



# Roles of Financial Development in Economic Development

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**Roles of Financial Development in Economic Development**

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## Summary

The emergence of finance and development, as a distinct field of research took place during the 1990s when researchers began to resort to financial frictions models and combined those with endogenous growth models to reveal how divergent financial systems could impact economic growth. This contributed to the emergence of theoretical literature on financial development and growth. Simultaneously, empirical research on the relationship between finance and economic development also exploded and enabled the forthcoming researchers to deploy a wide range of empirical methodologies, datasets, and historical studies to infer finance–growth and development nexus with meaningful insights. In spite of considerable debate, the overwhelming theoretical and empirical evidence suggests that a developed financial system in the form of both financial intermediaries and markets can contribute to growth and development, at least there is overwhelming empirical evidence for it during the last phase of the previous century. The differences of opinions are caused by a wide array of diversified theoretical propositions and empirical methodologies. Afterwards, finance and development expanded to discover new dimensions and linked financial development with poverty, income inequality, international trade, macroeconomic policy effectiveness, financial crisis and stability, financial globalization, macroeconomic volatility, financial innovation, entry, growth, and exit of firms, financial inclusion, energy efficiency and numerous other topics. This interconnected the literature on financial development with macroeconomics, international economics, development, finance, political science, history, and even legal studies.

Traditionally, researchers emphasized and endeavoured in linking financial development directly with economic growth and development. However, financial development can also exert indirect influence on economic growth and development process. On one hand, it can raise macroeconomic policy effectiveness to eventually impact long-run growth and achieve other developmental or policy goals like output expansion for short-term stabilization. On the other hand, it can also work together with financial literacy to improve financial inclusion and ultimately contribute to economic growth and development. Utilizing theoretical rationale, insights from empirical studies and historical experiences to different extents, researchers have explored diverse sections of the finance and development literature to construct the field of finance and development, as mentioned before. This Doctoral Dissertation delves into some unexploited territories, pertaining to the field of finance and development. The first two research works of this Doctoral Dissertation scrutinize the direct influence of financial development on policy effectiveness, which is indeed quite intriguing. An appropriate policy mix in conjunction with financial sector attributes is supposed to both accelerate and sustain economic progression. In the last research, the association between financial literacy and financial inclusion is examined. To be precise, it addresses whether financial literacy can improve the usage of unconventional banking and non-banking financial services to contribute to broader financial inclusion. However, the demand side factor financial literacy is assumed to contribute to financial inclusion, given that there exists a certain level of financial structure development, which can meet the needs of financially literate people.

Considering the contradicting findings and inadequate theoretical framework in the literature, the first research re-investigates the relationship between financial development and monetary policy effectiveness. The significance of prudent macroeconomic management for both short run stabilization to address business cycle fluctuations as well as to foster long run economic growth is well conceived in the literature. Along with that, the interplays between financial development and economic growth have been extensively studied by researchers too, as described earlier. Certainly, envisaging influence of financial development on monetary policy effectiveness is an intriguing endeavour. Monetary policy targets specific macroeconomic

variables pertaining to the financial sector with the ultimate objective of affecting the real economy, principally, output growth for short-term stabilization and inflation through the transmission mechanism; consequently, financial development can exert influence on the transmission mechanism. The plausible intuitions, embedded in the literature, exhibit that financial development can influence the monetary policy performance both positively and negatively. Taking into consideration the probable bi-directional causality, this chapter provides new evidence as to whether financial development augments or deteriorates monetary policy effectiveness. More precisely, through the incorporation of more logical sampling methods and appropriate estimation techniques to address endogeneity, it has analysed the effectiveness of monetary policy with ongoing financial development (focusing only on the depth dimension of financial development, which basically captures the size of the financial sector) with a view to efficient macro-management. Utilizing panel data from forty developed and developing economies and covering the time-span 1992-2014, this chapter shows that the direct influence of monetary policy in conjunction with financial development on output growth for short-term stabilization and inflation tends to be positive and negative, respectively, although quite meagre in magnitude, where the System GMM estimation technique, used for the aggregated data set is thought to be the more appropriate estimation technique as it addresses the endogeneity problem. It implies that financial development enhances monetary policy effectiveness. As monetary expansion, combined with financial development can cause real GDP growth for short-term stabilization, so, financial development is instrumental in policy effectiveness and consequently, must be considered meticulously for appropriate monetary policy formulation. As the monetary transmission mechanism initially works through the financial sector, notable and fast development of financial system in most economies, coupled with the ever-changing business and policy practices have forced policymakers to envisage tentative impact of financial development on the effectiveness of monetary policy.

