladesh, Costa Rica, Honduras, India, Indonesia, Kenya, Rwanda, Pakistan, Philippines Ukraine, Malaysia, Nicaragua, Mexico, Mozambique, Uganda, Argentina, Ecuador, Jamaica, Mauritius, Peru, South Africa, Thailand, turkey, Namibia, north Macedonia, Georgia, Moldova and Madagascar. To measure financial inclusion, the index is composed based on access, usage, and barriers. Monetary policy effectiveness is measured by inflation rate. Lower inflation rate indicates more effective monetary policy. Money supply, interest rate, exchange rate, and economic growth are the controlled variables used in the study.

1.2. Problem statement

The motivation of the study is to analyze the association between monetary policy effectiveness and financial inclusion in the developed country case and compare it with underdeveloped countries. In my best knowledge, there is hardly any literature available in this context. Monetary policy in underdeveloped countries is less effective due to financial exclusion as the large segment of the economy remain unaffected by any monetary policy action taken by the central bank (khan, 2011) but whether it is effective or not where the level of inclusiveness is high, *ceteris paribus*¹. And whether this relationship holds in case of a developed country. Theoretical literature also explains the links of financial inclusion and monetary policy effectiveness. The study will give us valuable insights regarding the relationship between monetary policy and financial inclusion in developed and underdeveloped countries.

1.3. Research questions

The empirical analysis is based on the following questions;

1. Does financial inclusion effect monetary policy effectiveness in developed and under-developed countries?
2. Whether there is uni and bi- directional relationship between financial inclusion and monetary policy effectiveness in both developed and developing countries?
3. What is the strength of the relationship of financial inclusion and monetary policy effectiveness in developed and under-developed countries?

¹ Fiscal policy, political instability, education, technology and more.

1.4. Objective of the study

To estimate the impact and causal relationship between financial inclusion and monetary policy effectiveness in developed and underdeveloped countries, it is necessary to achieve the following objectives.

1. To construct a financial inclusion index by using demand-side factors, supply-side factors, and barriers.
2. To check the uni and bi-causal relationship among
 - i. Financial inclusion and monetary policy effectiveness in case developed nations.
 - ii. Financial inclusion and monetary policy effectiveness in case underdeveloped nations.
3. To compare the degree of association between monetary policy effectiveness and financial inclusion in both economies.

1.5. Significance of the study

Economic growth, low level of unemployment, and stable inflation rate is the primary goal of central bank of any country. These goals can only be achieved through if monetary policy works effectively in the economy. This study would help us to come up with a robust relationship between monetary policy and financial inclusion. Furthermore, it highlights how monetary policy can help promote financial inclusion by changing in lending rate, saving rate. And on the other hand, financial inclusion can be play its role in improving the monetary transmission channels. Financial inclusion helps people move cash from the economy to bank accounts, which is easy to monitor. Any suspicious transaction can be addressed immediately and combat money laundering.

1.6. Organization of the study

The study is organized as: chapter 2 describe different global policies to enhance financial inclusion and overview to current financial inclusion statistics. Chapter 3 review all the existing literature. Chapter 4 explain the data and methodology. Results are discussed in chapter 5. Chapter 6 presents the conclusion and policy recommendations.

Chapter 2

Global policies and overview

2.1. Global policies

World Bank has set a target to achieve universal financial access by 2020. It is also believed that financial inclusion can help attain 7 of the 17 Sustainable Development Goals (SDGs). Because of easy access to financial products, extreme poverty (first SDG) can be reduced as more people invest in business and education. Out of the 2 billion unbanked adults, most of them are women, financial inclusion will reduce gender inequality by increasing their account ownership. A study in Kenya shows, women who had saving accounts spent 45% more in their businesses (Klapper et al; 2016). Increased access to credit, help small-medium firms to expand their businesses by investing more in capital, labor, and inventory. This will create job opportunities for people. Financially included farmers can take agriculture insurance and invest in more technical equipment and increase production. Research shows that farmers who have taken agriculture insurance make more risky investments and earn higher profits.

To achieve an inclusive financial system, many countries have taken different initiatives. The United Kingdom government was one of the earlier countries that recognizes the need for financial literacy and to promote financial inclusion, the government collaborated with banks and set up the task force to supervise and monitor progress (HM Treasury; 2007). In France, the voluntary charter was introduced by French Banker's Association. Banks are committed to open affordable accounts with facilities like cash cards, free access to the cash machine network. In Belgium, the Belgian Bankers Association launches a voluntary code that provides basic banking services like money transfer, deposits, withdrawals and bank statements for the people who do not

have an account. To tackle banking exclusion, the Canadian government proposed a rule in which all the banks are required to provide accounts with no minimum opening balance obligations regardless of the employment or credit history and minimum identification requirements (Kempson et al; 2004). Mexico announces the National Financial Inclusion Strategy to connect 56% unbanked adult population with financial services. India promoting financial inclusion in the unbanked and backward area with the help of technology and credit counseling. Moreover, banks are advised to open “no-frill accounts”.

The Global Findex conducted a survey and highlights the major barriers that why people remain unbanked. About 20% of the unbanked population do not have an account because of the distance (banks are too far away). To address the distance barrier the Brazilian government has started agent banking. The bank correspondents distribute welfare grants to unbanked people. In over three years, almost 12 million accounts were opened at agents. The success of agent banking inspired Colombia, Peru, and Chile and they practice similar approaches there too (Hanning & Jansen; 2010). The technology made it feasible to provide financial services to poor people and reduces the financial transaction cost. M-PESA in Kenya proposed by mobile network operators to transfer cash is running successfully. Around 7 million registered customers using this service.

Bangladesh commences 10 taka account for unbanked farmers with no obligation of maintaining a minimum balance. The country is also promoting the culture of saving and deposit among children by school banking and banking for working/street children. The total balance of school banking and street children banking is about TK.8.28 billion and TK 0.21 crore in the year 2016 respectively (Akter; 2016).

Pakistan is one of the 60 countries that adopted the National Financial Inclusion Strategy. Recently, the government has launched the Ehsaas initiative to promote financial inclusion. One

woman one bank account policy under Ehsaas strategy will provide women an opportunity to take better advantages of financial products and services like insurance, savings credit and payments. 500 digital hub will be opened at the district/tehsil level for the poor families to get access to government resources and provide financial literacy as well. To financially included the workers in the informal sector, the government has established a program named “Mazdor ka Ehsaas (compassion for workers)”. Almost 27.3 million people work in the informal sector in Pakistan. To tackle poverty, the government will grant interest-free loans to the people fall between 0-40 on the poverty scorecard².

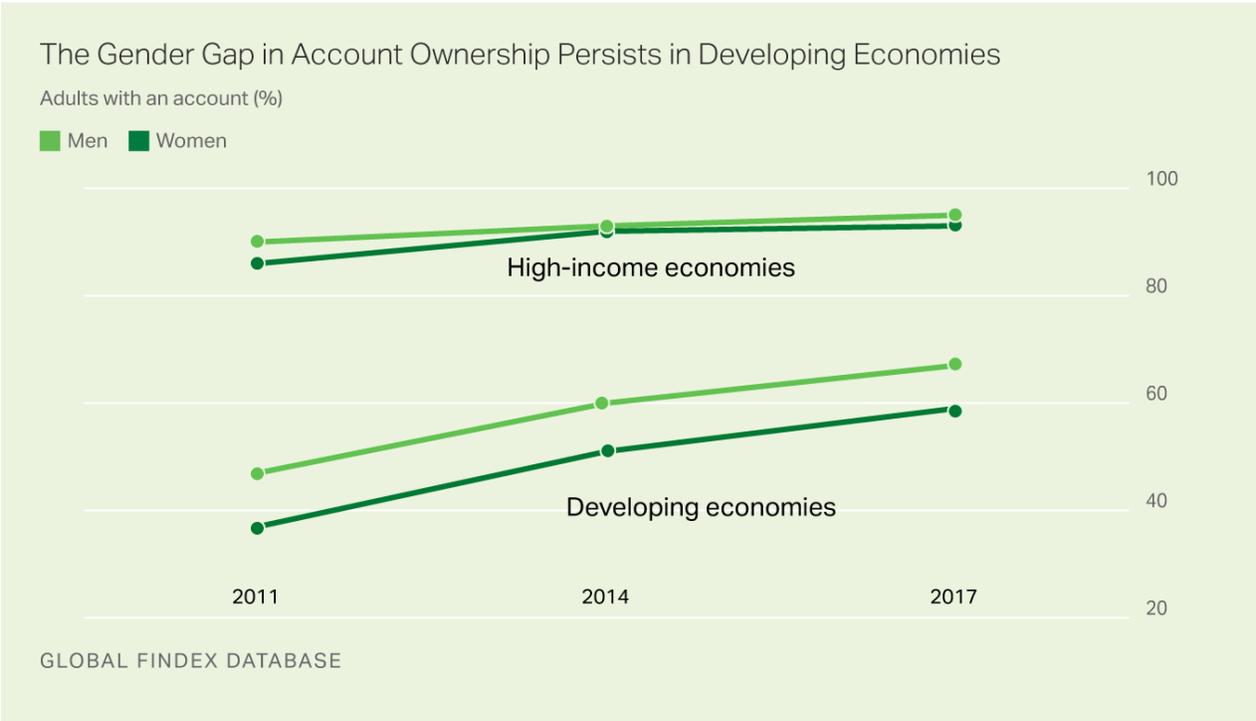
2.2. Global overview

Despite all the policies, about 1.7 billion adults are still unbanked (World Bank; 2019). From the Global Findex report, almost all the unbanked adults live in developing countries and nearly half of them came from seven countries: Bangladesh, China, Pakistan, Indonesia, Mexico, India, and Nigeria. The developing countries also face the gender gap and the gap between rich and poor. The richest 20% of adults in developing countries are likely to have more than one account while 40% of the unbanked adults come from poorest households. Unbanked people are expected to have less education. Half of the adults in developing countries, have primary education or less. However, the rich-poor gap in account ownership also exists in high-income economies. The richest 60% of households 74% of people have an account and among the poorest 40%, only 61% have an account, with a gap of 13%.

² The Ehsaas Strategy, 2019
http://pass.gov.pk/userfiles1/files/Strategy_Ehsaas_for_online_consultation.pdf

As far as the gender gap is concerned, 56% of unbanked adults are women. According to the study, if women’s access to the bank has grown equivalent to the rate experienced by men, the women’s access numbers for 2017 would have increase by 50 million. But, the gender gap of 9 % remains in 2017 as in 2011, 2014. Higher-income economies hardly face a gender gap in account ownership while in developing economies 72% of men have an account and 65 % of women. (Fig 2.1)

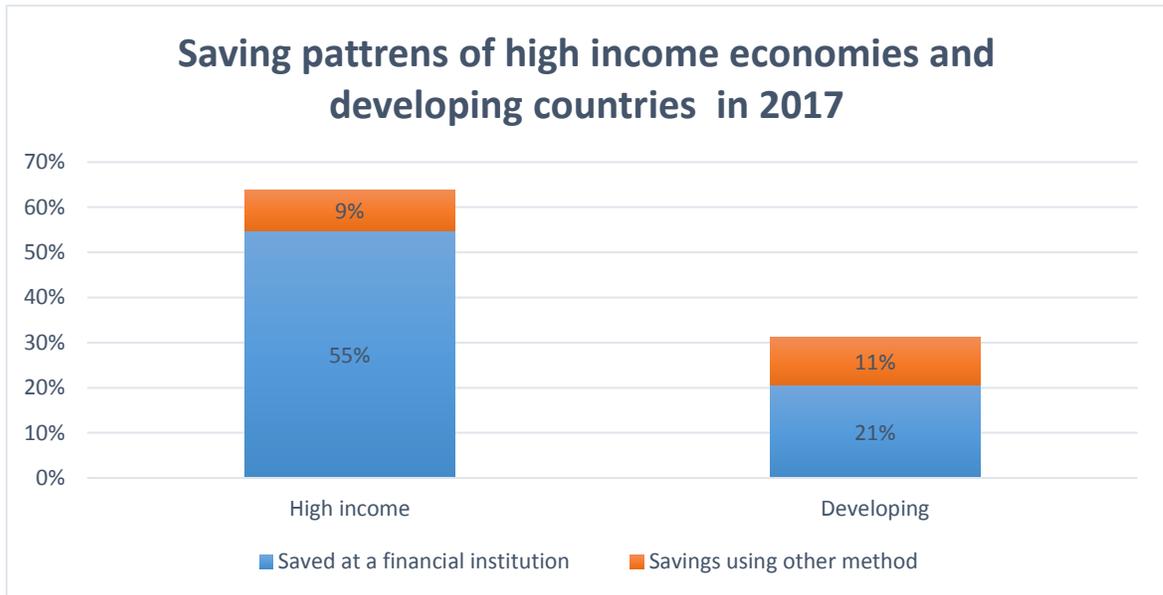
Figure 2.1. Gender gap in account ownership



Saving and borrowing is a common practice in both developed and developing countries. Almost 71% of people in higher economies reported saving and 43% in developing countries. The method of saving and borrowing in developing countries is a little different than developed economies. 53% of adults in higher-income economies save at a financial institution but only 21%

in developing countries. People mostly save at home (under the mattress) or save in a form of jewelry, real estate and livestock (Fig 2.2).

Figure 2.2. Savings at a financial institution



When it comes to borrowing, less than 10% of people in developing countries borrow from a financial institution (Fig 2.3). The Alternative method includes borrowing from friends and family. The major reason reported is that people do not have trust in the financial institution and secondly, the interest payments.

The reason for the low level of financial inclusion in developing countries is due to the fact that individuals face barriers that prevent them from using formal financial services. In 2017, the major reason cited for not using a financial services is the lack of money. Nevertheless, this is in the case of voluntary exclusion from financial services. Distance, affordability, trust in a financial

institution, lack of necessary documentation are reported as the major reason for voluntary exclusion.

Figure 2.3. Borrowing form financial institution

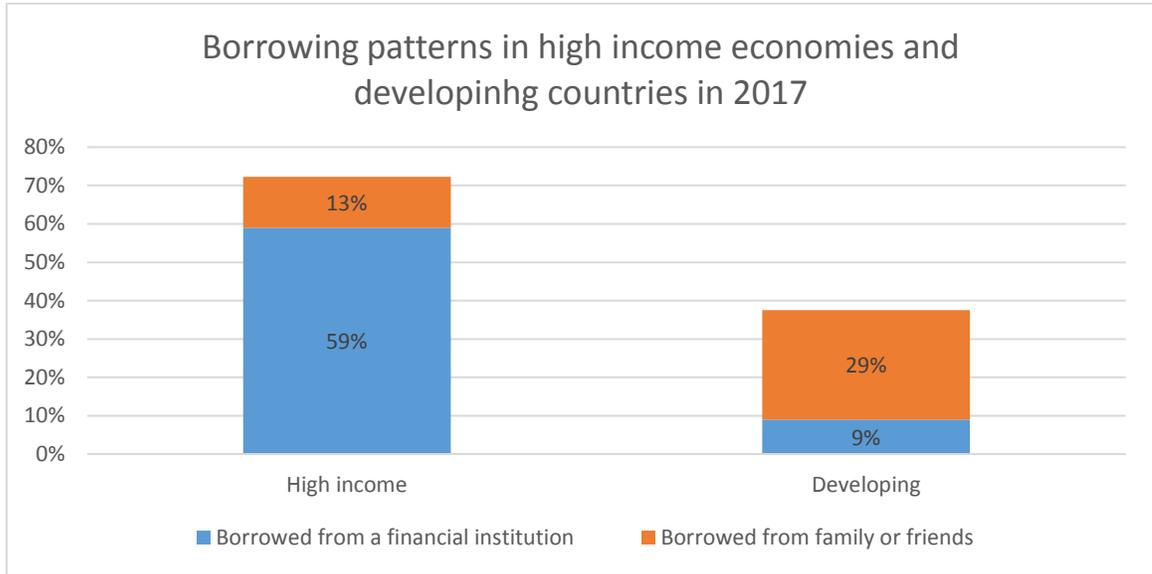
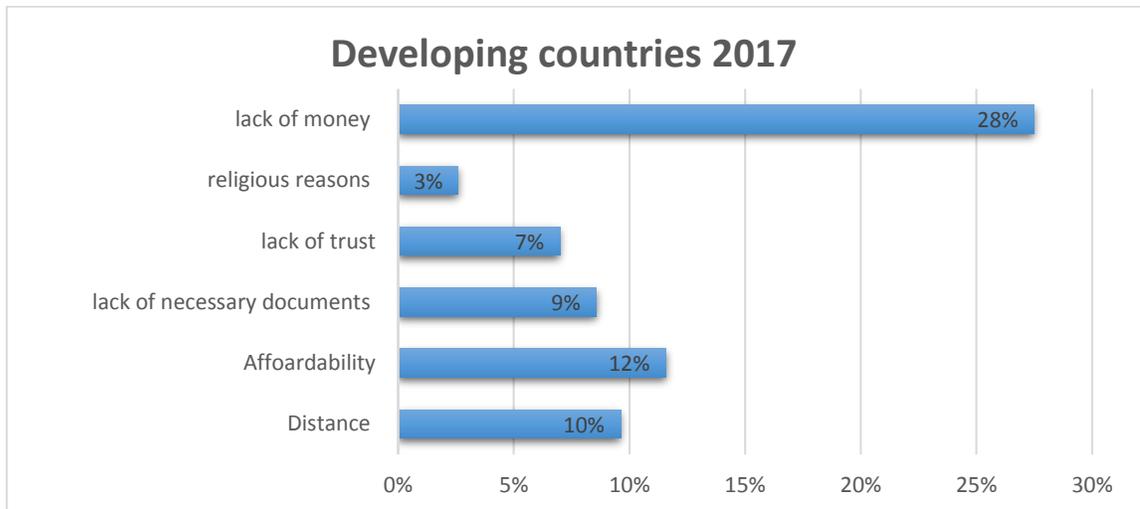


Figure 2.4. Barriers to Financial Inclusion



12% of people in developing countries do not use financial products and services because they are expensive. 10% of individuals cited distance as the major reason for exclusion from financial services. 9% of people do not get benefit from financial services because they lack basic

necessary documents to avail of financial products. The trust deficit between individuals and financial institutions is another major obstacle to an inclusive financial system. Almost, 7 % of adults do not have trust in financial institutions. To achieve a higher level of financial inclusion, the developing countries must adopt policies that tackle these barriers first.

Chapter 3

Literature Review

Section 3.1 covers theoretical literature. Section 3.2 describe empirical literature. Literature gap and summary of the literature is explained in section 3.3 and 3.4 respectively.

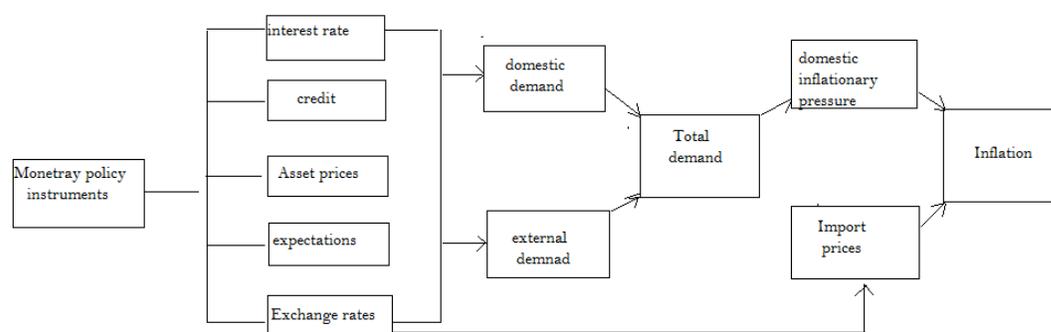
3.1. Theoretical Literature

Monetary policy is a powerful tool for a central bank to achieve its objectives of price stability, economic growth, financial stability and high level of employment. We consider two aspects that show how monetary policy depends upon the level of financial inclusiveness. First, the policymaker faces a tradeoff between inflation and output volatility (Mehrotra & Yetman 2014). Secondly, individual's access to savings and credit through the financial system helps them smoothen their consumption in a period of fluctuations. With the lower degree of financial inclusion, policymakers should try to reduce output volatility as individuals are incapable to sustain spending as income reduces. so in that case policymakers give more weightage to stabilizing output rather than stabilizing inflation.