Using a panel data of sixty developed and developing economies, the second chapter investigates whether financial development influences the direct effect of fiscal policy stance on real output growth for short-term stabilization to explain the non-existent theoretical framework. System GMM estimation to tackle endogeneity reveals that both fiscal expansion and fiscal size in conjunction with concurrent financial development does not directly impact real GDP growth significantly in the medium-term but can have contemporaneous or lagged impacts. Most importantly, as a policy comparison, unlike monetary policy, effectiveness of fiscal policy is not influenced by financial development, probably due to the non-complementarity between financial development and fiscal policy.

Previous cross-country studies have provided evidence regarding the positive influence of financial literacy on financial inclusion in conventional banking services. Consequently, the third chapter extends the literature through examining some unconventional banking and non-banking financial services, which have not been examined before. This is the first cross-country study to consider some other types of financial services for examining the positive influence of financial literacy on a broader financial inclusion. Financial inclusion has been recognized as an enabler for seven of the seventeen Sustainable Development Goals (SDGs), for its capacity to reduce poverty, improve livelihoods and contribute to ultimate economic growth and development. As one of the crucial policy tools for achieving the SDGs, financial inclusion, is usually measured as access to and use of financial services. The literature describes the possible different forms of financial inclusion and portrays the associated social benefits with inclusive growth and development. Financial literacy is considered as a demand side determinant of financial inclusion. It is well established in the literature that financial inclusion can be enhanced through an array of supply side and institutional factors, like financial infrastructure development, which is an important component of financial development. Compared to that, linking financial literacy with financial inclusion is relatively new. Multi-

levelled financial inclusion can be considered as both a more inclusive and far-reaching extension of financial development. Like financial development, financial literacy has the potential to generate a number of positive benefits, like increased growth and reduced income inequality within a country. Consequently, the enhancement of financial literacy among people is termed as a desirable policy goal, both from an individual as well as from a macroeconomic perspective and it is also linked with the key policy goal of financial inclusion of the World Bank and other international developmental organizations. Financial literacy does improve use of electronic/mobile phone payment services such as electronic payment, bill payment through mobile phones and mobile phone remittance/fund transfer. However, financial literacy, which is significantly different from insurance literacy has failed to entice the usage of insurance related services. Consideration of endogeneity also does not alter the findings. Policy makers should be encouraged to improve financial literacy through financial education and training at the macro level to promote financial inclusion where a developed financial structure could be an underlying precondition. It is anticipated that the findings of this chapter will help policy makers, who are promoting financial inclusion to understand how financial literacy affects unconventional banking and non-banking financial services. It will assist them to meticulously consider improving financial literacy through financial education and training as well as awareness building at the macro level as a tool not only for financial inclusion, but also to improve financial behaviour of people for achieving overall financial sector stability. Moreover, the findings of this study can also be useful to academicians for generalizing the causal links between financial literacy and a broader financial inclusion, covering diversified facets.

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## **CHAPTER I: INTRODUCTION**

Conventionally, economists have emphasized and endeavoured to link financial development with economic growth and development. However, financial development can also exert indirect influence on economic growth and development. On one hand, it can raise macroeconomic policy effectiveness to eventually impact long-run growth and achieve other developmental or policy goals like output expansion for short-term stabilization (Kaihatsu et al., 2018). On the other hand, it can also work together with financial literacy to improve financial inclusion and ultimately contribute to economic growth and development. This Doctoral Dissertation focuses on roles of financial development.

The emergence of finance and development, as a distinct field of research took place during the 1990s. In spite of the sporadic emphasis from Bagehot (1873), Schumpeter (1912), Gurley and Shaw (1955), and Goldsmith (1969) on the capacity of financial system to contribute to long-run economic growth, Levine (2005) noted that economic development did not consider financial development as a central doctrine till the end of the 1980s. In the 1990s, researchers began to resort to financial frictions models, utilized by economists to derive insights (e.g., Stiglitz and Weiss, 1981; Fama and Jensen, 1983; Grossman and Hart, 1986) and combined those with endogenous growth models that analysed the determinants for economic growth (e.g., Romer, 1986, 1990; Aghion and Howitt, 1992). In the process, Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Levine (1991), and King and Levine (1993a) and others revealed how divergent financial systems could impact economic growth and thus contributed to the emergence of theoretical literature on financial development and growth. Since then, it has advanced quite rapidly. Simultaneously, banking on the early contributions from King and Levine (1993a, 1993b), Jayaratne and Strahan (1996), Demirgüç-Kunt and Maksimovic (1998), Levine and Zervos (1998a), Rajan and Zingales (1998) and others, empirical research on the relationship between finance and economic development also exploded and enabled the forthcoming researchers to deploy a wide range of empirical methodologies, datasets, and historical studies to infer finance–growth and development nexus with meaningful insights.

However, throughout, economists have argued over the role of the financial sector in economic growth. Nobel Laureate Robert Lucas (1988, p. 6) dismissed finance as an “over-

stressed” determinant of economic growth, and Joan Robinson (1952, p. 86) famously argued that “where enterprise leads finance follows.” This perspective has propagated that finance responds to changing demands from the “real sector”. At the other extreme, Nobel Laureate Merton Miller (1998, p. 14) argued that, “[the idea] that financial markets contribute to economic growth is a proposition too obvious for serious discussion,” circulating the view of positive finance-growth nexus. In spite of disagreement among the scholars regarding the true nature of the finance-growth nexus, especially in light of the proposed new monotonic relationship (e.g., Rousseau and Wachtel, 2011), the overwhelming theoretical and empirical evidence suggested that a developed financial system in the form of both financial intermediaries and markets contributed to growth and development, at least during the end of the last century. The differences of opinions are caused by a wide array of diversified theoretical propositions and empirical methodologies.

Later on, finance and development expanded to discover new dimensions and link financial development with poverty, income inequality, international trade, macroeconomic policy effectiveness, financial crisis and stability, financial globalization, macroeconomic volatility, financial innovation, entry, growth, and exit of firms, financial inclusion, energy efficiency and numerous other topics. This interconnected the literature on financial development with macroeconomics, international economics, development, finance, political science, history, and even legal studies. Utilizing theoretical rationale, insights from empirical studies and historical experiences to different extents, researchers have explored diverse sections of the finance and development literature to construct the field of finance and development. This research delves into some unexploited territories pertaining to the field of finance and development. The first two research works scrutinize the direct influence of financial development on policy effectiveness, which is indeed quite intriguing. An appropriate policy mix in conjunction with financial sector attributes is supposed to both accelerate and sustain economic progression. In the last research, the association between financial literacy and financial inclusion is examined. To be precise, it addresses whether financial literacy can improve the usage of unconventional banking and non-banking financial services to contribute to broader financial inclusion. However, the demand side factor financial literacy is assumed

to contribute to financial inclusion, given that there exists a certain level of financial structure development, which can meet the needs of financially literate people.

Considering the contradicting findings and inadequate theoretical framework in the literature, the second chapter, re-investigates the relationship between financial development and monetary policy effectiveness. The significance of prudent macroeconomic management for both short run stabilization to address business cycle fluctuations as well as to foster long run economic growth (Ames et al., 2001) is well conceived in the literature. Along with that, the interplays between financial development and economic growth have been extensively studied by researchers too, as described earlier. Certainly, envisaging influence of financial development on monetary policy effectiveness is an intriguing endeavour. Monetary policy targets specific macroeconomic variables pertaining to the financial sector with the ultimate objective of affecting the real economy, principally, output growth or expansion for short-term stabilization and inflation through the transmission mechanism; consequently, financial development exerts influence on the transmission mechanism (Luis et al., 2010). The plausible intuitions, embedded in the literature exhibit that financial development can influence the monetary policy performance both positively and negatively. Taking into consideration the probable bi-directional causality, this chapter provides new evidence as to whether financial development augments or deteriorates monetary policy effectiveness. More precisely, through the incorporation of more logical sampling methods and appropriate estimation techniques to address endogeneity, it has analysed the effectiveness of monetary policy with ongoing financial development (focusing only on the depth dimension of financial development, which basically captures the size of the financial sector) with a view to efficient macro-management. Utilizing panel data from forty economies and covering the time-span 1992-2014, this chapter shows that the direct influence of monetary policy in conjunction with financial development on output growth or expansion for short-term stabilization and inflation tends to be positive and negative, respectively, although quite meagre in magnitude, where the System GMM estimation technique, used for the aggregated data set is thought to be the more appropriate estimation technique as it addresses the endogeneity problem. It implies that financial development enhances monetary policy effectiveness. As monetary expansion, combined with



financial development can cause output expansion for short-term stabilization, financial development is instrumental in policy effectiveness and, consequently, must be considered meticulously for appropriate monetary policy formulation.