Monetary policy affects the economy through different mechanisms. These transmission mechanisms include interest-rate effect, exchange rate effect, other asset price effect and credit channel (Mishkin, 1995). According to the conventional interest rate channel; a real interest rate cut reduces the cost of capital. These lower interest rate (real) then leads to an increase in business, residential and inventory investment and consumer durable expenditure which in turn raise the aggregate output. This infers that targeting interest rates to achieve the objective of the monetary policy will be ineffective with a lower level of financial inclusion.

The credit view is another important monetary transmission channel. It is associated with the problems of financial markets. The credit view is further subdivided into two different channels of monetary transmission i.e. the bank lending channel and balance sheet channel. In the balance sheet channel, any alterations in monetary policy affect the borrower's balance sheets and income statements. The bank lending channels focus more on providing loans by institutions (Bernanke & Gertler, 1995). An expansionary monetary policy causes the money supply to rise which leads to more supply of loans at lower borrowing costs due to increasing bank reserves. As households and small businesses are relying on these loans to finance their activities this loan expansion will cause investment spending to rise (Mishkin, 2006). Thus lower borrowing cost tends to increase financial inclusion.

Figure 3.1. Monetary Transmission Mechanism.



Transmission of monetary policy via the banking lending channel is a deeply-rooted phenomenon in economics/banking literature (khan *et al*, 2016). This argument is supported by Ma and Lin (2016), who used a credit view transmission channel to discover nexus among monetary policy and financial development. Monetary policy transmission channel is also

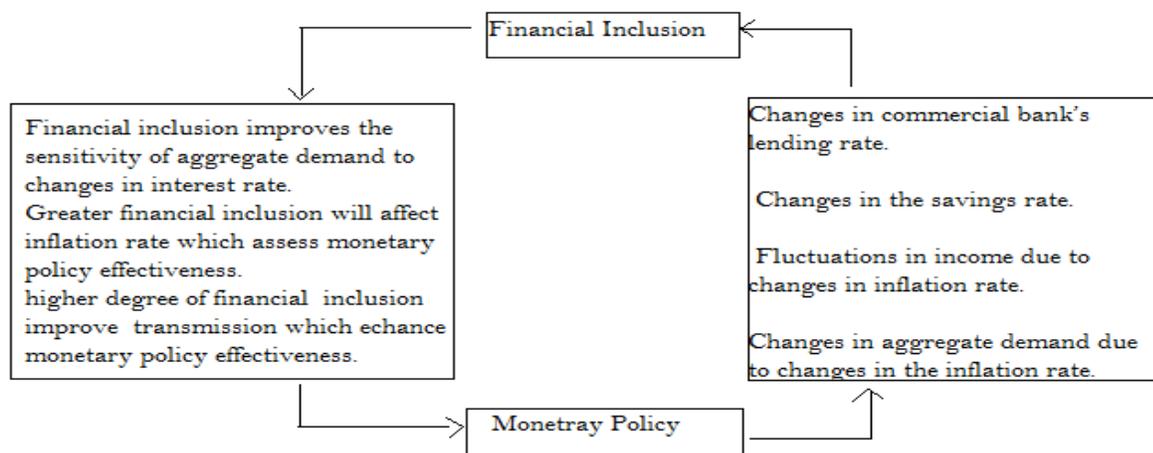
influenced by individual financial health as it determines their degree of access to credit and the condition under which it is granted affects the importance of the credit channel (Hernando, 1998). On the other hand, Lapukeni (2015) notifies that extravagant access to credit increases the risk of bad debts that can cause financial instability and it can also lead to inflation if the loan is not contributing to production. So, increasing financial inclusion must be effective for the economy and financial system.

The bank lending channel is an augmented mechanism of the traditional interest rate channel. The magnified impact of higher interest rates can be seen through the bank lending channel. As the interest rate increases, the results in fall in investment not only because of cost of capital is high but also the supply of bank loan is reduced. The importance of bank lending channel depend on three factors. First, the degree to which banks have been authorized by the central bank to expand loans. Second, monetary policy actions and lastly, borrower's reliance on bank loans. These factors can be easily affected by the structure of financial system (Agha *et al*, 2005).

The strength of any transmission channel depends upon the state of the financial system. The outcome of any monetary policy in an underdeveloped financial system takes a relatively shorter time to completely disappear from the economy. However, the enhanced banking system might help in improving monetary policy mechanisms (Agha *et al*, 2005). Brunnermeier and Sannikov (2014) also draw attention towards the banking condition to have effective transmission which promotes financial and monetary stability. Abuk *et al* (2019) documented that the effect of monetary policy changes as bank capital and liquidity change. More capitalized banks significantly transfer changes in monetary policy in comparison to lower capitalized banks. A sound banking system mobilizes small and scattered saving of community and make them available for investment in productive enterprise and plays a strong role in accelerating financial inclusion.

Financial inclusion can be an instrument for generating monetary fuel to achieve inclusive economic growth. In a wider context, it promotes economic inclusion by improving the living condition of poor people providing better facilities and generate employment opportunities. A higher disposable income leads to greater savings and a wider deposit base for financial institutions (khan, 2011). Greater financial inclusion enables monetary transmission channels to work more efficiently as it increases the share of the formal sector. According to khan (2011), a large informal sector negatively affected the monetary transmission mechanism as the financial decision taken by financially excluded are not affected by monetary policy. Thus, the inclusion of such persons in the overall financial system could result in positive externalities which may enable monetary policy to be more effective.

Figure 3.2. Conceptual Framework.



The above figure presents the conceptual framework that shows the transmission through which monetary policy and financial inclusion are linked. Monetary policy instruments for example; changes in the lending rate and saving rate promote financial inclusion. At the same time, a greater level of financial inclusion enhances monetary policy effectiveness by improving the

sensitivity of aggregate demand to interest rate changes. The bank lending channel suggest that higher degree of financial inclusion enable people to take credit easily. Eventually, the bank reserves will declines due to increased demand of credit. Central bank will increase their policy rate which leads interest rate to increase, as the cost of money has increased, aggregate demand will decrease which in turn reduces inflation.

3.2. Empirical literature

The concept of financial inclusion has gained attention in the 21st century. The early literature defines the inclusive financial system and its importance. Over time, the researchers focus on the determinants of financial inclusion (Sarma, 2008; Hanning & Jansen, 2010; Ardic *et al*, 2011; Demirgüç-Kunt & Klapper, 2012; Allen *et al*, 2016). Fewer studies examine the impact of financial inclusion on economic growth, income disparities, and poverty (Kima *et al*, 2018; Chinoda & Kwenda, 2019; Jalil & Ma, 2008). However, there is confined literature available on financial integration effects on monetary policy. In 2013, Mbutor and Uba compute the effect on monetary policy effectiveness due to financial inclusion in the case of Nigeria and cover the period from 1980-2012 and concludes a higher level of financial inclusion will help in conducting monetary policy effectively. Greater financial inclusion indicates a large number of people involved in formal saving and investment making monetary policy rate more sensitive. The results show that an increase of 1% in the ratio of total loans and advances from commercial banks will lead to decrease inflation by 0.01%. But the model does not give power full results of the association between financial inclusion and monetary policy and lacks theoretical backing.

Mugume (2011) applied the SVAR approach on quarterly data of Uganda from the period 1999Q1-2009Q1 and concludes that monetary policy transmission is weak because of the underdeveloped financial sector. However, monetary policy still affects inflation and output. A

contractionary monetary policy decreases output and inflation but there is no effect on the exchange rate. Monetary policy has no significant effect on private sector credit even though private sector credit innovation raised inflation. Another related study is conducted by Montiel (2013) in the case of Uganda using monthly data from December 2001 to June 2011. The result infers that the monetary policy's bank lending transmission channel has no significant effect on aggregate demand.

Mehrotra and Yetman (2014) infer that optimal monetary policy is sensitive to the degree of financial inclusion and degree of financial inclusion is correlated to the level of autonomy of the central bank. In other words, a central bank which is highly autonomous in their monetary policy decision is more likely to carry out optimal monetary policy. To conduct research the study is divided into three groups i.e. financially included, financially excluded and competitive firms. The ratio of output volatility to inflation volatility is more in case of financially included consumers. In response to any shock financial included consumer can adjust their consumption and saving decisions while financially excluded cannot.

Mehrotra and Yetman (2015) identify ways through which a higher degree of financial inclusion is beneficial to maintain monetary stability. Firstly, it helps in smoothing consumption in response to any economic shock and encourages the consumer to save through a financial institution. Secondly, in greater financial inclusion interest rate is proved to be an effective transmission mechanism channel and lastly, increased financial inclusion fosters financial stability.

In 2015, Lapukeni analyze the how financial inclusion influence effectiveness of monetary in Malawi. The author consider inflation as a policy instrument of monetary policy effectiveness. Controlled variables includes lending rate, money supply, and exchange rate. Financial inclusion

indicators are outstanding deposits and loans as a ratio of GDP. VAR technique is applied on the quarterly data over the time period of 2001-2013. In short run only 30% of variation in inflation rate is explained by financial inclusion however 70% variation is estimated in long run. The controlled variables money supply and exchange rate are statistically significant. The study also employed granger causality test and find out that money supply granger cause deposit and level of loans are granger caused by exchange rate and lending rate. The overall results shows that financial inclusion does impact on the effectiveness of monetary policy in Malawi.

Instead of taking few indicators to measure financial inclusion Lenka and bairwa (2015) formed an index and tries to explain the financial inclusion influences monetary policy in the SAARC region. The study used the annual data from the period 2004 to 2013. Demographic penetration, geographic penetration, and banking penetration variables are used in order to construct financial inclusion index through principal component analysis (PCA) method. The results of PCAs shows that Maldives is placed first in the financial inclusion among all SAARC region and Pakistan is facing an extreme condition of financial exclusion with the negative index. The fixed-effect model, random effect model, and panel corrected standard error are put together to find the relationship between financial inclusion, inflation, exchange rate, and interest rate. Results imply the significant negative relation of financial inclusion with inflation. Financial accessibility may reduce inflation and bring price stability in the economy.

Mehrotra and Nadhanael (2016) highlights two implications for the monetary policy under different levels of financial inclusion. First, they evaluate how emerging Asian economies prices and output response against interest rate shocks under different degree of financial inclusion. The result infers that output and prices are more interest sensitive in economies where people are more financially included. That is because of the interest rate's role in consumption. A higher interest

rate reduces the consumption demand of financially included individuals. This results in the reduction of real wages and consumption demand of financially excluded. And second, what should be the central bank inflation target with limited financial inclusion. They conclude that central bank should target headline inflation instead of core inflation when there is a higher share of food in the total consumption expenditure and lower degree of financial inclusion. As the food prices increases, the aggregate demand in the agriculture sector is increased by the credit-confined consumers. This will pressure inflation to increase further. In this scenario, central bank should target headline inflation and limits the initial food price to increase.

Evan o. (2016) examine causality among financial inclusion and monetary policy effectiveness. the study uses annual data from 2005-2014 for 15 African countries.to establish results panel VECM approach and panel Granger causality test are applied. The final results show only monetary policy effectiveness granger cause financial inclusion. This means that financial inclusion do not have a significant effect on monetary policy effectiveness but the monetary policy does. To achieve a higher degree of financial inclusion heightened monetary policy is required. The impulse response results shows that the shocks in financial inclusion, interest rate and money supply explain variation in monetary policy in short run but in long run , only interest rate explain more than 45 % variation in monetary policy.

Ma and Lin (2016) used quarterly data of forty-one economies and observe an inverse relationship between financial development and monetary policy effectiveness. This indicates that the more developed the financial system is the lesser will be the monetary policy effectiveness. Besides, the study also discovers that the monetary policy is less effective in the bank-oriented financial system than a market-oriented financial system. The author also captures the asymmetrical effects of financial development on inflation and output in economies

with different monetary policy. The developing economies which experienced more financial development, the monetary policy's impact on output become lessen while in advance economies it strengthens the impact on inflation by monetary policy.

In related work, Hung (2016) investigates the same relationship in case of Vietnam. The study captures the data of from 2004 to 2015. To check the monetary policy, inflation is taken as a proxy variable. To measure financial inclusion, the author composed an index using variables of geographic penetration, demographic penetration, and banking penetration. The principle component analysis is used to make an index. The main results indicate a higher level of financial inclusion lowers the inflation rate. The results of error correction model specify long term effect on inflation of financial inclusion index, exchange rate, and interest rate. Another study has been done in the case of Vietnam by Huong (2018). Moreover, the author add net national income as he consider income as an important factor in relationship of monetary policy and financial inclusion. In contrast to the previous study, the author used money supply as a controlled variable. The results suggests that inflation response negatively to the financial inclusion index, money supply and net national income and positively to interest rate.

Brownbridge, Bwire, Rubatsimbira, and Tinyinondi (2017) adopt a panel vector error correction model to test the hypothesis that monetary policy transmission is less effective in economies with a lower degree of financial inclusion than ones with an increased degree of financial inclusion. To test this hypothesis quarterly data of four African countries i.e. Mauritius, South Africa, Ghana and Uganda from the period 2001-2016 are used. The countries are divided into two groups by their level of financial inclusion using the no. of deposit account and to check the strength of impulse response of inflation on other monetary variables PVARs model is applied

to each group. The study establishes evidence that the impact of monetary policy on inflation is greater for the economies where the level of inclusiveness is higher.

In the model by Seth and Kalyanaraman (2017), it is illustrated that the countries with more developed financial system are able to transmit monetary policy effectively. Higher financial inclusion, well-structured economy, and financial system allows policy makers to control the transmission of monetary policy more effectively without any leakages. A well-developed banking system can see the multiplier effect of monetary policy and increase bank liquidity.

Yetman (2018) highlights three ways through which a higher level of financial inclusion has an impact on monetary policy choices. First, the higher degree of financial inclusion may bound the central bank to emphasize more on core inflation instead of headline inflation. Second, a higher degree of financial inclusion made interest rate as an effective tool of monetary policy. Financial inclusion provides means to entrepreneurs to fund investment other than retained earning and a reduction in policy rate stimulates borrowing demand. Thirdly, the central bank may want to modify its interest rate rule to guarantee determinacy and optimality. Optimal policy focuses more on inflation stabilization instead of output stabilization.

Ma (2018) applied a panel data model on forty-nine countries over the period 1980-2014 to analyze whether financial advancement affects the growth impact of monetary policy. The effect of financial development on growth of monetary policy is significantly negative. The results conclude that the growth effect of monetary policy in advance economics is more pronounced due to a strong financial structure than developing economies and it is most noticeable in the market-concentrated financial system in comparison to the bank- concentrated financial system.

In relation to the above mentioned studies, Anarfoa *et al* (2019) also conduct a study on forty-eight sub-Saharan African economies from 1990 to 2014. But instead of using inflation rate as a proxy this study use monetary policy rate to check the effectiveness of monetary policy. The author consider monetary policy rate as a better measure of monetary policy effectiveness as inflation rate is just an outcome variable. The study also introduce some more controlled variable i.e. economic growth as a percentage of GDP growth rate along with inflation rate , real effective exchange rate. To measure financial inclusion, an index is formed using demand side and supply side factors. The panel vector auto-regression (PVAR) estimation technique is applied to the data set. The results imply that there is a bi- directional relation of financial inclusion and monetary policy. Lags of GDP growth rate and inflation rate has a significant impact on financial inclusion. Variance decomposition shows that any shock in monetary policy significantly influence the variation of financial inclusion in the long run and vice versa.

Yin *et al* (2019) inspects the relationship of financial inclusion, circumstance monetary policy, and economic fundamentals. This paper discussed what kind of circumstances is suitable for the growth of financial inclusion and how to achieve sustainable development of financial inclusion. A traditional econometric model VAR has been applied to Chinese regional data for 2012-2019. Interbank lending rate, M2, agriculture-related loan, agricultural enterprise loan, GDP and oil prices are taken as proxy variables. Result reports that monetary policy positively effects on factors of financial inclusion that gradually fades away with time. Effective monetary policy can lead to the sustainable growth of financial inclusion. However, at the same time economic fundamental has an inverse effect on financial inclusion. The regional imbalance of economic development is the main obstacle in the path of sustainable growth of financial inclusion.

The effectiveness of monetary policy is depend upon the transmission channel. Credit channel and liquidity channel transmit any monetary policy actions in the financial system. How effectively these channels works depend upon how developed the financial system is. Economies with the less developed financial system, the credit channel dominates the liquidity channel. The study conducted by Carranza et al (2005) shows that countries with less developed financial system experienced higher lending rate and shows asymmetric behavior. The behavior of lending rate is different for expansionary and contractionary policy. Contractionary shock have higher impact on output than to expansionary shocks.

In the developing countries, monetary policy experienced a weak bank lending channel using aggregate data. To confront this statement, Abuka *et al* (2019) conducted a study in Uganda using micro data. The aim of the study is to provide the better interpretation of monetary policy effectiveness in the developing countries using micro data. The study shows that how unanticipated changes in monetary policy influence the loan application, loan volumes, and loan rates. A contractionary monetary policy leads to the reduction in the bank supply of loans to the firms. The banks with low capital affected more by tighten credit conditions, and higher loan rates as compared to more capitalized banks.

Bank plays an important role in transmitting monetary policy in the economy. Agha et al (2005) shows the significance of bank lending channel in Pakistan. The author examine the impulse response function to highlight the bank's role in transmitting monetary shock to output. The result shows that if the position of the bank loans is blocked, it dampens the output response.

Borrowing through the informal means is a common practice in the developing countries.it is believed that informal credit hampers the transmission channel of monetary policy. However, Abuka *et al* (2019) argued that informal credit cannot neutralize the effect of monetary policy.

Firstly, informal loan place substantial interest rates and transaction cost. Borrowing through the informal lenders, will increase firm's cost of external financing which in turn hinders productivity and output. And secondly, bank cannot be substituted by informal lenders because of their limited and small capital.

3.3. Literature gap

Financial inclusion has gained much importance over the last two decades. Many studies are conducted that investigates how financial inclusion influences economic growth, poverty, income disparities and financial stability (Kima *et al*, 2018; Chinoda & Kwenda, 2019; Jalil & Ma, 2008).

Agoba *et al* (2017) review literature over the period 2007-2015 and highlighted a vast research gap on financial inclusion association with monetary. There are few studies inspect the connection between financial inclusion and monetary policy. Most researches have attempted to examine relationship in a single country for example china, Malawi, Vietnam and Nigeria (Mbutor & Uba, 2013; Lapukeni, 2015; Hung, 2016; Yin *et al*, 2019) or a group of regional countries SAARC region excluding Pakistan, African countries, and Sub-Saharan African countries (Lenka & bairwa, 2015; Evan, 2016; Ma, 2018; Anarfoa *et al*, 2019; Brownbridge *et al*, 2017). This study tries to address this gap by investigating how these nexus operate in economies of different development levels. For this, we split the world sample into two groups of underdeveloped countries and developed countries and estimate unidirectional and bidirectional relation between financial inclusions and monetary policy effectiveness. To what extent these two-term are related and how this association varies among different countries.

3.4 Summary of the literature

All the literature in section 3.1 concludes the theoretical literature. The effectiveness of monetary policy depends upon how effectively it is transmitted in to the economy. There are different transmission mechanism through which the monetary policy stance are transferred in economy. The bank lending channel connects the monetary policy with the financial system. Financial inclusion helps in improving transmission channel and enhance monetary policy effectiveness. Higher level of financial inclusion means people have more access to banks which raises the credit demand. As the demand of loans greater than supply of loans, central bank increase their policy rate which leads interest rate to increase, as the cost of money has increased , aggregate demand will decrease which in turn reduces inflation.

The section 3.2 highlight empirical studies that shows the relationship between financial inclusion and monetary policy effectiveness. Most of the studies used inflation rate as proxy of monetary policy effectiveness (Mbutor & Uba, 2013; Lapukeni, 2015; Lenka & Bairwa, 2016, Evan, 2016). Financial inclusion cannot be measured using single variable, various studies composed a financial inclusion index by taking different variables (Lenka & Bairwa, 2016; Huong, 2018; Anarfoa, 2019). The results of the studies shows that financial inclusion have a positive and significant effect on monetary policy effectiveness. Few studies witness one way causality from monetary policy effectiveness to financial inclusion (Lapukeni, 2015; Evan, 2016). However, some studies observe two way causality between monetary policy effectiveness and financial inclusion (Anarfoa et al, 2019).

Chapter 4

Data and Methodology.

This chapter concludes the methodological framework, description of variables, and data sources. Section 4.1 describes variables and data sources. Section 4.2 is labeled as the computation of the financial inclusion index. Section 4.3 describes the empirical model used to evaluate the relationship between monetary policy and financial inclusion.

4.1. Data Sources and Variables.

The study covers the secondary data of 10 developed³ and 30 underdeveloped countries throughout 2004-2018. Data has been taken out on a proportionality basis i.e. 10:39 out of 39:149 countries but as a consequence of data unavailability of underdeveloped countries, the final proportion is 10:30. The inflation rate (Consumer Price Index) is used as a proxy for monetary policy effectiveness. The data of inflation rate and other controlled variables i.e. official exchange rate, broad money (M2), interest rate, and economic growth (GDP growth rate) are gathered from World Development Indicator (WDI). The data of demand-side (usage) and supply (access) side factors of financial inclusion is taken from Financial Access Survey (FAS) IMF data. World Bank Global Findex conducted a survey of about 150,000 adults regarding the use of the financial product and summarized the data of 180+ indicators of financial inclusion. This database is published every three years since 2011. The barriers (distance, trust, affordability, documentation) data for this study are obtained from the Global Findex of 2011, 2014, and 2017. The study uses compound average growth rate to find out missing values.

³ ³ The World Economic Situation and Prospects classified all the countries. The countries are taken from https://www.un.org/en/development/desa/policy/wesp/wesp_current/2014wesp_country_classification.pdf

Table 4.1: list of countries.

developed countries		developing countries	
Australia	Algeria	Philippines	Mauritius
Austria	Armenia, Republic of	Ukraine	Peru
Belgium	Bangladesh	Malaysia	South Africa
Chile	Costa Rica	Nicaragua	Thailand
Czech Republic	Honduras	Mexico	Turkey
Hungary	India	Mozambique	Namibia
Latvia	Indonesia	Uganda	North Macedonia, Republic of
Seychelles	Kenya	Argentina	Georgia
New Zealand	Rwanda	Ecuador	Moldova
United State	Pakistan	Jamaica	Madagascar

Table 4.2. Data and variable description

variables	Notation	Description	Data source
Inflation rate	INFRA	Inflation, consumer prices (annual %)	WDI
Financial inclusion index	FII	index consisted of 10 variables	FAS, IMF data
Financial inclusion index	DCB	Outstanding deposits with commercial banks (% of GDP)	FAS, IMF data
Financial inclusion index	LCB	Outstanding loans from commercial banks (% of GDP)	FAS, IMF data
Financial inclusion index	CBBPKM	Number of commercial bank branches per 1,000 km ²	FAS, IMF data
Financial inclusion index	CBBPA	Number of commercial bank branches per 100,000 adults	FAS, IMF data
Financial inclusion index	ATMSKM	Number of ATMs per 1,000 km ²	FAS, IMF data
Financial inclusion index	ATMSAD	Number of ATMs per 100,000 adults	FAS, IMF data
Financial inclusion index	DISTANCE	No account because financial institutions are too far away (% age 15+)	Global Findex, World Bank
Financial inclusion index	DOCUMENTATION	No account because of lack of necessary documentation (% age 15+)	Global Findex, World Bank
Financial inclusion index	TRUST	No account because of lack of trust in financial institutions (% age 15+)	Global Findex, World Bank
Financial inclusion index	AFFORDABILITY	No account because financial services are too expensive (% age 15+)	Global Findex, World Bank
Board money	M2	Broad money (% of GDP)	WDI
Economic growth	GDPGR	GDP growth (annual %)	WDI
Interest rate	Ir	Lending interest rate (%)	WDI
Exchange rate	ER	Official exchange rate (LCU per US\$, period average)	WDI

4.2. Construction of Financial Inclusion Index.

Financial inclusion measurement is a complicated job and it has been the topic of interest among many researchers. Well, it cannot be measured with a single variable as one variable cannot depict the true picture. So, there are different indicators used to measure financial inclusion. Most Commonly used indicators by different studies are the banking population, geographic penetration, availability of financial services to the people, and usage of the financial services (Sarma, 2008; Demirgüç-Kunt, 2012; Gupte et al, 2012; Sarma, 2012; Caamara & Tuesta, 2014; Hung, 2016; Huong, 2018; Anarfoa et al, 2019; Datta & Singh 2019) .

In 2004, the IMF Financial Access Survey list the indicators under two broad categories (i) usage and (ii) access indicators. The usage or demand-side evaluates the extent to which people use financial services. The indicators lie in usage category are (a) Outstanding loans from commercial banks (b) Outstanding deposits from commercial banks (c) Numbers of deposits accounts with commercial banks per 1000 adults (d) Number of borrowers from the commercial bank per 1000 adults. Access estimates the supply of financial services. The indicator is (a) Numbers of commercial bank branches per 1000 km^2 (b) Numbers of commercial bank branches per 1000 adults (c) Number of ATMs per 1000 km^2 (d) Number of ATMs per 1000 adults.

Despite capture the demand and supply side, these indicator does not explain why some people are financially exclusive. In 2011, the global Findex design a questionnaire that highlights the major barriers of individuals does not own a bank account. The global Findex conduct survey after three years since 2011. In 2017, 28% of individuals cited lack of money as a major reason for financial exclusion. The other reported barriers include distance (banks are too far away), affordability (expensive financial services), documentation (does not have necessary documents), trust (people do not trust their financial institution), family members already own an account.

The following are the variables we are using to compute an index.

A. Demand-side factors (usage)

- i. Outstanding loans from commercial banks (LCB)
- ii. Outstanding deposits from commercial banks (DCB)

B. Supply-side factors (access)

- i. Numbers of commercial bank branches per 1000 km^2 (CBBPKM)
- ii. Numbers of commercial bank branches per 1000 adults (CBBPA)
- iii. Number of ATMs per 1000 km^2 (ATMSKM)
- iv. Number of ATMs per 1000 adults (ATMSAD)

C. Barriers

- i. Distance
- ii. Documentation
- iii. Affordability
- iv. Trust

In literature, there are two major techniques are used to measure financial inclusion (i) using separate variables (ii) composed a multidimensional index. The financial inclusion index has been constructed by different studies. There are two main approaches to composite an index; parametric and non-parametric (Caamara & Testa, 2014; Rahimpoor, 2017). In the non-parametric technique, weights are assigned exogenously, while the parametric approach determined them. The Parametric approach is further split into principal component analysis and common factor analysis. Sarma (2008) and Chakravarty and pal (2010) used a non-parametric approach to construct a financial inclusion index.

To construct a financial inclusion index, the principal component analysis (PCA) technique is used to handle the suspected multi-collinearity among variables. PCA transforms the correlated

variable into orthogonal and uncorrelated variables (factors or pcs) by reducing correlated variables while keeping as much information as possible in the variables. These factors are arranged in a way that the first few values retain the majority of variation in all the original variables (Gujarati, 2011). According to this method, the index of *the jth* factor can be addressed as

$$FII_j = W_{j1}X_1 + W_{j2}X_2 + \dots + W_{jp}X_p \quad (1)$$

Where FII is the financial inclusion index; W_j is the factor of coefficient's weight; X is the original variable; p is the number of variables in the equation.

The separate index has been formed for both developed and underdeveloped countries. In the case of developed countries, only two dimensions are used for index construction, i.e. demand and supply side, but barriers are also incorporated in underdeveloped countries.

The financial inclusion index for developed countries is composed of six indicators. The index can be specified as follow:

$$FII = f(\text{LCB, DCB, CBBPKM, CBBPA, ATMSKM, ATMSAD}) \quad (2)$$

For underdeveloped countries, the index is made up of ten factors.

$$FII = f(\text{LCB, DCB, CBBPKM, CBBPA, ATMSKM, ATMSAD, DISTANCE, AFFORDABILITY, TRUST, DOCUMENTATION}) \quad (3)$$

The study normalize all the data set to create a financial inclusion index. The reason for the normalization of the data set are: Firstly, the variables have different measurement units. Secondly, it is to ensure that the larger variables are not given extra weight with the smaller ones which lead to biased results. The variables are normalized using z-score approach.

$$Z = \frac{X - \mu}{\sigma}$$

Where,

X= observation

μ = mean

σ = standard deviation

4.3. Model specification

The study employed a panel structural vector autoregressive (SVAR) technique for estimations. The SVAR model impose restrictions on the basis of economic theory is the only difference between VAR and SVAR. The VAR model is first suggested by Sims (1980). He criticizes the model of the time because of the strong restrictions and assumptions made in models about the dynamic nature of the relationship between macro-economic models and proposed VARs as an alternative model. These are the multivariate time series model design to capture the joint dynamics of multiple time series, forecasting macroeconomic variables and structural analysis. The variables in the VARs system are considered as endogenous and depends on its lags, lags of all other variables.

4.3.1. SVAR model

The generalized panel SVAR model can be written as follow:

$$BY_{it} = \Gamma_0 + \Gamma_{it}Y_{it-k} + \varepsilon_{it} \quad (4)$$

B is a square matrix that captures the contemporaneous effect of variables. Y_{it} is a vector of the K endogenous variable. The subscript $i=1 \dots N$ and $t=1 \dots T$ represent country and time. ε_{it} is

the structural shock. The structural shock must satisfy following conditions (i) $E(\varepsilon_t) = 0$, (ii) $E(\varepsilon_t \varepsilon_t') = \Sigma_t$ and (iii) $E(\varepsilon_t \varepsilon_s') = 0$

In order to obtain reduce form VAR equation, pre multiply B^{-1} with equation (4)

$$Y_{it} = B^{-1}\Gamma_0 + B^{-1}\Gamma_{it}Y_{it-k} + B^{-1}\varepsilon_{it} \quad (5)$$

Where $e_{it} = B^{-1}\varepsilon_{it}$ is reduce form VAR errors that satisfy these conditions (i) $E(e_t) = 0$

(ii) $E(e_t e_t') = \sigma$ and (iii) $E(e_t e_{t-k}') = 0$.

The variance covariance of the structural matrix is

$$\begin{aligned} \Sigma_s &= E(\varepsilon_t \varepsilon_t') \\ &= E(B e_t e_t' B') = E B (e_t e_t') B' \\ &= B \Sigma_e B' \end{aligned}$$

For the system to be exactly identified $n^2(n^2-n)/2$ restriction will be imposed in order to recover all the structural shocks from the reduce form VAR residual e_t .

Structural model

Given the formula $n^2(n^2-n)/2$, we will be applying 15 restriction on the B matrix in order the system to be identified. The matrix B estimate the contemporaneous impact of variable on each other. The variable are list in the order; the most exogenous ones are written before the endogenous ones. The diagonal shows that the coefficient are normalized to unity and zeros represent the restrictions.

$$BY_t = \begin{bmatrix} 1 & \emptyset_{12} & 0 & 0 & \emptyset_{15} & \emptyset_{16} \\ \emptyset_{21} & 1 & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} & \emptyset_{26} \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & \emptyset_{42} & 0 & 1 & \emptyset_{45} & \emptyset_{46} \\ 0 & \emptyset_{52} & 0 & \emptyset_{54} & 1 & \emptyset_{56} \\ 0 & 0 & 0 & \emptyset_{64} & 0 & 1 \end{bmatrix} \begin{bmatrix} MS_t \\ IR_t \\ ER_t \\ FII_t \\ INF_t \\ EG_t \end{bmatrix} \quad (4)$$

The first, second, third, and fourth zero restriction shows that exchange rate, financial inclusion inflation and economic growth does not have a contemporaneous impact on money supply. Fifth and sixth zero shows that interest rate does contemporaneously respond to exchange rate and economic growth. Money supply, financial inclusion, inflation and economic growth does not affect exchange rate in the same period. The study assume that only interest rate, inflation and economic growth have the contemporaneous impact on financial inclusion. The thirteenth and fourteenth restriction is imposed on the assumption that exchange rate and economic growth does not have contemporaneous effect on inflation. The last restriction is imposed that economic growth does not respond in the same period to exchange rate.

Reduce form VAR

The reduce form VAR (equation 5) in matrix notation can be written as

$$\begin{bmatrix} MS_t \\ IR_t \\ ER_t \\ FII_t \\ INF_t \\ EG_t \end{bmatrix} = \begin{bmatrix} \emptyset_1 \\ \emptyset_2 \\ \emptyset_3 \\ \emptyset_4 \\ \emptyset_5 \\ \emptyset_6 \end{bmatrix} + \begin{bmatrix} 1 & \emptyset_{12} & 0 & 0 & \emptyset_{15} & \emptyset_{16} \\ \emptyset_{21} & 1 & \emptyset_{23} & \emptyset_{24} & \emptyset_{25} & \emptyset_{26} \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & \emptyset_{42} & 0 & 1 & \emptyset_{45} & \emptyset_{46} \\ 0 & \emptyset_{52} & 0 & \emptyset_{54} & 1 & \emptyset_{56} \\ 0 & 0 & 0 & \emptyset_{64} & 0 & 1 \end{bmatrix} \begin{bmatrix} MS_{t-1} \\ IR_{t-1} \\ ER_{t-1} \\ FII_{t-1} \\ INF_{t-1} \\ EG_{t-1} \end{bmatrix} + \begin{bmatrix} e_{1t} \\ e_{2t} \\ e_{3t} \\ e_{4t} \\ e_{5t} \\ e_{6t} \end{bmatrix} \quad (5)$$

4.3.2. Empirical description of the directional relationship between monetary policy effectiveness and financial inclusion.

The study used a panel structural vector autoregressive (SVAR) model to determine the causal link of financial inclusion and monetary policy effectiveness. The previous studies used the PVAR technique to compute the relationship between monetary policy and financial inclusion (Mehrotra & Nadhanael, 2016; Yin et al, 2019; Anarfoa, 2019). PVAR methodology merges the traditional VAR model with a panel data approach. VAR is a multiple equation system model which addresses all variables as endogenous and captures the linear interdependence among variables. Each variable in the system has an equation that depends on its lag, lag of other variables present in the model, and an error term.

The reduce form VAR in equation as follow:

$$INFRA_{it} = \emptyset + \sum_{K=1}^P \emptyset_{1k} INFRA_{it-k} + \sum_{K=1}^P \emptyset_{2k} FII_{it-k} + \sum_{K=1}^P \emptyset_{3k} ER_{it-k} + \sum_{K=1}^P \emptyset_{4k} M2_{it-k} + \sum_{K=1}^P \emptyset_{5k} Ir_{it-k} + \sum_{K=1}^P \emptyset_{6k} GDPGR_{it-k} + \varepsilon_{it} \quad (5)$$

$INFRA_{it}$ is the inflation rate which depends on its lags, the lag of financial inclusion FII_{it-k} , and lags of the controlled variables such as exchange rate (ER_{it-k}), interest rate (Ir_{it-k}), economic growth ($GDPGR_{it-k}$), broad money ($M2_{it-k}$).

The inflation rate is taken as a proxy of monetary policy effectiveness. Most of the studies also use inflation to check the effectiveness of monetary policy (Mbutor & Uba, 2013; Lapukeni, 2015; Lenka & Bairwa, 2016; Evan, 2016). Where financial inclusion index is taken as a measure of financial inclusion. The principal component analysis method is used to develop an index.

Financial inclusion is expected to have an inverse relationship with monetary policy effectiveness. The more the individuals are financially included, the better the monetary policy will be.

The money supply is expected to have a positive effect on the inflation rate. An increase in money supply leads to a rise in aggregate demand, Firms will increase their prices to fulfill the demand. In literature, the sign of money supply is seen positive (Evan, 2016).

The exchange rate is expected to have a positive impact on inflation. A depreciation of domestic currency makes imported goods expensive. Aggregate demand will increase as people switch to domestic goods and that results in inflation.

The interest rate has an inverse relation with inflation. Lower interest rate means people are capable to borrow more money. Now people have more money to consume which causes the economy to grow and increases inflation.

GDP growth rate is used to measure economic growth. Higher economic growth tends to push the prices upward and leads to higher inflation.

The model of financial inclusion index is written as:

$$FII_{it} = \emptyset + \sum_{K=1}^P \phi_{1k} FII_{it-k} + \sum_{K=1}^P \phi_{2k} INFRA_{it-k} + \sum_{K=1}^P \phi_{3k} ER_{it-k} + \sum_{K=1}^P \phi_{4k} M2_{it-k} + \sum_{K=1}^P \phi_{5k} Ir_{it-k} + \sum_{K=1}^P \phi_{6k} GDPGR_{it-k} + \varepsilon_{it} \quad (6)$$

The Controlled variables are listed as follow:

$$ER_{it} = \emptyset + \sum_{K=1}^P \phi_{1k} ER_{it-k} + \sum_{K=1}^P \phi_{2k} INFRA_{it-k} + \sum_{K=1}^P \phi_{3k} FII_{it-k} + \sum_{K=1}^P \phi_{4k} M2_{it-k} + \sum_{K=1}^P \phi_{5k} Ir_{it-k} + \sum_{K=1}^P \phi_{6k} GDPGR_{it-k} + \varepsilon_{it} \quad (7)$$

$$M2_{it} = \phi + \sum_{K=1}^P \phi_{1k} M2_{it-k} + \sum_{K=1}^P \phi_{2k} INFRA_{it-k} + \sum_{K=1}^P \phi_{3k} Z + \sum_{K=1}^P \phi_{4k} ER_{it-k} + \sum_{K=1}^P \phi_{5k} Ir_{it-k} + \sum_{K=1}^P \phi_{6k} GDPGR_{it-k} + \varepsilon_{it} \quad (8)$$

$$GDPGR_{it} = \phi + \sum_{K=1}^P \phi_{1k} GDPGR_{it-k} + \sum_{K=1}^P \phi_{2k} INFRA_{it-k} + \sum_{K=1}^P \phi_{3k} FII_{it-k} + \sum_{K=1}^P \phi_{4k} M2_{it-k} + \sum_{K=1}^P \phi_{5k} Ir_{it-k} + \sum_{K=1}^P \phi_{6k} ER_{it-k} + \varepsilon_{it} \quad (9)$$

$$Ir_{it} = \phi + \sum_{K=1}^P \phi_{1k} Ir_{it-k} + \sum_{K=1}^P \phi_{2k} INFRA_{it-k} + \sum_{K=1}^P \phi_{3k} FII_{it-k} + \sum_{K=1}^P \phi_{4k} M2_{it-k} + \sum_{K=1}^P \phi_{5k} GDPGR_{it-k} + \sum_{K=1}^P \phi_{6k} ER_{it-k} + \varepsilon_{it} \quad (10)$$

Due to limited data of barrier's variables the estimation are divided in to three models. Model 1 estimates the relationship between financial inclusion and monetary policy effectiveness without incorporating barriers dimension in composition of financial inclusion index. In model 2, the financial inclusion index of developing countries incorporates the barriers dimension whereas the developing countries index is made of only by taking access and usage indicators. Model 3 explore the relationship between financial inclusion and monetary policy over the time period of 2011-2018 with barriers data incorporating in only index of developing countries.

4.3.3. Lag identification.

The panel VAR model is estimated on the optimal number of Lag determination. The study uses the Akaike information criteria (AIC) and Bayesian information criteria (BIC) to determine the appropriate length of the lag. The lowest or minimum values of the AIC and BIC are considered for the number of lags.