Using a panel data of sixty economies, the third chapter investigates whether financial development influences the direct effect of fiscal policy stance on real output growth or expansion as a means for short-term stabilization to explain the non-existent theoretical framework. System GMM estimation to tackle endogeneity reveals that both fiscal expansion and fiscal size in conjunction with concurrent financial development does not impact real GDP growth significantly in the medium term but can have contemporaneous or lagged impacts. Most importantly, as a policy comparison, unlike monetary policy, effectiveness of fiscal policy is not influenced by financial development, probably due to the non-complementarity between financial development and fiscal policy.

Previous cross-country studies have provided evidence regarding the positive influence of financial literacy on financial inclusion in conventional banking services. Consequently, the forth chapter extends the previous study of Grohmann et al. (2018) by examining some unconventional banking and non-banking financial services, which have not been examined before. This is the first cross-country study to consider some other types of financial services for examining the positive influence of financial literacy on a broader financial inclusion. Financial inclusion has been recognized as an enabler for seven of the seventeen Sustainable Development Goals (SDGs), for its capacity to reduce poverty, improve livelihoods and contribute to ultimate economic growth and development. As one of the crucial policy tools for achieving the SDGs, Klapper et al. (2016) emphasized financial inclusion, which is usually measured as access to and use of financial services. Demircuc-Kunt et al. (2017) described the possible different forms of financial inclusion and portrayed the associated social benefits with inclusive growth and development. Financial literacy is considered as a demand side determinant of financial inclusion. It is well established in the literature that financial inclusion can be enhanced through an array of supply side and institutional factors, like financial infrastructure development, which is an important component of financial development. Compared to that, linking financial literacy with financial inclusion is relatively new.

According to Grohmann and Menkhoff (2020), multi-levelled financial inclusion can be considered as both a more inclusive and far-reaching extension of financial development. Like financial development, financial literacy has the potential to generate a number of positive benefits, like increased growth and reduced income inequality within a country. Consequently, they termed the enhancement of financial literacy among people a desirable policy goal, both from an individual as well as from a macroeconomic perspective and linked it with the key policy goal of financial inclusion of the World Bank and other international institutions. This research confirms that financial literacy does improve use of electronic/mobile phone payment services such as electronic payment, bill payment through mobile phones and mobile phone remittance/fund transfer. However, financial literacy, which is significantly different from insurance literacy has failed to entice the usage of insurance related services. Consideration of endogeneity also does not alter the findings. Consequently, financial literacy promotes unconventional banking and non-banking financial services in a cross-country setup too for achieving broader financial inclusion, augmenting the findings of the previous study. Policy makers should be encouraged to improve financial literacy through financial education at the macro level to promote financial inclusion where a developed financial structure could be an underlying precondition.

## **CHAPTER II: FINANCIAL DEVELOPMENT AND MONETARY POLICY EFFECTIVENESS**

### **2.1 Introduction**

The significance of prudent macroeconomic management for both short run stabilization to address business cycle fluctuations as well as to foster long run economic growth (Ames et al., 2001) is well conceived in the literature. Along with that, the interplays between financial development and economic growth have been extensively studied by researchers. Certainly, envisaging influence of financial development on policy effectiveness is an intriguing endeavour. An appropriate policy mix in conjunction with financial sector attributes is supposed to both accelerate and sustain economic progression. Monetary policy targets specific macroeconomic variables pertaining to the financial sector with the ultimate objective of affecting the real economy, principally, output growth or expansion for short-term stabilization and inflation through the transmission mechanism; consequently, financial development exerts influence on the transmission mechanism (Luis et al., 2010). The plausible intuitions, embedded in the literature exhibit that financial development can influence the monetary policy performance both positively and negatively. Taking into consideration the probable bi-directional causality, this research provides new evidence as to whether financial development augments or deteriorates monetary policy effectiveness. More precisely, through the incorporation of more logical sampling methods and appropriate estimation techniques to address endogeneity, it has analysed the effectiveness of monetary policy with ongoing financial development (focusing only on the depth dimension of financial development, which basically captures the size of the financial sector) with a view to efficient macro-management. The literature review also validates that this research topic is not only timely, but also is anticipated to have significant theoretical and policy implications for the global economies experiencing speedy financial development and steady reliance on monetary policy.