4.3.4. Granger causality test

Granger causality test investigates the causality among variables and predicts the future values of one variable using the current and the past values of another variable. Given two variables x_t and y_t , y_t is said to be granger cause x_t if the information contained in the past values of y_t better predicts x_t than the past value of x_t alone.

4.3.5. Impulse response function

The impulse response functions explain the reaction of the dependent variable in the VAR system to shocks in the error term ε_{it} (Gujarati, 2011). The impulse response function is derived from estimated VAR parameters and their standard errors, so it is necessary to estimate the confidence interval to get the impulse response function

4.3.6. Forecast error variance decomposition

The forecast error variance decomposition depicts the changes in the variables due to shocks in other variables and its own shock. It determines the severity of the total effect and provides the upcoming trends of variables when there is a shock in the economy. Given the two variables y_t and z_t . If e_{y_t} shocks explain the forecast error variance of z_t then z_t is endogenous. Any unanticipated changes in the z_t can be explained by the shock in y_t .

CHAPTER 5

RESULTS AND DISCUSSION

This chapter contain the estimation and interpretation of results of the econometric model as describe in previous chapter. Section 5.1 explain descriptive statistics. Section 5.2, 5.3 and 5.4 describe model 1, model 2, and model 3 and presents the results of various test applied.

5.1 Descriptive Statistics

Table 5.1(a). Developed Countries.

	DCB	LCB	CBBPKM	CBBPA	ATMSKM	ATMSPA	INF	MS	ER	IR	EG
Mean	56.84379	65.55427	28.19627	28.33151	65.50733	89.23116	3.017619	80.12265	82.86697	6.823896	2.706333
Median	57.26984	51.17182	10.60548	29.58214	45.95230	69.36764	2.300581	79.61269	1.452629	6.184167	2.569576
Maximum	116.9492	151.5085	163.1770	57.27765	287.5495	186.3976	36.96476	124.7770	676.9577	15.34725	11.88939
Minimum	27.25037	21.89657	0.642776	11.28622	2.925296	31.72825	-2.404639	33.86690	0.629000	1.470968	-14.40169
Std. Dev.	21.77312	35.66702	40.82865	11.81921	76.63491	47.72878	4.249449	20.90159	175.6862	2.701664	3.104637
Skewness	0.584918	0.857783	1.904525	0.451933	1.767837	0.845145	5.693974	0.025360	2.187101	0.619891	-0.938329
Kurtosis	2.719984	2.599703	5.450539	2.302073	5.165393	2.240773	42.30853	2.445104	6.458323	2.954136	9.416156
Jarque-Bera	9.043294	19.39627	128.2125	8.150473	107.4370	21.45941	10467.79	1.940514	194.3352	9.619773	279.3056
Probability	0.010871	0.000061	0.000000	0.016988	0.000000	0.000022	0.000000	0.378986	0.000000	0.008149	0.000000
Sum	8526.569	9833.141	4229.441	4249.727	9826.100	13384.67	452.6429	12018.40	12430.05	1023.584	405.9499
Sum Sq. Dev.	70636.24	189548.3	248379.8	20814.36	875063.6	339427.5	2690.615	65094.57	4598980.	1087.549	1436.177
	150	150	150	150	150	150	150	150	150	150	150

Table 5.1(b). Developing Countries.

	DCB	LCB	CBBPKM	CBBPA	ATMSKM	ATMSPA	INF	MS	ER	IR	EG
Mean	41.40151	35.73398	13.82834	11.77968	27.81115	30.11245	6.591139	52.10041	600.1374	14.47521	4.470400
Median	36.36288	31.31939	7.587327	10.25243	15.27119	23.60050	5.560687	48.39638	33.94995	13.21051	4.791336
Maximum	182.1831	116.0438	111.8227	45.14101	228.5714	122.7815	48.69986	140.0924	14236.94	60.00000	13.86571
Minimum	6.758187	6.951322	0.156688	0.398073	0.046428	0.039807	-1.403608	14.98698	1.000000	3.422500	-14.75855
Std. Dev.	28.29307	21.51379	20.49245	8.129037	39.88478	26.99459	5.407448	26.75852	2016.640	8.539466	3.324591
Skewness	2.470646	1.187412	2.887993	1.221297	3.007395	1.016398	2.967167	1.323385	4.764360	2.698394	-1.250864
Kurtosis	10.18281	4.569321	11.69595	4.892518	13.51012	3.576389	18.56071	4.629658	26.34494	13.67592	8.396444
Jarque-Bera	1418.837	151.2478	2034.324	178.2272	2737.285	83.33697	5177.236	180.3418	11867.95	2671.210	660.4314
Probability	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	18547.88	16008.82	6195.096	5277.295	12459.40	13490.38	2952.830	23340.98	268861.5	6484.893	2002.739
Sum Sq. Dev.	357822.5	206891.0	187713.4	29538.32	711085.5	325732.5	13070.50	320060.3	1.82E+09	32596.35	4940.649
Observations	448	448	448	448	448	448	448	448	448	448	448

The table 5.1(a) and 5.1(b) show the descriptive statistics of developed and developing countries respectively. The skewness and kurtosis explain the normality of each variable. The mean values of deposits from commercial banks (DCB), loans from commercial banks (LCB), commercial bank branch per 1000km² (CBBPKM), commercial bank branch per 1000 adults (CBBPA), number of ATMs per 1000km² (ATMSKM), and number of ATMs per 1000 adults reveals the higher level of financial inclusion in developed countries in comparison to developing countries. Average 65 in developed countries take loans from commercial banks and average 35 in the developing countries. Most people in developing countries prefer to borrow from friends and relatives rather than from financial institutions. This shows the lack of trust in the financial institutions.

The developing countries also experience the higher inflation rate (INF) and interest rate (IR) of average 6.6 and 14.5 while the developed sample have a mean value of 3 and 7 respectively. The mean of economic growth (EG) in developed countries is 2.7, while that of developing is 4.5.

5.2. Model 1: Developed and developing countries analysis without incorporating barriers in index.

5.2.1. Lag determination

Table 5.2 (a). Developed lag determination

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-2184.058	NA	7.91e+09	39.81923	39.96653	39.87898
1	-1524.636	1234.917	94661.55	28.48429	29.51538*	28.90251
2	-1467.326	101.0749	64616.46	28.09683	30.01171	28.87352
3	-1410.720	93.65658*	45067.12*	27.72218*	30.52086	28.85734*
4	-1379.376	48.44001	50415.28	27.80684	31.48932	29.30047

Table 5.2 (b). Developing lag determination

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-7892.639	NA	3.33e+13	48.16243	48.23182	48.19012
1	-5530.061	4624.316	22948324	33.97598	34.46167*	34.16976*
2	-5481.514	93.24491	21262647	33.89948	34.80147	34.25935
3	-5421.492	113.0910*	18375233*	33.75300*	35.07130	34.27896
4	-5400.978	37.90015	20215127	33.84743	35.58204	34.53949

Table 5.2(a) and 5.2(b) describe the lag determination statistics of developed and developing countries. The lag is determined on the minimum values of Akaike information criteria (AIC) Hannan-Quinn information criteria (HQ), and Schwarz information criteria (SC). Based on AIC, HQ, and SC, the study takes three lags of developed countries and one lag of developing countries.

5.2.2. Structural VAR

Table 5.3(a) and 5.3(b) represent the contemporaneous effect of the coefficient of all variables in developed and developing countries. The maximum likelihood method is used to estimate the matrix. The study imposes 15 structural restrictions based on theory. The exogenous looking variables are written before the endogenous looking variables. The order of the variables is money supply > interest rate > exchange rate > financial inclusion > inflation rate > economic growth rate.

3 out of 21 coefficients in developed countries and 1 out of 21 coefficients in developing countries are significant at 5%. In both economies, none of the variable have a contemporaneous effect on financial inclusion. The negative coefficients of both the inflation rate and financial inclusion indicate the inverse relation between them. From the controlled variable, only the money

supply has a significant and contemporaneous effect on inflation in both developed and developing countries.

Table 5.3(a). Estimation of contemporaneous coefficient of Developed Countries

MS	IR	ER	FII	INF	EG
1	-0.050074 (0.9136)	0	0	0.382364** (0.0024)	0.653043** (0.0006)
-0.134354 (0.1287)	1	0.044047** (0.0168)	-2.159939 (0.1115)	0.094465 (0.5072)	-0.359815 (0.1690)
0	0	1	0	0	0
0	-0.597026 (0.9962)	0	1	-0.018610 (1.0000)	0.176429 (0.9982)
0	-0.852465 (0.9998)	0	-1.019175 (0.9999)	1	-0.333674 (0.9998)
0	0	0	7.397340 (0.1282)	0	1

Notes: probability values in (), ** represent significance level at 5%.

Table 5.3(b). Estimation of contemporaneous coefficient of Developing Countries

MS	IR	ER	FII	INF	EG
1	-0.028011 (0.9042)	0	0	0.248670 (0.0194)	0.113860 (0.3680)
-0.138879 (0.3409)	1	0.001866 (0.2664)	-4.601127 (0.4520)	-0.408135 (0.3794)	0.421788 (0.5327)
0	0	1	0	0	0
0	-34.79899 (0.9905)	0	1	-20.53692 (0.9905)	-9.628598 (0.9904)
0	-2.452017 (0.4570)	0	-17.84107 (0.5384)	1	1.376833 (0.5683)
0	0	0	6.691376 (0.6165)	0	1

Notes: probability values in (), ** represent significance level at 5%.

5.2.3. Reduce-form Vector Autoregressive

The regression results of developed and developing countries are shown in table 5.4 (a) and 5.4 (b). The results indicate the presence of reverse causality between financial inclusion and inflation rate at a 10% significance level in developed countries. A higher level of financial inclusion means more people being able to take credits from financial institutions and increase the demand for loanable fund. This results in an increase in policy rate which in turn increases interest rate, reduces inflation and makes monetary policy effective (Mishkin, 1995). The findings are consistent with another study (Mbutor & Uba, 2013).

In developing countries, the lag of inflation rate has a significant impact on financial inclusion. The results coincides with other finding (Evan o, 2016). The negative coefficient indicates the inverse relationship with financial inclusion. Lower Inflation promotes financial inclusion by changes in lending rate, saving rate and changes in aggregate demand. But, the lag of financial inclusion does not shows any significant impact on inflation rate. The developing countries witness the lower degree of financial inclusion which create obstacle to transmit monetary policy action properly in the economy (khan, 2011).

The study uses the exchange rate, interest rate, economic growth, and money supply as controlled variables. In developed countries, only economic growth shows a significant impact on financial inclusion but the coefficient of economic growth in the first lag appears to be negative. The second and third lag shows a positive impact on financial inclusion. An increase in economic growth leads to an increase in aggregate demand, more investment opportunities which make people take more credit from banks and promotes financial inclusion (Kima *et al*, 2018; Chinoda & Kwenda, 2019; Jalil & Ma, 2008). The results are consistent with another study that found positive relation (Anarfoa *et al*, 2019). The lags of the exchange rate, money supply, and interest

rate do not influence financial inclusion. In the case of inflation, the lags of money supply and economic growth have a statistically significant impact (same what economic theory suggests). The coefficient of money supply indicates an increase in the money supply cause's inflation rate to increase (Froyen, 1990). As the country's economic growth rate increases, it indicates higher production, lower unemployment rates. This will increase aggregate demand and in turn inflation increases (Abel et al, 2014).

In the case of financial inclusion, the results of developing countries are the same as in developed countries. Only economic growth is a significant driver of financial inclusion shown in table 5.4 (b). Both the money supply and exchange rate has a negative but not significant effect on financial inclusion. The first lag of all controlled variables shows an insignificant impact on the inflation rate in developing countries.

Table 5.4(a). Reduce-form VAR results of Developed countries

	FII	INF	ER	IR	MS	EG
FII(-1)	0.904890** (0.10524) [8.59874]	0.108304 (0.76676) [0.14125]	-0.356171 (2.98000) [-0.11952]	-0.063568 (0.26582) [-0.23914]	-2.308861** (0.86043) [-2.68337]	1.369941** (0.56998) [2.40351]
FII(-2)	-0.311351** (0.14281) [-2.18020]	0.427411 (1.04052) [0.41077]	-0.758256 (4.04397) [-0.18750]	0.212495 (0.36073) [0.58906]	2.393923** (1.16764) [2.05022]	-0.443885 (0.77348) [-0.57388]
FII(-3)	0.205339** (0.09599) [2.13911]	-1.256355*** (0.69942) [-1.79629]	4.167941 (2.71829) [1.53330]	-0.377114 (0.24248) [-1.55525]	-0.095642 (0.78487) [-0.12186]	-0.458983 (0.51992) [-0.88280]
INF(-1)	-0.025403*** (0.01420) [-1.78881]	0.374573** (0.10347) [3.62008]	0.341263 (0.40214) [0.84862]	0.055846 (0.03587) [1.55681]	-0.258854** (0.11611) [-2.22934]	-0.132129** (0.07692) [-1.71784]
INF(-2)	-0.003129 (0.01382) [-0.22642]	-0.485739** (0.10070) [-4.82359]	-0.149049 (0.39137) [-0.38084]	-0.057406 (0.03491) [-1.64432]	0.079778 (0.11300) [0.70598]	0.229890** (0.07486) [3.07107]
INF(-3)	-0.016896	0.226739**	0.107990	0.002261	-0.339655**	-0.127766**

	(0.01275)	(0.09291)	(0.36108)	(0.03221)	(0.10426)	(0.06906)
	[-1.32509]	[2.44050]	[0.29907]	[0.07020]	[-3.25785]	[-1.84999]
ER(-1)	-0.002920 (0.00341) [-0.85703]	0.016330 (0.02482) [0.65789]	1.411350** (0.09647) [14.6296]	-0.030096 (0.00861) [-3.49730]	-0.030560 (0.02785) [-1.09711]	0.009710 (0.01845) [0.52621]
ER(-2)	0.000388 (0.00572) [0.06787]	-0.018271 (0.04170) [-0.43813]	-0.671941** (0.16207) [-4.14593]	0.022990 (0.01446) [1.59023]	0.003123 (0.04680) [0.06674]	-0.023232 (0.03100) [-0.74945]
ER(-3)	0.002554 (0.00367) [0.69647]	7.52E-05 (0.02672) [0.00281]	0.272714** (0.10386) [2.62590]	0.006800 (0.00926) [0.73399]	0.024276 (0.02999) [0.80956]	0.014528 (0.01986) [0.73137]
IR(-1)	-0.007721 (0.03939) [-0.19602]	-0.123348 (0.28698) [-0.42981]	1.902954** (1.11536) [1.70614]	0.587311** (0.09949) [5.90303]	0.280705 (0.32204) [0.87163]	-0.324350 (0.21333) [-1.52040]
IR(-2)	0.010418 (0.04581) [0.22739]	0.432484 (0.33381) [1.29559]	-2.153308** (1.29736) [-1.65976]	0.117742 (0.11573) [1.01740]	-0.378285 (0.37459) [-1.00985]	0.132720 (0.24814) [0.53486]
IR(-3)	0.023378 (0.03633) [0.64347]	-0.104520 (0.26472) [-0.39484]	0.659296 (1.02882) [0.64083]	0.270827** (0.09177) [2.95103]	0.286778 (0.29706) [0.96540]	0.237811 (0.19678) [1.20852]
MS(-1)	-0.007394 (0.01106) [-0.66871]	-0.245272** (0.08057) [-3.04431]	0.273853 (0.31312) [0.87458]	0.032993 (0.02793) [1.18119]	1.161358** (0.09041) [12.8454]	0.013296 (0.05989) [0.22200]
MS(-2)	-0.007463 (0.01712) [-0.43582]	-0.057136 (0.12477) [-0.45791]	0.021039 (0.48494) [0.04338]	-0.084790*** (0.04326) [-1.96013]	-0.250183** (0.14002) [-1.78679]	-0.063142 (0.09275) [-0.68076]
MS(-3)	0.011287 (0.01163) [0.97080]	0.297159** (0.08471) [3.50789]	-0.318356 (0.32923) [-0.96697]	0.062778** (0.02937) [2.13762]	0.038337 (0.09506) [0.40329]	0.055531 (0.06297) [0.88185]
EG(-1)	-0.048744* (0.01836) [-2.65516]	0.163582 (0.13376) [1.22295]	0.536844 (0.51986) [1.03267]	0.070436 (0.04637) [1.51889]	0.082071 (0.15010) [0.54676]	0.495024*** (0.09943) [4.97851]
EG(-2)	0.016163 (0.02037) [0.79339]	0.136377 (0.14843) [0.91879]	-0.392413 (0.57687) [-0.68024]	0.014738 (0.05146) [0.28641]	-0.512180** (0.16656) [-3.07497]	-0.151544 (0.11034) [-1.37346]
EG(-3)	0.007372 (0.01687) [0.43709]	0.229672*** (0.12289) [1.86886]	-0.026491 (0.47763) [-0.05546]	0.074124*** (0.04261) [1.73977]	0.678162** (0.13791) [4.91749]	-0.084804 (0.09135) [-0.92830]
C	0.553344 (0.25072) [2.20705]	0.820818 (1.82675) [0.44933]	-1.436841 (7.09968) [-0.20238]	-1.313652 (0.63331) [-2.07426]	5.466255 (2.04993) [2.66656]	0.505126 (1.35793) [0.37198]
R-squared	0.735327	0.578020	0.995507	0.866010	0.972816	0.398924
Adj. R-squared	0.688158	0.502816	0.994707	0.842130	0.967972	0.291802

F-statistic	15.58909	7.685990	1243.355	36.26589	200.8046	3.724001
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Notes: t-Statistics in [], Standard Errors in (), *, **, *** represent significance level at 1%, 5% and 10%

Table 5.4 (b). Reduce-form VAR results of Developing countries

	FII	INF	ER	IR	MS	EG
FII(-1)	0.891650** (0.01664) [53.5724]	-0.221095 (0.21712) [-1.01831]	18.75522** (7.22445) [2.59608]	0.120099 (0.10779) [1.11423]	-0.085576 (0.15908) [-0.53793]	-0.388730** (0.14869) [-2.61429]
INF(-1)	-0.005750*** (0.00338) [-1.70268]	0.573600** (0.04405) [13.0210]	-0.331466 (1.46579) [-0.22613]	0.071742** (0.02187) [3.28053]	-0.065844** (0.03228) [-2.03998]	-0.097474** (0.03017) [-3.23093]
ER(-1)	-1.68E-06 (8.7E-06) [-0.19319]	-7.54E-05 (0.00011) [-0.66418]	1.035815** (0.00378) [274.240]	1.43E-05 (5.6E-05) [0.25396]	-0.000174** (8.3E-05) [-2.09178]	0.000102 (7.8E-05) [1.31723]
IR(-1)	0.001807 (0.00231) [0.78352]	0.038925 (0.03008) [1.29414]	0.875284 (1.00082) [0.87456]	0.973223** (0.01493) [65.1771]	0.001911 (0.02204) [0.08670]	-0.007202 (0.02060) [-0.34965]
MS(-1)	-0.000260 (0.00073) [-0.35823]	-0.010964 (0.00947) [-1.15801]	-0.065500 (0.31505) [-0.20790]	-0.003916 (0.00470) [-0.83303]	0.985787** (0.00694) [142.097]	-0.008569 (0.00648) [-1.32151]
EG(-1)	0.013186*** (0.00515) [2.56215]	0.004334 (0.06714) [0.06456]	0.604644 (2.23388) [0.27067]	0.069560** (0.03333) [2.08708]	0.084038** (0.04919) [1.70842]	0.318864** (0.04598) [6.93515]
C	0.133744 (0.07337) [1.82281]	2.767314 (0.95714) [2.89123]	-6.802026 (31.8481) [-0.21358]	-0.297536 (0.47516) [-0.62618]	1.673340 (0.70130) [2.38605]	3.990971 (0.65550) [6.08843]
R-squared	0.881033	0.358695	0.994860	0.935792	0.985402	0.182622
Adj. R-squared	0.879297	0.349333	0.994785	0.934855	0.985189	0.170689
F-statistic	507.2915	38.31343	13259.45	998.3495	4624.074	15.30456

Notes: t-Statistics in [], Standard Errors in (), *, **, *** represent significance level at 1%,5% and 10%

5.2.4. Granger Causality

The study applied a granger causality/ Block Exogeneity Wald test to analyze the causality among variables. Table 5.5(a) and 5.5(b) show the causation results of developed and developing countries. At a 5% significance level, the test reveals that financial inclusion and inflation rate do

not granger causes each other in both developed and developing countries. It means that the past values of both financial inclusion and inflation rate do not help better predict each other.

From the controlled variables in developed countries, there is bidirectional causality between financial inclusion and economic growth but only economic growth granger cause financial inclusion in developing countries. This means that economic growth will help in better predict financial inclusion as compared to the past values of financial inclusion alone. The increase in economic growth contributes to greater financial inclusion. Financial inclusion granger cause the exchange rate in only developing countries.

There is bidirectional causality present between money supply and inflation rate in developing countries but only money supply granger causes inflation rate in developed countries. This indicates that inflation will be better predicted by the money supply. An increase in the money supply causes inflation rate to rise. There is two-way causation between Inflation rate, interest rate, and economic growth in developed countries.

Table 5.5(a). Granger causality Developed countries.

FII / Excluded	Chi-sq	Df	Prob.
INF	5.527971	3	0.1370
ER	1.789656	3	0.6172
IR	1.769169	3	0.6217
MS	3.472189	3	0.3244
EG	7.890012	3	0.0483
INF / Excluded	Chi-sq	Df	Prob.
FII	6.548478	3	0.0878
ER	1.288876	3	0.7318
IR	3.077972	3	0.3798
MS	25.69681	3	0.0000
EG	13.14987	3	0.0043
ER/ Excluded	Chi-sq	Df	Prob.
FII	6.321598	3	0.0970
INF	0.743466	3	0.8629
IR	3.862639	3	0.2767
MS	2.298159	3	0.5129
EG	1.198333	3	0.7534
IR/ Excluded	Chi-sq	Df	Prob.
FII	4.579534	3	0.2053

INF	4.657924	3	0.1986
ER	17.12940	3	0.0007
MS	7.967466	3	0.0467
EG	9.635980	3	0.0219
MS / Excluded	Chi-sq	Df	Prob.
FII	8.532702	3	0.0362
INF	14.00448	3	0.0029
ER	5.950662	3	0.1140
IR	2.472834	3	0.4802
EG	25.52408	3	0.0000
EG / Excluded	Chi-sq	Df	Prob.
FII	8.000260	3	0.0460
INF	10.47081	3	0.0150
ER	1.057406	3	0.7874
IR	3.431497	3	0.3298
MS	0.954670	3	0.8122

Table 5.5(b). Granger causality Developing countries.

FII / Excluded	Chi-sq	Df	Prob.
INF	4.963653	3	0.1745
ER	4.277100	3	0.2331
IR	4.752750	3	0.1908
MS	2.124432	3	0.5470
EG	11.12209	3	0.0111
INF / Excluded	Chi-sq	Df	Prob.
FII	0.231502	3	0.9724
ER	0.635324	3	0.8883
IR	1.099532	3	0.7772
MS	9.795265	3	0.0204
EG	1.298612	3	0.7295
ER / Excluded	Chi-sq	Df	Prob.
FII	7.446845	3	0.0589
INF	1.021523	3	0.7960
IR	1.453987	3	0.6929
MS	0.380227	3	0.9443
EG	0.301953	3	0.9597
IR / Excluded	Chi-sq	Df	Prob.
FII	2.415142	3	0.4908
INF	8.558671	3	0.0358
ER	2.074850	3	0.5570
MS	3.826908	3	0.2808
EG	7.597036	3	0.0551
MS / Excluded	Chi-sq	Df	Prob.
FII	6.572084	3	0.0869
INF	7.371568	3	0.0610
ER	2.806781	3	0.4224
IR	0.198714	3	0.9778
EG	3.511456	3	0.3193
EG / Excluded	Chi-sq	Df	Prob.
FII	0.715262	3	0.8696

INF	4.258826	3	0.2348
ER	2.496133	3	0.4760
IR	8.652570	3	0.0343
MS	13.57305	3	0.0035

5.2.5 Impulse Response Function

The impulse response function represents the behavior of the variable over time due to random shock in another variable. The structural restrictions are employed in order to find more meaningful results. The controlled variables are listed in the order; the most endogenous variables are written after the most exogenous looking variables. Figure 5.1(a) shows the response of financial inclusion and inflation to the shock in all endogenous variables of developed countries. The structural shock in inflation and economic growth generates fluctuation in financial inclusion. The shock in inflation causes financial inclusion to decrease (panel a) and over time the response dies off. Inflation's negative response to the shock in financial (panel b) confirm the bidirectional causality between two variables. The results are consistent with the economic theory and previous findings. Any shock in economic growth lead to respond financial inclusion negatively. This response of financial inclusion supports the granger causality results of bidirectional causality between variables. The inflation slightly response positively and negatively to the shock in money supply and economic growth respectively and become completely positive at the end of the period.

In developing countries, the initial response of financial inclusion to shock in economic growth creates slight fluctuations. Financial inclusion responded negatively to the shock in inflation. In return, inflation also shows a strong response to the shock of financial inclusion. These findings support the negative relation between financial inclusion and inflation. However, the

VAR results highlight that only the lag of inflation has an impact on financial inclusion. The impulse response function of controlled variables are presented in appendix.

Figure 5.1(a) Impulse Response of Developed countries

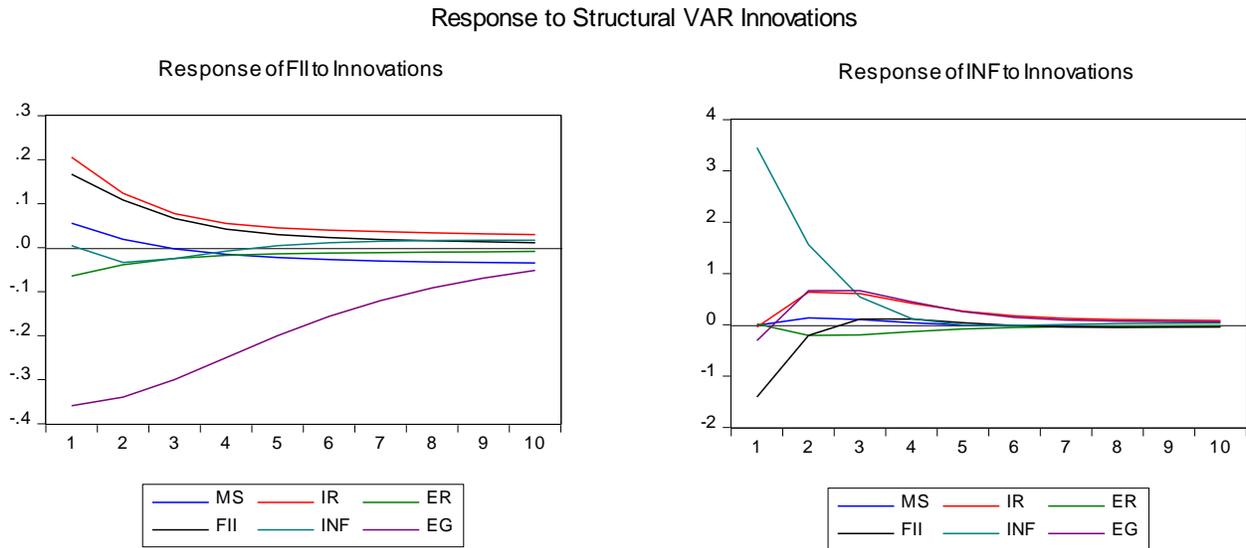
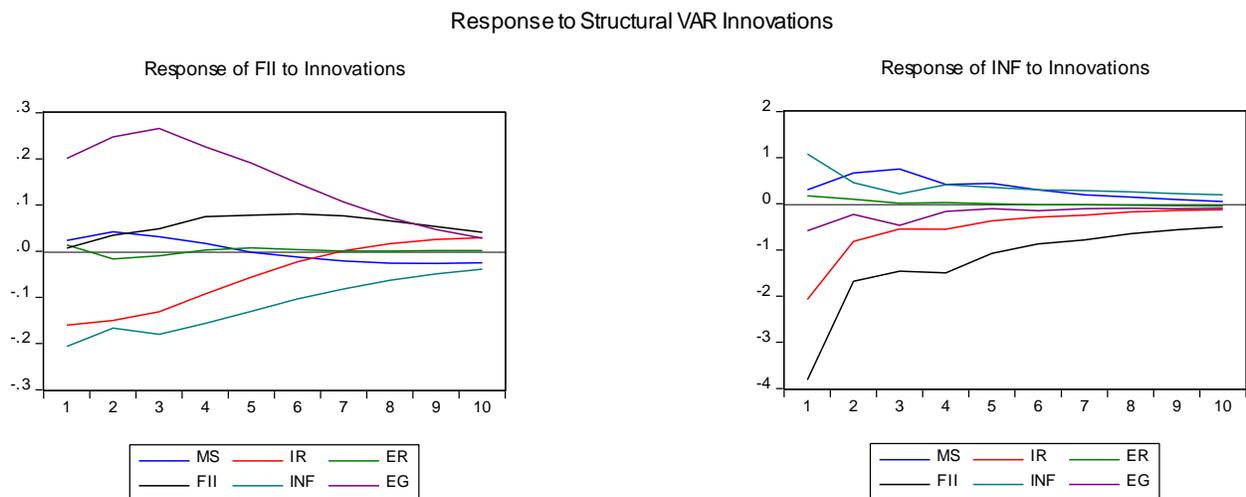


Figure 5.1(b) Impulse Response of Developing Countries



5.1.6. Forecast Error Variance Decomposition

Table 5.6 to 5.7 shows the results of variance decomposition. The analysis provides additional information regarding the variance relation of all endogenous variables. The forecast error variance decomposition confirms the previous results. By the fourth period, 0.34% (column 6) and 76% (column 8) variance of inflation and economic growth explain the variation in financial inclusion respectively in developed countries. In the long run, 0.47% and 77% variation in financial inclusion is explained by inflation and economic growth shocks. In developing countries, in the tenth period (table 5.7(a)) inflation and economic growth shocks contribute significantly 28% and 50% respectively to the variation in financial inclusion.

In developed countries, financial inclusion, money supply, and economic growth shocks significantly explain the variation in the inflation rate. In the long run, 10%, 0.17%, and 6.6% variation in inflation is explained by the shocks in financial inclusion, money supply, and economic growth respectively. In the tenth period of developing countries, 70%, 4%, and 2% variation in inflation rate is explained by financial inclusion, money supply and economic growth shocks respectively.

Table 5.6(a). Variance decomposition of Financial Inclusion of Developed Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	4.140976	1.500989	20.43571	2.038927	13.48415	0.009050	62.53118
2	5.836645	0.983990	16.31565	1.627286	11.25291	0.324177	69.49599
3	7.093507	0.764942	13.97696	1.394807	9.704630	0.385549	73.77311
4	8.104493	0.708784	12.73821	1.272383	8.784903	0.347626	76.14810
5	8.950670	0.742368	12.11039	1.210770	8.263071	0.324400	77.34900
6	9.677319	0.830689	11.81411	1.181806	7.968693	0.331551	77.87315
7	10.31283	0.956032	11.69514	1.169868	7.800075	0.357774	78.02111
8	10.87613	1.107606	11.66870	1.166342	7.699965	0.392993	77.96440
9	11.38044	1.277357	11.68870	1.166576	7.636817	0.432006	77.79854
10	11.83536	1.458591	11.73054	1.168139	7.593482	0.472559	77.57669

Table 5.6(b). Variance Decomposition of Inflation of Developed Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	1.299387	0.000898	0.012232	0.001220	14.12044	85.19545	0.669758
2	1.781583	0.104582	2.346786	0.247770	11.61016	82.62196	3.068741
3	2.101117	0.152220	4.190421	0.439172	10.94724	78.99739	5.273554
4	2.322895	0.157128	5.033994	0.524028	10.76730	77.31113	6.206426
5	2.478974	0.155957	5.367069	0.555626	10.69325	76.72094	6.507165
6	2.590155	0.158248	5.508695	0.567849	10.66363	76.49991	6.601671
7	2.670458	0.162664	5.583282	0.573539	10.65711	76.38501	6.638390
8	2.729281	0.167301	5.632657	0.576842	10.65883	76.30562	6.658745
9	2.772945	0.171433	5.670574	0.579070	10.66161	76.24343	6.673885
10	2.805773	0.174979	5.701550	0.580661	10.66341	76.19273	6.686668

Table 5.7(a). Variance Decomposition of Financial inclusion of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	3.268183	0.490837	23.43972	0.165488	0.042960	38.89992	36.96108
2	4.557889	1.028080	21.47807	0.207116	0.549164	31.32973	45.40784
3	5.617811	0.949449	18.78230	0.161857	1.037781	29.49681	49.57180
4	6.596186	0.818779	16.87766	0.130173	2.098092	29.01697	51.05832
5	7.455212	0.717542	15.39731	0.124957	3.057042	28.76719	51.93596
6	8.228721	0.694399	14.36295	0.117955	4.045066	28.62897	52.15066
7	8.943557	0.745201	13.74530	0.112902	4.903161	28.58206	51.91138
8	9.607067	0.843453	13.44557	0.110092	5.525478	28.55379	51.52162
9	10.22529	0.951300	13.35434	0.108694	5.930279	28.53191	51.12348
10	10.80578	1.045857	13.37730	0.108024	6.159103	28.52231	50.78741

Table 5.7 (b). Variance Decomposition of Inflation of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	2.166521	0.438061	20.91942	0.147694	71.11824	5.708923	1.667652
2	3.236621	2.159875	20.04321	0.161250	70.44843	5.590153	1.597080
3	3.961194	3.921914	18.78922	0.142781	69.84916	5.106679	2.190250
4	4.573739	4.114871	17.98953	0.131709	70.50939	5.181427	2.073066
5	5.141776	4.510396	17.51425	0.125138	70.53423	5.311469	2.004515
6	5.664119	4.643816	17.21610	0.122491	70.58922	5.417803	2.010580
7	6.148434	4.646143	16.98580	0.120990	70.72314	5.528447	1.995479
8	6.603100	4.634037	16.80597	0.122115	70.81397	5.633909	1.989993
9	7.031996	4.605764	16.67272	0.125721	70.88858	5.709114	1.998104
10	7.438475	4.571591	16.56789	0.131232	70.95543	5.766537	2.007320

5.2. Model 2: Developed and developing countries analysis with barrier incorporating in index

In this model, the index of financial inclusion for developing is based on three dimensions; Access, Usage, and barriers whereas the financial inclusion index of developed countries is composed taking only Access and Usage dimension due to non-availability of barriers data. We are using the same results as model 1 for developed countries and compare with developing countries in this model.

5.2.1. Lag determination criteria

Table 5.2 (a) model 1, for developed countries three lags were taken based on AIC, and HQ. Table 5.8 shows the results of the lag order selection for developing countries. The SC and HQ criteria choose one lag whereas AIC chooses three lags. As the majority of test pick out first lag so we are taking one lag for estimation of VAR/SVAR.

Table 5.8. Lag Selection of Developing Countries

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-7987.109	NA	5.92e+13	48.73847	48.80785	48.76615
1	-5599.882	4672.559	35127619	34.40172	34.88741*	34.59550*
2	-5546.715	102.1206	31643032	34.29704	35.19904	34.65691
3	-5497.742	92.27144*	29251969*	34.21794*	35.53624	34.74391
4	-5471.549	48.39335	31085558	34.27774	36.01235	34.96980

5.2.2. Structural VAR

Structural VAR shows the contemporaneous effect of all the variables in the system. A total of 15 restrictions are imposed based on theory. The order of the variables is money supply > interest rate > exchange rate > financial inclusion > inflation rate > economic growth rate.

1 and 3 out of 21 coefficients are significant at 5% in developing and developed countries (table 5.3(a) and 5.9). In both economies, none of the variable have a contemporaneous effect on financial inclusion. Only the money supply has a contemporaneous effect on inflation. The results seem to be consistent with the theory; as the money supply increased by the central bank the inflation rate also increases. The negative sign of the coefficient of financial inclusion and inflation indicates inverse relations but does not have a contemporaneous impact on each other.

Table 5.9. Estimation of contemporaneous coefficient of Developing Countries

MS	IR	ER	FII	INF	EG
1	-0.026802 (0.9074)	0	0	0.183674** (0.000)	0.079290 (0.5935)
0.180264 (0.2190)	1	0.001741 (0.4111)	-6.809423 (0.5185)	0	0.671830 (0.5472)
0	0	1	0	-0.916615 (0.6123)	0
0	0.289111 (0.9939)	0	1	-0.011241 (0.9997)	-0.036373 (0.9966)
0	-0.521203 (0.9992)	0	-0.608906 (0.9997)	1	0.135268 (0.9983)
0	0	0	4.049940 (0.6443)	0	1

Notes: probability values in (), ** represent significance level at 5%.

5.2.3. Reduce-form Vector Autoregressive

The VAR results for developed countries depict the reverse causality between financial inclusion and inflation rate. A higher level of financial inclusion causes the inflation rate to decrease and make monetary policy effective (Mbutor & Uba, 2013). In developing countries, the negative coefficient of financial inclusion and inflation rate (table 5.10) indicates the inverse relationship between these two variables. But at first lag, both are statistically insignificant. This may be because of the lower degree of financial inclusion prevails in developing countries that hardly have an impact on inflation. Out of controlled variables, economic growth has a significant impact on financial inclusion. Economic growth of a country promotes financial inclusion (Chinoda & Kwenda, 2019; Jalil & Ma, 2008). On inflation, money supply and economic growth has a significant impact in developed countries (table 5.4(a)).

In model 1 of developing countries, from all controlled variables only economic growth has a significant effect on financial inclusion. But in this model, no controlled variable influences financial inclusion. For the impact on inflation, the results of model 1 and model 2 are the same. None of the controlled variables has a significant impact on inflation.

Table 5.10. Reduce-form VAR Developing countries

	FII	INF	ER	IR	MS	EG
FII(-1)	0.915880* (0.01705) [53.7281]	-0.145743 (0.18647) [-0.78160]	12.80003** (6.22006) [2.05786]	0.160447*** (0.09232) [1.73787]	-0.051611 (0.13658) [-0.37788]	-0.325991* (0.12769) [-2.55307]
INF(-1)	-0.001891 (0.00405) [-0.46715]	0.572987* (0.04427) [12.9423]	-0.266446 (1.47680) [-0.18042]	0.074499* (0.02192) [3.39867]	-0.065939** (0.03243) [-2.03341]	-0.100631* (0.03032) [-3.31943]
ER(-1)	3.23E-06 (1.0E-05) [0.31133]	-7.83E-05 (0.00011) [-0.68959]	1.036040* (0.00379) [273.651]	1.24E-05 (5.6E-05) [0.22087]	-0.000175** (8.3E-05) [-2.10859]	0.000100 (7.8E-05) [1.29076]
IR(-1)	0.003475 (0.00275) [1.26345]	0.039669 (0.03009) [1.31833]	0.811538 (1.00373) [0.80852]	0.972699* (0.01490) [65.2895]	0.002192 (0.02204) [0.09944]	-0.005792 (0.02060) [-0.28111]

MS(-1)	-0.000216 (0.00086) [-0.24954]	-0.011418 (0.00945) [-1.20860]	-0.028772 (0.31515) [-0.09130]	-0.004002 (0.00468) [-0.85553]	0.985592* (0.00692) [142.427]	-0.009082 (0.00647) [-1.40382]
EG(-1)	0.002577 (0.00614) [0.41931]	0.007199 (0.06722) [0.10711]	0.392481 (2.24218) [0.17504]	0.073747* (0.03328) [2.21591]	0.085486*** (0.04923) [1.73633]	0.318973* (0.04603) [6.93003]
C	0.142883 (0.08758) [1.63153]	2.774902 (0.95797) [2.89664]	-7.515468 (31.9553) [-0.23519]	-0.314639 (0.47431) [-0.66336]	1.675511 (0.70167) [2.38788]	4.015451 (0.65598) [6.12129]
R-squared	0.882450	0.358031	0.994829	0.936068	0.985397	0.182003
Adj. R-squared	0.880734	0.348659	0.994754	0.935135	0.985184	0.170061

Notes: t-Statistics in [], Standard Errors in (), *, **,*** represent significance level at 1%,5% and 10%

5.2.4. Granger Causality.

The results show no granger causality present between financial inclusion and inflation in developed countries and developing countries, consistent with results of granger causality of model 1. Bidirectional causality present between financial inclusion and economic growth in developed countries. The Inflation rate and money show a unidirectional causation. Money supply granger cause inflation in developed countries.