Historically, the monetarist view has advocated the influence of monetary policy on both output and inflation (Friedman and Schwartz, 1963). The research works of Krausa and Rioja (2006), Luis et al. (2010), and Ma and Lin (2016) have linked the notion of financial development with the effectiveness of monetary policy. Considering the contradicting findings

of the previous research, this study has attempted to derive a set of generalized conclusions about the direction of relation, for unravelling this long-standing puzzle. This research has made significant contribution to the literature in terms of verifying the findings of previous studies, as well as explaining the contradiction of Ma and Lin (2016), through more heterogeneous and comprehensive sampling, adopting econometrically correct estimation methods for probable simultaneous causal bias and incorporating possible theoretical rationale. This study shows that the direct influence of monetary policy in conjunction with financial development on real GDP growth for short-term stabilization and inflation tends to be positive and negative, respectively, but quite meagre in magnitude. It implies that financial development enhances effectiveness of monetary policy, where the capacity to expand output for short-term stabilization and control inflation have been considered as the benchmarks for policy effectiveness. As monetary expansion, along with financial development, can cause real GDP growth for short-term stabilization, financial development is instrumental in monetary policy effectiveness. Consequently, the level of financial development must be considered meticulously for appropriate monetary policy formulation.

After the Introduction, Section 2.2 entails a brief overview of the theoretical developments, intuitive explanation regarding the direction of probable influence and the literature review. Discussions on the deployed empirical models, methodologies and the data set are featured in Section 2.3. Section 2.4 captures the descriptive analysis regarding the empirical findings. Section 2.5 wraps up the paper with the concluding remarks.

## **2.2 Theoretical development and literature review**

Monetary theory proclaims that through variations in money supply, monetary policy can influence real output in the short run and price levels over the long run, where targeting money supply growth is predicted to perform better over discretionary monetary policy. Within the domain of mainstream economics, Milton Friedman's (1956) restatement of the quantity theory of money uplifted the doctrine of monetarism which also challenged the Keynesian (1936) understanding; Clark Warburton (1945) is also acknowledged for his early contributions.

Friedman argued that an increase in the supply of money would not only spur investment through lowering interest rates but also would stimulate consumption spending; consequently, expansionary monetary policy would raise the aggregate demand and output but excessive monetary expansion could lead to inflation causing disequilibrium. Accordingly, the Monetarist View propagates that through manipulating the money supply, monetary policy can generate controlled inflation as well as optimal output expansion for short-term stabilization in an economy (Friedman and Schwartz, 1963). Alteration of either money supply or short-term interest rates can influence the macroeconomic agents' consumption, savings, and investment behaviour. Along with the influence over prevailing borrowing and lending rates, monetary policy stance also does impact credit availability, market liquidity, and asset prices; all of which work as catalysts in decision making as well. Along with dealing with the current problems in light of monetary theory, the monetarists have always endeavoured to interpret historical events such as the Great Depression of the 1930s, post-war phases of inflation, hyperinflation, and stagflation. However, since the 1990s, the classical form of monetarism has been questioned due to its inability to explain the disconnection of the money supply growth from inflation in sheer monetary terms as well as the failure of pure monetary policy to stimulate the economy during phases such as 2001–2003. Clark Warburton (1945) has been accredited as the pioneer monetarist for initiating the first meaningful empirical research on the monetarist interpretation of economic fluctuations to find the means for propping up economic growth. Later on, he enriched his contributions with a series of papers emphasizing issues such as-monetary growth as the key source of business fluctuations, applicability of quantity theory of money in both short and long run, causality from money growth to economic activities, monetary rule of steady money supply growth aligned with output, employment and inflation targets, and inadequacy of central bank theory due to lack of research. His thoughts were instrumental in instigating Milton Friedman to uphold the notion of “money matters” as well as encouraging Cagan (1956), Brunner and Meltzer (1968) and others to discover close ties between money, prices and output empirically both in periods of inflation and deflation. In the early 1950s, Milton Friedman and Anna Schwartz collaborated with the National Bureau of Economic Research, USA in its much-admired money and business cycles project for a period spanning