In developing countries, none of the controlled variable granger causes inflation and financial inclusion. Though, financial inclusion granger causes economic growth and exchange rate at a 5% significance level. Inflation rate gangers cause interest rates, money supply, and economic growth at a 5 % significance level.

Table 5.11. Granger causality Developing Countries

FII / Excluded	Chi-sq	df	Prob.
INF	0.218228	1	0.6404
ER	0.096927	1	0.7555
IR	1.596307	1	0.2064
MS	0.062272	1	0.8029

EG	0.175818	1	0.6750
INF/ Excluded	Chi-sq	df	Prob.
FII	0.610894	1	0.4345
ER	0.475532	1	0.4905
IR	1.737996	1	0.1874
MS	1.460711	1	0.2268
EG	0.011472	1	0.9147
ER/ Excluded	Chi-sq	df	Prob.
FII	4.234793	1	0.0396
INF	0.032552	1	0.8568
IR	0.653710	1	0.4188
MS	0.008335	1	0.9273
EG	0.030641	1	0.8610
IR/ Excluded	Chi-sq	df	Prob.
FII	3.020205	1	0.0822
INF	11.55096	1	0.0007
ER	0.048781	1	0.8252
MS	0.731931	1	0.3923
EG	4.910271	1	0.0267
MS / Excluded	Chi-sq	df	Prob.
FII	0.142793	1	0.7055
INF	4.134773	1	0.0420
ER	4.446166	1	0.0350
IR	0.009887	1	0.9208
EG	3.014842	1	0.0825
EG/ Excluded	Chi-sq	df	Prob.
FII	6.518168	1	0.0107
INF	11.01863	1	0.0009
ER	1.666059	1	0.1968
IR	0.079020	1	0.7786
MS	1.970719	1	0.1604

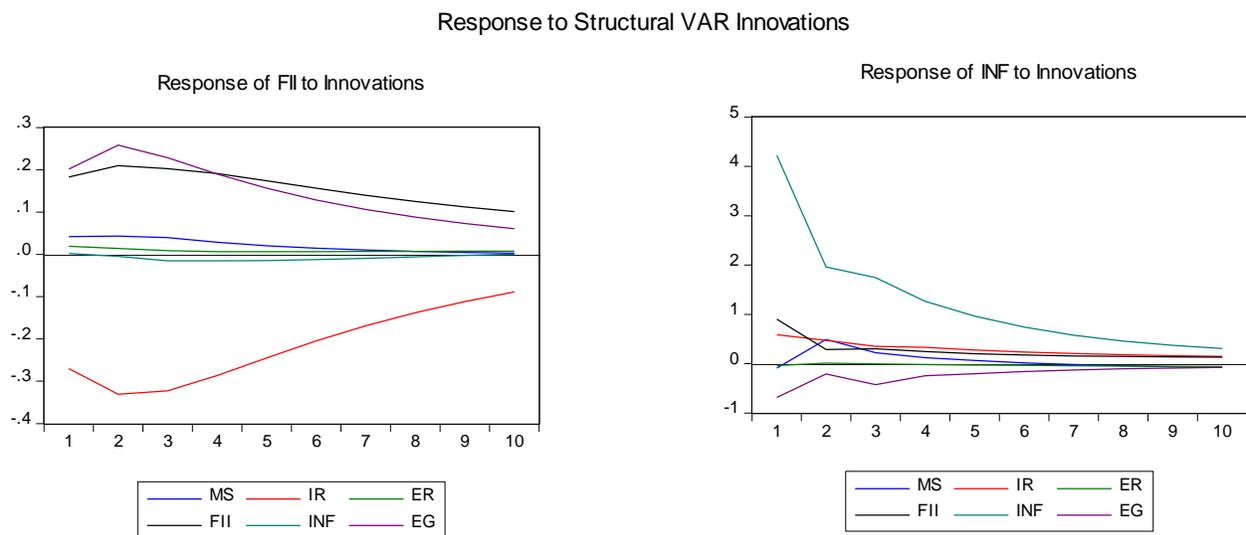
5.2.5. Impulse Response Functions

The impulse response function of developed countries is shown in fig 5.1(a). The structural shock in inflation and economic growth generates fluctuation in financial inclusion. The shock in inflation causes financial inclusion to decrease (panel a) and over time the response dies off. Inflation's negative response to the shock in financial (panel b) confirm the bidirectional causality between two variables. The results are consistent with the theory; any shock in economic growth

lead to respond negatively in the financial inclusion. This response of financial inclusion supports the granger causality results of bidirectional causality between variables. The inflation slightly response positively and negatively to the shock in money supply and economic growth respectively and become completely positive at the end of the period.

Fig 5.2 shows the results of IRFs in the case of developing countries. The shock in inflation creates a slight fluctuation in financial inclusion but the response immediately dies off (panel a). Likewise, any structural shock in financial inclusion does not create strong fluctuations in inflation (panel b). The graph supports the earlier results i.e. VAR and SVAR. Financial inclusion response negatively to the shock in interest rate initially and perishes gradually with the passage of time. Shock in money supply leads to a positive response in inflation and decrease over time. The impulse response function of controlled variables are presented in appendix.

Figure 5.2. Impulse response of developing countries



5.2.6. Forecast Error Variance Decomposition

The forecast error variance decomposition of financial inclusion and inflation of developed countries are shown in table 5.6 (a) and (b). In the third period, 0.38% (column 6) and 73% (column 8) variance of inflation and economic growth explain the variation in financial inclusion respectively in developed countries. In the long run, 0.47% and 77% variation in financial inclusion is explained by inflation and economic growth shocks. Financial inclusion, money supply, and economic growth shocks significantly explain the variation in the inflation rate. In the long run, 10%, 0.17%, and 6.6% variation in inflation are explained by the shocks in financial inclusion, money supply and economic growth respectively.

The results of VAR and SVAR of developing countries show the insignificant impact of financial inclusion and inflation on each other. Table 5.12(a) and (b) confirm these results and show that the shocks in both variables hardly explain the variations in one another. 1% of the variation in inflation in the long run, is explained by the money supply shocks.

Table 5.12 (a) Variance Decomposition of Financial inclusion of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	3.264102	1.183343	48.84218	0.247826	22.49515	0.003770	27.22774
2	4.570119	0.974989	49.10428	0.150341	20.89142	0.007558	28.87141
3	5.610771	0.911153	50.20295	0.111015	20.81160	0.044175	27.91911
4	6.535146	0.828317	50.75744	0.093128	21.36332	0.067489	26.89031
5	7.357153	0.764549	50.91858	0.084976	22.03098	0.083940	26.11697
6	8.103792	0.718859	50.86541	0.081835	22.68707	0.092908	25.55392
7	8.789943	0.686246	50.68721	0.081557	23.29666	0.096023	25.15230
8	9.425879	0.662912	50.44233	0.083079	23.85114	0.095446	24.86510
9	10.01946	0.646059	50.16702	0.085821	24.35164	0.093294	24.65617
10	10.57673	0.633754	49.88350	0.089446	24.80203	0.091451	24.49982

Table 5.12 (b). Variance Decomposition of Inflation of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	2.117885	0.042789	1.766119	0.008961	4.189932	91.58690	2.405299

2	3.109036	1.036669	2.369655	0.007621	3.750958	90.68664	2.148454
3	3.830707	1.079464	2.521472	0.006712	3.601983	90.24908	2.541286
4	4.447765	1.060058	2.741708	0.007495	3.582966	90.02289	2.584879
5	4.995125	1.036766	2.893858	0.009868	3.583718	89.84522	2.630568
6	5.491953	1.015466	3.013512	0.014211	3.604464	89.69300	2.659350
7	5.950067	1.003099	3.107990	0.020336	3.633729	89.55703	2.677818
8	6.376823	1.000532	3.183070	0.028069	3.667095	89.43088	2.690352
9	6.777449	1.006924	3.243591	0.037242	3.702455	89.31094	2.698850
10	7.155859	1.020800	3.293089	0.047706	3.738687	89.19513	2.704591

5.3. Model 3: Developed and developing countries analysis from time period 2011-2018.

In model 3, the data of developed and developing countries range over the period of 2011-2018. The financial inclusion index of developing countries in this model is also composed of three dimensions. As the data of barriers starts from 2011 and taken every three years. The missing values of years 2012, 2013, 2015, 2016, and 2018 are evaluated with the help of compound annual growth rate.

5.3.1. Lag determination

Table 5.13 (a) and (b) shows the results of developed and developing countries. Based on AIC, SC, and HQ four lags are selected for developed countries and one lag of developing countries.

Table 5.13 (a). Developed lag determination

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-687.6831	NA	46592779	34.68416	34.93749	34.77575
1	-396.2552	480.8561	135.2785	21.91276	23.68608	22.55394
2	-358.6051	50.82760	141.1357	21.83025	25.12357	23.02101
3	-306.7823	54.41388	90.91679	21.03912	25.85242	22.77946
4	-180.1289	94.99005*	2.175388*	16.50645*	22.83975*	18.79637*

Table 5.13 (b). Developing lag determination

Lag	Log L	LR	FPE	AIC	SC	HQ
0	-2882.404	NA	7.35e+13	48.95600	49.09688	49.01320
1	-1921.349	1808.086	11417713	33.27710	34.26328*	33.67752*
2	-1891.061	53.90207	12635793	33.37392	35.20539	34.11755

3	-1853.287	63.38398	12404210	33.34385	36.02061	34.43069
4	-1804.704	76.57967*	10246160*	33.13058*	36.65263	34.56064

5.3.2. Structural VAR

Table 5.14 (a) and (b) shows the contemporaneous effect of variables on each other. Financial inclusion and inflation rate do not have a contemporaneous effect on one another in both developed and developing countries. The coefficient of both the inflation rate and financial inclusion in this model shows a positive signs. The study done by Anarfoa et al (2019) shows the positive relationship between financial inclusion and inflation. An increase in inflation rate makes people borrow from the financial institution to maintain the standard of living as now their real income has decreased. Only 2 out of 21 coefficients have a contemporaneous effect in developed countries and none in developing countries. The Interest rate shows a significant impact on the inflation rate.

Table 5.14 (a). Estimation of contemporaneous coefficient of Developed Countries

MS	IR	ER	FII	INF	EG
1	-1.312703 (0.3047)	0	0	0.215223 (0.7154)	0.398535 (0.4204)
0.085090 (0.2272)	1	0.023220* (0.0004)	0.291337 (0.4008)	-0.384322** (0.0630)	0.227193 (0.1914)
0	0	1	0	0	0
0	-0.384810 (0.9978)	0	1	0.060870 (0.9997)	0.649132 (0.9933)
0	0.646711 (0.9953)	0	0.411439 (0.9987)	1	-0.180745 (0.9992)
0	0	0	-3.689569 (0.6749)	0	1

Notes: probability values in (), ** represent significance level at 5%.

Table 5.14 (b). Estimation of contemporaneous coefficient of Developing Countries

MS	IR	ER	FII	INF	EG
1	0.556789 (0.4333)	0	0	0.119490 (0.6787)	0.364185 (0.5856)
-0.358243 (0.2439)	1	0.002120 (0.3798)	2.913371 (0.3760)	-0.495272 (0.3976)	-0.203988 (0.8791)
0	0	1	0	0	0
0	-0.239228 (0.9990)	0	1	0.028261 (0.9998)	-0.107761 (0.9997)
0	1.081023 (0.9995)	0	2.494197 (0.9997)	1	2.068005 (0.9986)
0	0	0	-0.694779 (0.9009)	0	1

Notes: probability values in (), ** represent significance level at 5%.

5.3.3. Reduce-form Vector Autoregressive

Table 5.15 (a) shows the VAR results of developed countries. The lags of financial inclusion and inflation are significant at 10%. The negative coefficients indicate an inverse relation between two variables. The results are the same as models 1 and 2. Lags of interest rate, money supply, and economic growth have a significant impact on financial inclusion. An increase in interest rate leads to create fluctuations in people's incomes due to an increase in inflation (positive relation of inflation and interest rate as per fisher's equation). As per the permanent income hypothesis to smooth their consumption, people will borrow from a financial institutions (Romer, 2012). An increase in money supply results in a higher level of financial inclusion. Increased money supply by the central bank reduces interest rates which creates investment opportunities and promotes financial inclusion. Only economic growth shows a significant impact on inflation in developed countries. Inflation rate can expected to be raise if the aggregate demand expand

faster than aggregate supply. This increased demand suggest that economic growth is higher than the long run sustainable rate of growth (Froyen, 2012).

In developing countries table 5.15(b), lag of financial inclusion and inflation does not show a significant impact on each other. None of the controlled variables shows a significant impact on financial inclusion as well as on the inflation rate. The results are the same as model 2.

Table 5.15(a). Reduce-form VAR Developed countries

	FII	INF	ER	IR	MS	EG
FII(-1)	0.943173* (0.22853) [4.12714]	0.537704 (0.35704) [1.50601]	0.514925 (2.64601) [0.19460]	-0.211454 (0.26453) [-0.79935]	-0.534286 (1.34934) [-0.39596]	-0.612046 (0.55047) [-1.11187]
FII(-2)	-0.095418 (0.23137) [-0.41240]	-0.183113 (0.36148) [-0.50657]	-5.828030** (2.67892) [-2.17552]	0.848314* (0.26782) [3.16745]	0.176903 (1.36612) [0.12949]	0.340898 (0.55731) [0.61168]
FII(-3)	-0.284986 (0.31570) [-0.90270]	0.879698*** (0.49323) [1.78353]	2.026972 (3.65535) [0.55452]	-0.228945 (0.36544) [-0.62649]	-1.173021 (1.86405) [-0.62929]	-0.522409 (0.76045) [-0.68698]
FII(-4)	0.079435 (0.22639) [0.35088]	-0.091994 (0.35369) [-0.26010]	4.664722*** (2.62122) [1.77960]	-0.153225 (0.26205) [-0.58471]	1.090306 (1.33670) [0.81567]	0.576469 (0.54531) [1.05714]
INF(-1)	-0.077615 (0.11539) [-0.67265]	0.216613 (0.18027) [1.20158]	0.685447 (1.33600) [0.51306]	0.005253 (0.13357) [0.03933]	-0.211336 (0.68130) [-0.31020]	-0.089769 (0.27794) [-0.32298]
INF(-2)	0.167998*** (0.10088) [1.66527]	-0.038577 (0.15761) [-0.24476]	-0.344987 (1.16807) [-0.29535]	0.121850 (0.11678) [1.04345]	-0.169627 (0.59566) [-0.28477]	0.091631 (0.24300) [0.37708]
INF(-3)	0.039260 (0.09974) [0.39364]	0.007793 (0.15582) [0.05001]	-0.871635 (1.15478) [-0.75481]	-0.098870 (0.11545) [-0.85641]	-0.275530 (0.58888) [-0.46788]	0.235608 (0.24024) [0.98073]
INF(-4)	-0.165817*** (0.08700) [-1.90604]	-0.426192* (0.13592) [-3.13572]	1.354647 (1.00727) [1.34487]	0.083819 (0.10070) [0.83236]	0.865652 (0.51366) [1.68527]	-0.358031*** (0.20955) [-1.70858]
ER(-1)	0.005550 (0.01272) [0.43639]	-0.021079 (0.01987) [-1.06078]	0.821701* (0.14726) [5.57985]	0.006914 (0.01472) [0.46963]	0.002123 (0.07510) [0.02827]	-0.064804** (0.03064) [-2.11530]
ER(-2)	-0.013021 (0.01525) [-0.85404]	0.020695 (0.02382) [0.86883]	-0.490491* (0.17652) [-2.77861]	0.015940 (0.01765) [0.90321]	-0.061864 (0.09002) [-0.68723]	0.058137 (0.03672) [1.58310]

ER(-3)	-0.002675 (0.02033) [-0.13160]	-0.032154 (0.03176) [-1.01241]	-0.116421 (0.23537) [-0.49462]	0.002790 (0.02353) [0.11856]	0.067915 (0.12003) [0.56582]	-0.076643 (0.04897) [-1.56521]
ER(-4)	0.012722 (0.02187) [0.58169]	0.039224 (0.03417) [1.14796]	0.937647* (0.25322) [3.70282]	-0.031997 (0.02532) [-1.26392]	-0.011290 (0.12913) [-0.08743]	0.094873*** (0.05268) [1.80093]
IR(-1)	0.456137*** (0.24414) [1.86833]	-0.040335 (0.38143) [-0.10575]	-1.912837 (2.82678) [-0.67668]	0.652831** (0.28260) [2.31005]	0.466149 (1.44152) [0.32337]	0.372393 (0.58807) [0.63324]
IR(-2)	-0.326500 (0.29588) [-1.10350]	0.324617 (0.46226) [0.70224]	-4.952039 (3.42580) [-1.44552]	0.902093* (0.34249) [2.63392]	-1.415286 (1.74699) [-0.81013]	-0.343950 (0.71269) [-0.48261]
IR(-3)	-0.036694 (0.24550) [-0.14947]	-0.383535 (0.38356) [-0.99995]	17.09485* (2.84253) [6.01396]	-0.542277*** (0.28418) [-1.90822]	1.158881 (1.44955) [0.79947]	-0.283667 (0.59135) [-0.47969]
IR(-4)	-0.050480 (0.17001) [-0.29692]	0.173363 (0.26562) [0.65268]	-10.76999* (1.96849) [-5.47118]	0.016280 (0.19680) [0.08273]	-0.135266 (1.00384) [-0.13475]	0.223801 (0.40952) [0.54650]
MS(-1)	0.065226 (0.04645) [1.40418]	-0.005619 (0.07257) [-0.07743]	-0.286841 (0.53784) [-0.53332]	-0.029700 (0.05377) [-0.55236]	1.273298* (0.27427) [4.64248]	-0.058418 (0.11189) [-0.52210]
MS(-2)	-0.125183*** (0.07013) [-1.78502]	-0.037546 (0.10957) [-0.34268]	-0.473579 (0.81199) [-0.58323]	0.047208 (0.08118) [0.58153]	-0.540562 (0.41408) [-1.30547]	0.092889 (0.16892) [0.54989]
MS(-3)	0.015644 (0.05748) [0.27219]	0.091795 (0.08980) [1.02226]	0.989421 (0.66547) [1.48679]	-0.093994 (0.06653) [-1.41281]	0.382510 (0.33936) [1.12715]	0.002382 (0.13844) [0.01721]
MS(-4)	0.030605 (0.03244) [0.94336]	-0.043795 (0.05069) [-0.86404]	-0.290833 (0.37564) [-0.77424]	0.078088** (0.03755) [2.07936]	-0.138244 (0.19156) [-0.72169]	-0.064971 (0.07815) [-0.83141]
EG(-1)	0.094090 (0.09811) [0.95900]	-0.153791 (0.15328) [-1.00331]	-0.961073 (1.13599) [-0.84602]	0.052218 (0.11357) [0.45979]	-0.112926 (0.57930) [-0.19494]	0.480981** (0.23633) [2.03523]
EG(-2)	-0.112145 (0.08892) [-1.26112]	0.483346* (0.13893) [3.47906]	-0.871489 (1.02961) [-0.84643]	-0.042571 (0.10293) [-0.41357]	-0.499828 (0.52505) [-0.95196]	0.048187 (0.21420) [0.22497]
EG(-3)	0.145867 (0.11073) [1.31734]	-0.271085 (0.17299) [-1.56702]	-0.959684 (1.28206) [-0.74855]	0.086175 (0.12817) [0.67233]	0.642969 (0.65379) [0.98345]	0.004785 (0.26671) [0.01794]
EG(-4)	-0.255788* (0.08847) [-2.89140]	0.286963** (0.13821) [2.07625]	2.493131** (1.02429) [2.43402]	-0.060126 (0.10240) [-0.58715]	0.059470 (0.52234) [0.11385]	0.007860 (0.21309) [0.03689]
C	1.908054*	-0.238212	11.94337	-0.674694	2.179272	4.678565**

	(0.80950) [2.35709]	(1.26470) [-0.18835]	(9.37270) [1.27427]	(0.93703) [-0.72004]	(4.77963) [0.45595]	(1.94987) [2.39943]
R-squared	0.841598	0.890871	0.999790	0.989937	0.994491	0.746132
Adj. R-squared	0.588155	0.716264	0.999454	0.973837	0.985675	0.339942

Notes: t-Statistics in [], Standard Errors in (), *, **, *** represent significance level at 1%,5% and 10%

Table 5.15(b). Reduce-form VAR Developing countries.

	FII	INF	ER	IR	MS	EG
FII(-1)	0.930774* (0.03628) [25.6530]	0.570220 (0.38943) [1.46426]	-6.255008 (10.4093) [-0.60090]	0.178103 (0.15553) [1.14511]	-0.007058 (0.22395) [-0.03152]	-0.009325 (0.17069) [-0.05463]
INF(-1)	0.001314 (0.00598) [0.21981]	0.636647* (0.06414) [9.92596]	-0.360528 (1.71444) [-0.21029]	0.072756* (0.02562) [2.84017]	-0.085177** (0.03689) [-2.30924]	0.033191 (0.02811) [1.18062]
ER(-1)	7.65E-06 (1.5E-05) [0.50682]	-0.000137 (0.00016) [-0.84692]	1.062240* (0.00433) [245.339]	-4.07E-05 (6.5E-05) [-0.62977]	-9.63E-05 (9.3E-05) [-1.03382]	8.87E-05 (7.1E-05) [1.24977]
IR(-1)	0.005218 (0.00381) [1.37074]	0.025821 (0.04086) [0.63193]	0.360917 (1.09221) [0.33045]	0.993515* (0.01632) [60.8794]	-0.002470 (0.02350) [-0.10510]	-0.003552 (0.01791) [-0.19835]
MS(-1)	0.000619 (0.00137) [0.45150]	-0.011390 (0.01472) [-0.77390]	-0.043369 (0.39340) [-0.11024]	-0.000184 (0.00588) [-0.03130]	0.985373* (0.00846) [116.424]	0.006731 (0.00645) [1.04346]
EG(-1)	0.014398 (0.01290) [1.11623]	-0.094937 (0.13845) [-0.68573]	0.208418 (3.70068) [0.05632]	0.050914 (0.05529) [0.92078]	0.049821 (0.07962) [0.62575]	0.583693* (0.06068) [9.61883]
C	0.053065 (0.14428) [0.36780]	2.268309 (1.54853) [1.46482]	3.841912 (41.3919) [0.09282]	-0.655486 (0.61847) [-1.05986]	1.847886*** (0.89052) [2.07505]	0.952295 (0.67873) [1.40306]
R-squared	0.773750	0.416754	0.996953	0.963382	0.989565	0.340002
Adj. R-squared	0.766996	0.399343	0.996862	0.962289	0.989254	0.320301

Notes: t-Statistics in [], Standard Errors in (), *, **, *** represent significance level at 1%,5% and 10%

5.3.4. Granger Causality

Table 5.16 (a) and (b) show the results of Granger causality. In developed countries, the results indicate that financial inclusion granger causes inflation but inflation does not. From the controlled variables, money supply, and economic growth granger cause financial inclusion (results same as VAR). There is one-way causality present from financial inclusion towards the

exchange rate and interest rate. Among controlled variables, money supply only granger cause inflation (same results as model 1 and 2).

In developing countries, the results of granger cause support VAR results. Both financial inclusion and inflation do not granger cause each other. None of the controlled variables granger causes financial inclusion and inflation. There is one-way causality between inflation rate, interest rate, and money supply.

Table 5.16(a). Granger causality Developed

FII/ Excluded	Chi-sq	df	Prob.
INF	5.155223	4	0.2717
ER	3.466144	4	0.4830
IR	6.131892	4	0.1895
MS	12.05913	4	0.0169
EG	9.934471	4	0.0415
INF/ Excluded	Chi-sq	df	Prob.
FII	12.98694	4	0.0113
ER	2.980690	4	0.5611
IR	2.238553	4	0.6920
MS	2.234693	4	0.6927
EG	13.17275	4	0.0105
ER/ Excluded	Chi-sq	df	Prob.
FII	12.13725	4	0.0164
INF	1.878842	4	0.7580
IR	39.06217	4	0.0000
MS	5.491599	4	0.2405
EG	14.71170	4	0.0053
IR/ Excluded	Chi-sq	df	Prob.
FII	11.98348	4	0.0175
INF	2.571038	4	0.6320
ER	9.800107	4	0.0439
MS	5.036379	4	0.2836
EG	0.936917	4	0.9192
MS/ Excluded	Chi-sq	df	Prob.
FII	1.241768	4	0.8712
INF	3.530380	4	0.4733
ER	2.616597	4	0.6239
IR	1.218601	4	0.8750
EG	2.122994	4	0.7131
EG/Excluded	Chi-sq	df	Prob.
FII	3.114935	4	0.5388
INF	2.952292	4	0.5658
ER	4.777973	4	0.3108
IR	0.741352	4	0.9461
MS	8.212801	4	0.0841

Table 5.16(b). Granger causality developing

FII/ Excluded	Chi-sq	df	Prob.
INF	0.048317	1	0.8260
ER	0.256862	1	0.6123
IR	1.878918	1	0.1705
MS	0.203849	1	0.6516
EG	1.245963	1	0.2643
INF/ Excluded	Chi-sq	df	Prob.
FII	2.144043	1	0.1431
ER	0.717266	1	0.3970
IR	0.399341	1	0.5274
MS	0.598923	1	0.4390
EG	0.470219	1	0.4929
ER/Excluded	Chi-sq	df	Prob.
FII	0.361085	1	0.5479
INF	0.044221	1	0.8334
IR	0.109196	1	0.7411
MS	0.012154	1	0.9122
EG	0.003172	1	0.9551
IR/ Excluded	Chi-sq	df	Prob.
FII	1.311287	1	0.2522
INF	8.066556	1	0.0045
ER	0.396611	1	0.5288
MS	0.000980	1	0.9750
EG	0.847832	1	0.3572
MS/ Excluded	Chi-sq	df	Prob.
FII	0.000993	1	0.9749
INF	5.332612	1	0.0209
ER	1.068785	1	0.3012
IR	0.011046	1	0.9163
EG	0.391560	1	0.5315
EG/Excluded	Chi-sq	df	Prob.
FII	0.002985	1	0.9564
INF	1.393873	1	0.2378
ER	1.561930	1	0.2114
IR	0.039341	1	0.8428
MS	1.088802	1	0.2967

5.3.5. Impulse Response Function

The impulse response function of developed and developing countries is shown in fig 5.3 (a) and (b) respectively. In developed countries, financial inclusion shows no response to the shock in the inflation rate (panel a) but the inflation rate positively responded to shock in financial inclusion (panel b). From the controlled variables, financial inclusion positively responded to shock in an interest rate and money supply and negatively to economic growth (same as depicted in the VAR model). The response of inflation to the shock in economic growth is negative and significant.

In developing countries, financial inclusion shows positive but statistically insignificant response to inflation. At an initial period, the shock in financial inclusion causes inflation to respond negatively but with the passage of time, it shows a positive response. The impulse response function of controlled variables are presented in appendix.

Figure 5.3 (a). Impulse response of developed countries

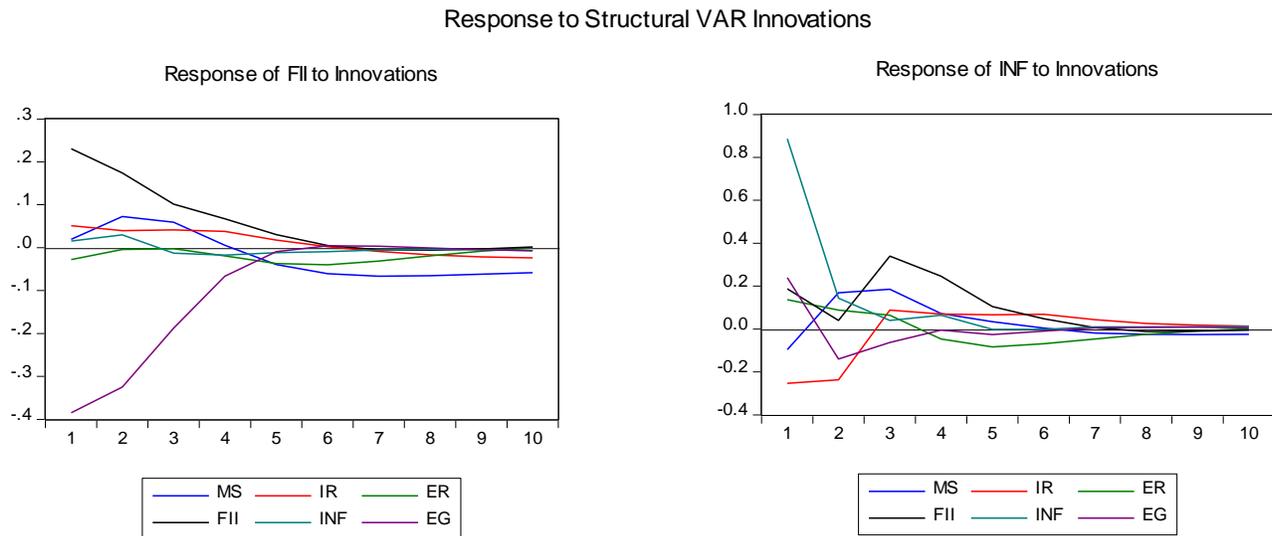
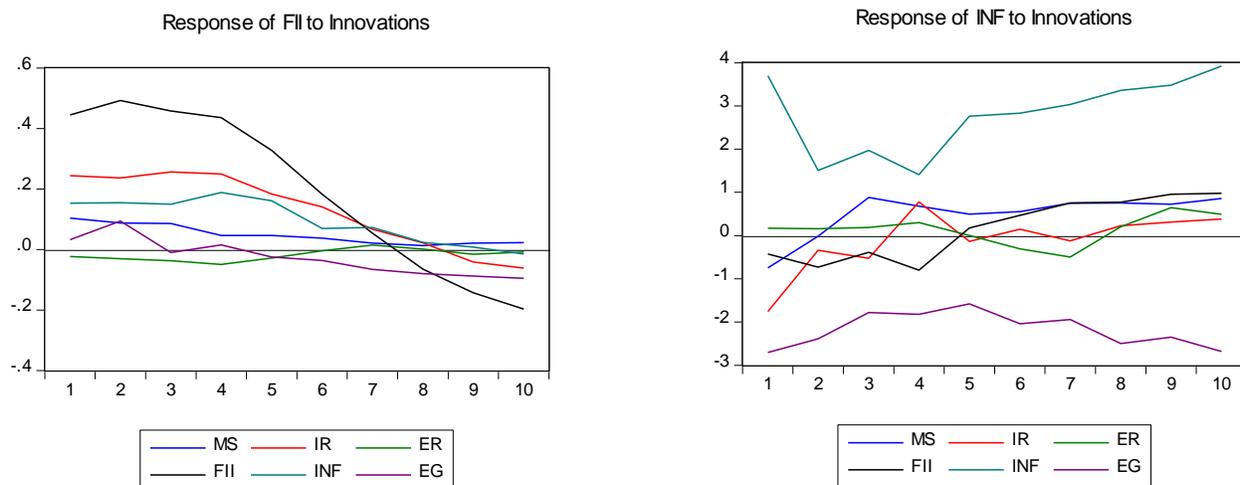


Figure 5.3(b). Impulse response of developing countries

Response to Structural VAR Innovations



5.3.6. Forecast Error Variance Decomposition

The forecast error variance decomposition of financial inclusion and inflation of developed countries are shown in table 5.17 (a) and (b). In the third period, 0.32% (column 6) and 72% (column 8) variance of inflation and economic growth explain the variation in financial inclusion respectively in developed countries. In the long run, 0.44%(column 6), 66% (column 7), 6% (column 2), and 2% (column 3) variation in financial inclusion is explained by inflation, economic growth, money supply, and interest rate shocks respectively. Financial inclusion and economic growth shocks significantly explain the variation in the inflation rate. In the long run, 16%, and 5% variation in inflation is explained by the shocks in financial inclusion, and economic growth respectively.

The results of VAR and SVAR of developing countries show the insignificant impact of financial inclusion and inflation on each other. Table 5.18(a) and (b) confirm these results and show that the shocks in both variables hardly explain the variations in one another.

Table 5.17 (a) Variance Decomposition of Financial inclusion of Developed Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	2.703993	0.185429	1.279503	0.374872	25.93021	0.113225	72.11676
2	4.072490	1.616719	1.199233	0.225545	23.92250	0.327041	72.70896
3	5.058444	2.286525	1.479636	0.198406	23.45219	0.324776	72.25847
4	5.848836	2.233031	1.786492	0.280954	23.92615	0.390695	71.38268
5	6.532737	2.587197	1.841225	0.608508	23.89357	0.420840	70.64866
6	7.162097	3.424756	1.818617	0.976920	23.59362	0.436106	69.74998
7	7.761249	4.413158	1.812990	1.190274	23.29449	0.437769	68.85132
8	8.340932	5.347199	1.856853	1.261646	23.03602	0.436301	68.06198
9	8.906907	6.166981	1.942194	1.265446	22.80598	0.437279	67.38212
10	9.462573	6.889401	2.050818	1.253718	22.59435	0.443923	66.76779

Table 5.17 (b) Variance Decomposition of Inflation of Developed Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	0.600669	0.957806	6.609087	1.936349	3.615575	80.96840	5.912781
2	0.881292	3.426200	10.86982	2.417092	3.317574	73.01596	6.953351
3	1.129870	5.677525	10.05923	2.427933	11.94529	63.54630	6.343724
4	1.354715	5.745120	9.844914	2.451311	15.74235	60.23177	5.984530
5	1.557940	5.730981	9.990879	2.918410	16.26453	59.16664	5.928559
6	1.742101	5.683576	10.25003	3.226933	16.29315	58.66234	5.883972
7	1.908202	5.689472	10.35268	3.371593	16.24248	58.47704	5.866736
8	2.057989	5.725571	10.38666	3.410216	16.22578	58.38997	5.861803
9	2.193479	5.768223	10.40043	3.412120	16.21703	58.34138	5.860821
10	2.316494	5.807275	10.40596	3.409716	16.20777	58.31028	5.859002

Table 5.18 (a) Variance Decomposition of Financial inclusion of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	2.990744	3.672421	20.33539	0.185390	67.44033	8.010969	0.355501
2	4.673472	2.911154	18.26801	0.234078	69.54370	7.474849	1.568207
3	6.113795	2.747931	19.28517	0.305880	69.17751	7.415933	1.067580
4	7.355022	2.268408	19.76295	0.433968	68.15993	8.541751	0.832991
5	8.456998	2.143897	19.76439	0.438160	67.52626	9.350908	0.776382
6	9.418057	2.152139	20.29955	0.421248	67.00297	9.288498	0.835599
7	10.26673	2.156641	20.35803	0.429917	66.39990	9.532440	1.123070
8	11.10573	2.150226	20.22877	0.426627	66.16109	9.493098	1.540184
9	11.93839	2.135418	19.93416	0.434366	66.16976	9.306002	2.020295
10	12.77985	2.095898	19.51424	0.424775	66.42686	9.010001	2.528230

Table 5.18 (b) Variance Decomposition of Inflation of Developing Countries

Period	S.E.	MS	IR	ER	FII	INF	EG
1	2.043644	2.240919	12.40870	0.113126	0.732907	55.04154	29.46281
2	2.921453	1.662798	9.548766	0.160773	2.129310	47.58515	38.91320
3	3.626704	3.188017	8.304502	0.215021	2.066963	47.42556	38.79994
4	4.211677	3.669364	8.331007	0.368004	3.067761	44.62437	39.93950
5	5.090441	3.444664	6.895778	0.303315	2.580384	49.63853	37.13733
6	6.004016	3.254143	5.699586	0.380514	2.423020	51.94515	36.29759
7	7.042235	3.362968	4.770552	0.602652	2.679837	53.94626	34.63774
8	8.168782	3.307045	3.967934	0.534762	2.766382	55.03878	34.38510
9	9.488230	3.212933	3.422697	0.786244	3.060248	56.10793	33.40995
10	10.96446	3.178954	2.955631	0.816461	3.196166	57.13586	32.71693

Chapter 6

Conclusion and policy recommendations

6.1. Conclusion

Financial inclusion gained much attention in the 21st century. Many researchers investigate the impact of financial inclusion on a different macroeconomic variable but only fewer studies found the relationship of financial inclusion and monetary policy effectiveness. This is the first study (in my knowledge) that analyzes the relationship between financial inclusion and monetary policy effectiveness in developed and developing countries. Financial inclusion is measured by an index composed on access, usage and barrier dimensions. Inflation rate is used as a proxy of monetary policy effectiveness. The controlled variables used in the study are money supply, economic growth, interest rate and exchange rate. The study employed a panel structural vector autoregressive technique on the data set ranging from period 2004 to 2018.

Due to unavailability of barriers data, the study is divided in to three models. The SVAR results of both developed and under-developed countries in all models are same. Financial inclusion and inflation rate does not have a contemporaneous impact on each other. However, the reduce-form VAR results witness the presence of reverse causality between financial inclusion and monetary policy in case of developed countries.

In case of developed countries, the empirical results of all three model shows the same results. The study found the inverse and bidirectional causality between financial inclusion and monetary policy. A higher degree of financial inclusion lower inflation and this makes monetary policy effective. The results are consistent with other studies (Mbutor & Uba, 2013; Lapukeni,

2015; Lenka & Bairwa, 2016). Financial inclusion is also a significant driver of the exchange rate and economic growth in developed countries. The higher level of financial inclusion plays a significant role in developing strong financial infrastructure which results in higher economic growth and vice versa economic growth promotes financial inclusion.

In case of the under-developed countries, the results of first model indicates that lag of inflation has a significant impact on financial inclusion. The results are consistent with Evan o, (2016). This implies that in order to have a higher level of financial inclusion more effective monetary policy will be needed in developing countries. However, the second and third model (in which barrier data is used) highlights the insignificant but inverse impact of financial inclusion and inflation rate on each other. The results of the controlled variables are same in all model. Only economic growth has a significant impact on financial inclusion and none of the controlled variable has a significant impact on inflation.

6.2. Policy Recommendations

The result of developed countries suggests that a higher level of financial inclusion helps monetary policy to perform effectively and effective monetary policy also increases the level of financial inclusion. Many developing countries initiate different policies to achieve the financial inclusion of a higher degree.

In 2015, Pakistan has adopted a national financial inclusion strategy. Achieving higher financial inclusion is one of the top priorities of the government of Pakistan and made it a part of its 100-days agenda. The government of Pakistan has set different targets to be met by 2023. Increase usage of digital payments, raise agriculture and SMEs finance, and promote Islamic banking are the main targets. The state bank of Pakistan also playing its part in promoting financial

inclusion. They launch a financial literacy program to spread financial awareness. In collaborating with the national institute of bank and finance, state bank conduct sessions about money management and financial matters for the school-going children. Recently, the government has also launch Ehsaas program that not only promote financial inclusion but reduce the gender gap in account ownership. One woman one bank account policy under Ehsaas strategy will provide women an opportunity to take better advantages of financial products and services like insurance, savings credit and payments.

Here are the few policy recommendations to increase financial inclusion in Pakistan.

- **Financial literacy.**

Financial literacy considers a first step toward achieving financial inclusion. State bank of Pakistan has already conducted financial literacy sessions in different districts but still there are cities that lack behind in financial awareness i.e. Rural Sindh and Baluchistan and the demand side gap still prevails in these provinces. Financial literacy provides awareness and helps to build trust in a financial institution. Gallup Pakistan survey highlights that more than half of the population does not trust financial institutions and that is quite alarming.

Pakistan also initiated mobile banking like jazz cash and easy paisa but inter media Pakistan FII qualitative studies highlight that people hesitate to perform mobile money transactions or they do not register because they need more information about the services once an account is registered. So there is a need for more financial literacy programs that target the people of all age groups.

- **Marketing of financial products and services.**

Less educated, rural, and poor people are most likely to be financially excluded. The local community does not own sufficient resources for example internet through which they find out about financial products. This creates a communication gap between the financial institution and the customer. The gap can be addressed by proper marketing of financial products through television and radio in local languages.

- **Investment friendly schemes.**

Lapukeni (2015) emphasizes that financial inclusion helps in transmitting monetary policy effectively if the loans and advances from banks are for production rather than smoothing consumption. So, the government and the financial institutions should launch such investment-friendly schemes for a startup that attract more people. For instance, the loans could be interest-free for the first two years of the startup and if the customers do not repay their loan within two years the institution could charge the market interest rate.

- The loans should be available at a moderate interest rate which is for the benefit of both the customer and financial institution.

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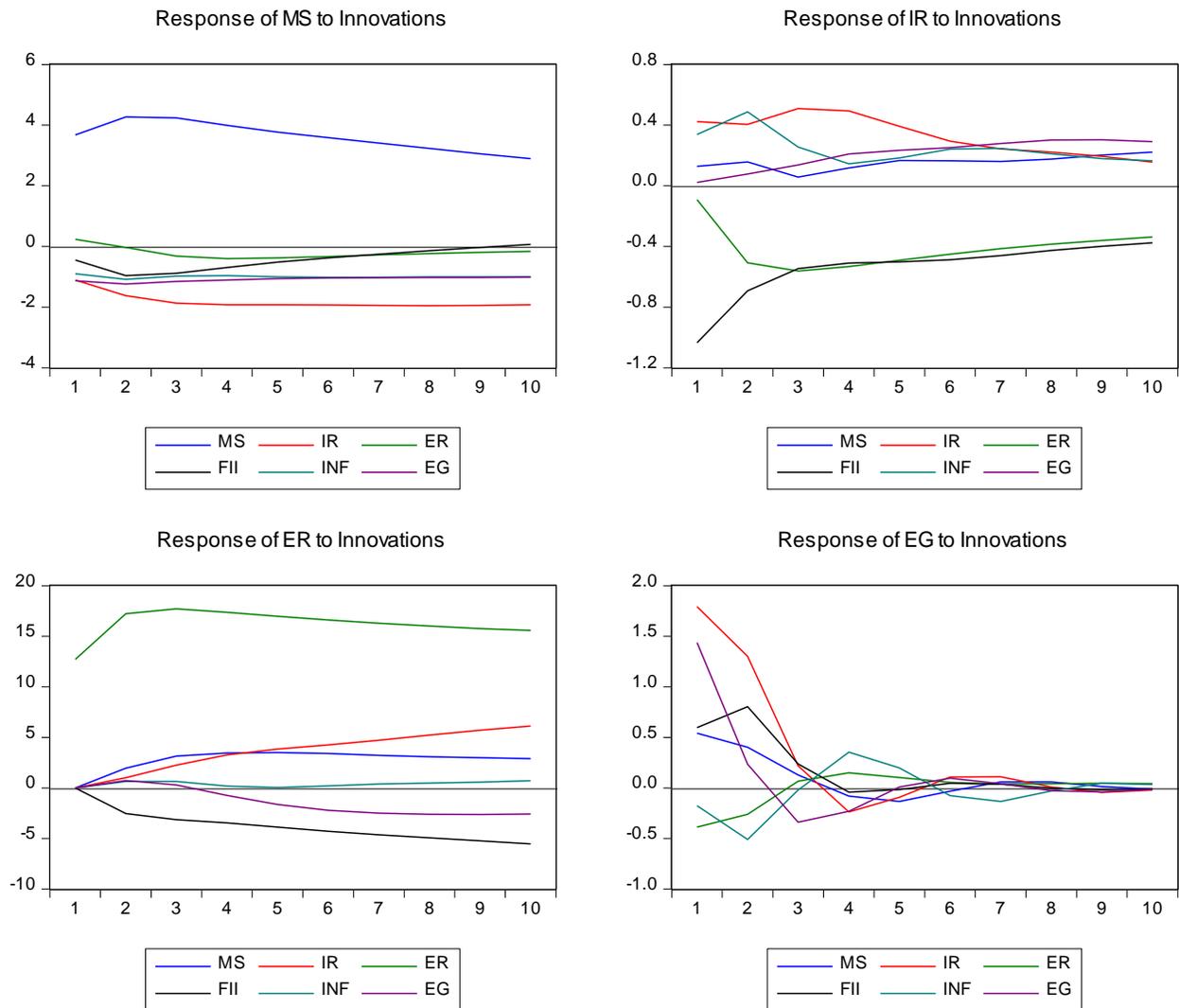
Appendix

Impulse response functions of controlled variables

Model 1

➤ Developed countries

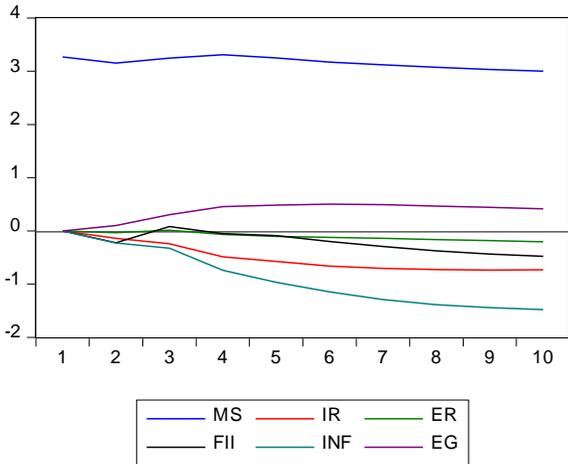
Response to Structural VAR Innovations



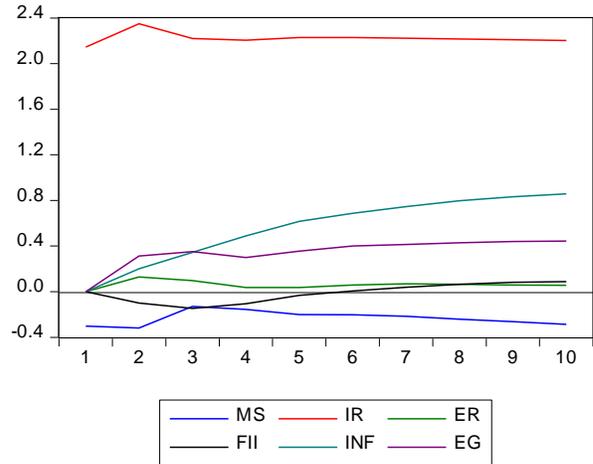
➤ **Developing countries**

Response to Structural VAR Innovations

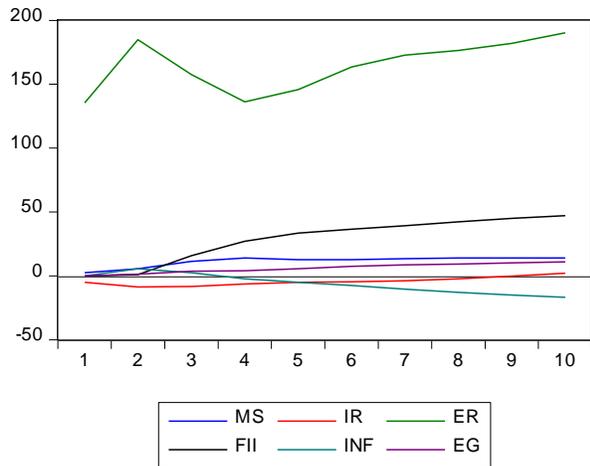
Response of MS to Innovations



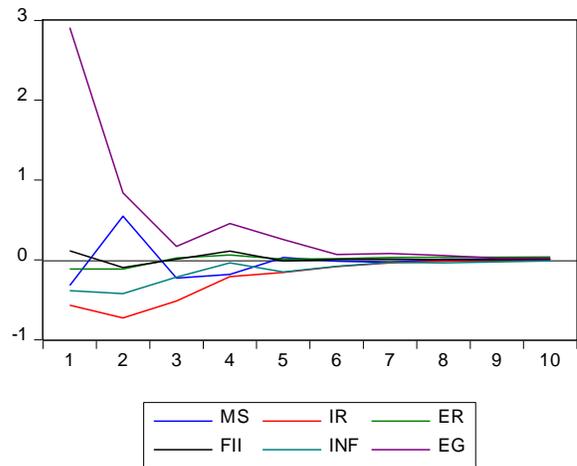
Response of IR to Innovations



Response of ER to Innovations



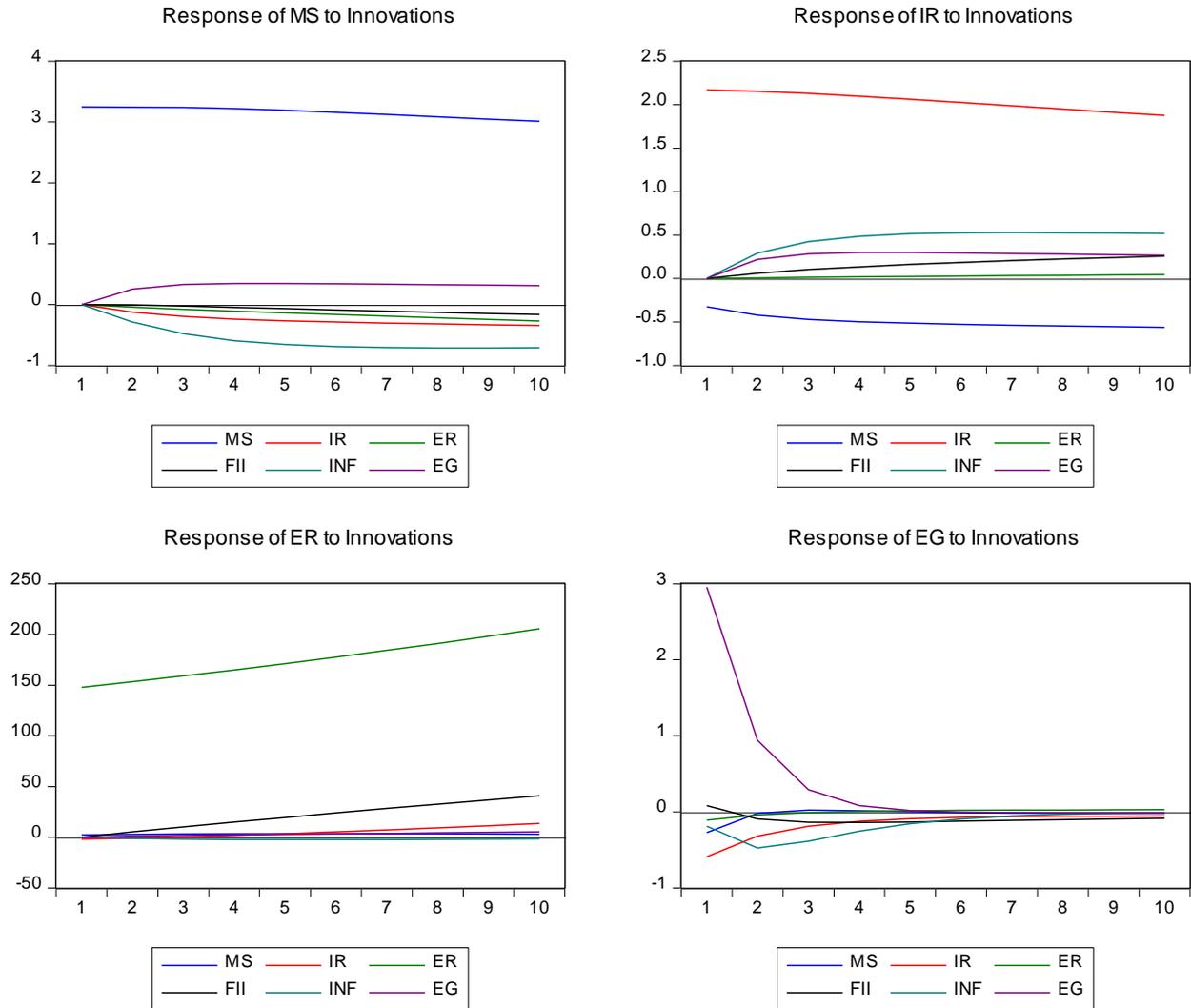
Response of EG to Innovations



Model 2

➤ Developing countries

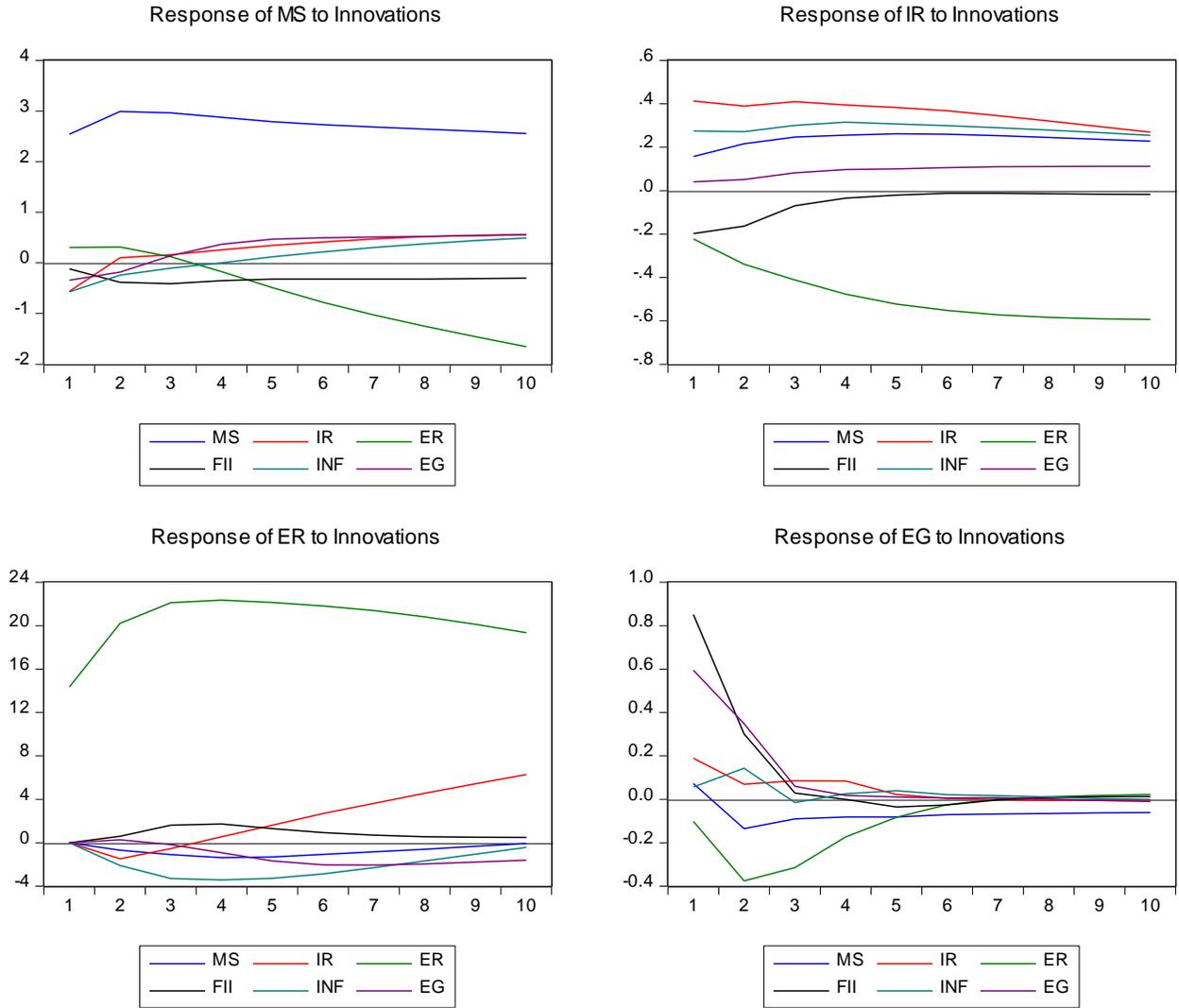
Response to Structural VAR Innovations



Model 3

➤ Developed countries

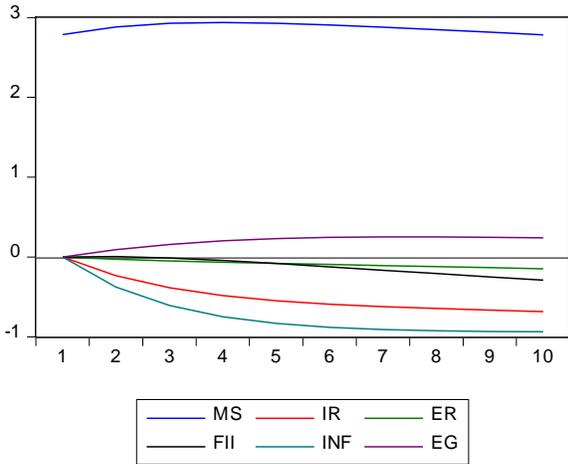
Response to Structural VAR Innovations



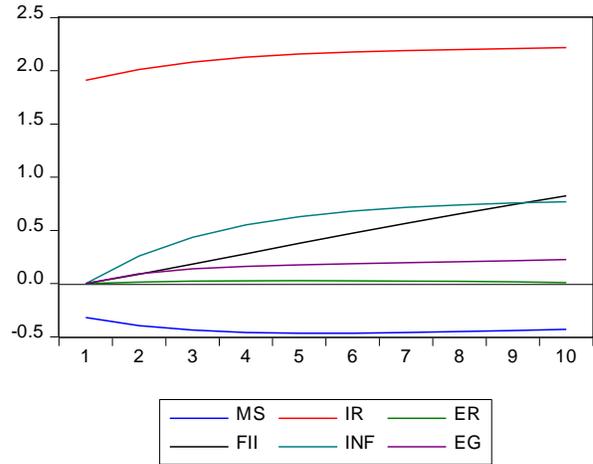
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Response to Structural VAR Innovations

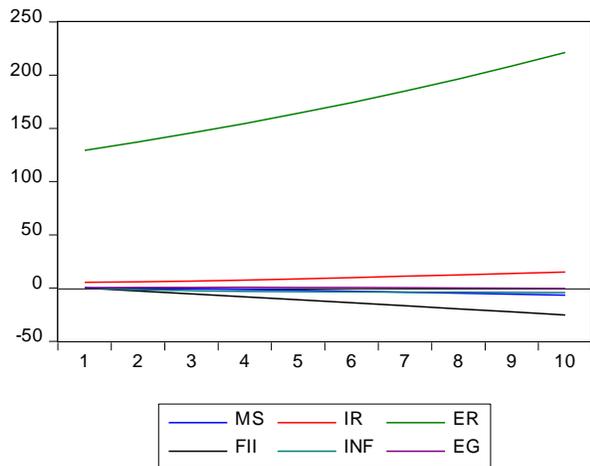
Response of MS to Innovations



Response of IR to Innovations



Response of ER to Innovations



Response of EG to Innovations