more than 30 years to come up with numerous influential studies on monetary economics. Their efforts have encouraged Tobin (1969), Fischer (1977), Blinder and Stiglitz (1983), Bernanke and Gertler (1995), Kimball (1995), Gertler et al. (1999), Woodford (2001), Svensson (2003), Bernanke et al. (2004) and others to conduct quality research in this field. This ever-expanding doctrine of monetarism has incorporated new dimensions to produce innovative and dynamic research, in which recently, the notion of financial development has been associated with the effectiveness of monetary policy.

As there is persisting debate at the theoretical level, regarding the fundamental mechanism behind monetary policy effectiveness (where the liquidity channel postulates that an increase in monetary supply can augment private spending through a reduction in interest rates; the alternative approach of credit channel emphasizes policy influence over the other factors for credit allocation except price of liquidity, which is the short-run interest rate), a significant portion of the empirical literature on monetary policy effectiveness has focused on the predominance of one channel over the other. But for sure, both channels operate through the financial system and, thus, the degree of financial development is presumed to be pivotal in monetary policy effectiveness. As monetary policy works through the financial sector, the diverse levels of financial development across economies is supposed to result in different degrees of policy effectiveness. Intuitively, financial development can either strengthen or weaken the monetary policy performance.

Within the framework of the monetary policy transmission mechanism, to have the maximum extent of policy impact, the simplest model of credit creation assumes that all the loans or borrowed money from the banks in a fractional-reserve banking system are re-deposited into the system entirely, allowing simple calculation of the amount of credit created. This is considered as a no leakage scenario that ensures maximum policy impact given the other assumptions are also satisfied. But in the real world, it actually never happens and it is merely considered as a theoretical extreme like as laissez-faire economy. In reality, not all the money returns to the banks, cash leakages occur when amounts of money, borrowed from the banking system are not re-deposited to the system and rather kept elsewhere. Leakages can

also occur when the funds deposited in the banking system are not lent out by the banks, the idle funds which remain within the banking system. These sorts of cash leakages lower the ability of credit creation and consequently weaken the transmission of monetary policy.

A more developed financial sector could reduce monetary policy effectiveness if excessive financial innovation raises the leakage in the financial system, where the new financial instruments allow private agents to insure themselves against unexpected monetary policy shocks, and consequently reduce the volatility of their expenditure pattern as well as weaken the strength of monetary transmission. In the economies, possessing developed financial system, the creation of new financial instruments, such as derivatives, enables the banks and other financial market agents to protect themselves against unexpected changes in monetary policy stance. This insurance to the financial intermediaries and other financial market agents, especially to the banks, could impede the effectiveness of monetary policy through allowing for more leakages into the transmission channel of monetary policy. It also slackens the extent of authority of the monetary watchdog within the financial system due to the simultaneous co-existence of multiple regulators for governing these segments of the financial market. For example, the size of the market for derivatives is much larger as well as the structure of the products are quite complex in the economies with developed financial sectors as compared to ones with relatively underdeveloped financial structures. This intensified the sub-prime financial crises during 2008, as the monetary authorities along with other financial sector regulators failed to properly monitor and manipulate the market for derivatives to anticipate the probable huge losses.

On the other hand, a relatively developed financial system is simultaneously well-organized and well-governed to ensure healthy competition among the large number of adequately capitalized banks, who operate in a well-functioning financial market which handles diversified financial instruments. All these features of the developed financial system can make the monetary policy more effective through minimizing the policy lags and swiftly transmitting the policy changes to the real economy, where the economic agents are also presumed to be more rational. Moreover, financially developed economies can have efficient and fast transmission of monetary policy through ensuring minimum cash leakages from the banking

system which simply bolsters the multiplier effect (Carranza et al., 2010). A robust and trustworthy banking system also ensures fewer leakages due to the largely cashless nature of transactions and, consequently, the loanable funds borrowed from the banks will be ultimately returned to the banking system in the form of bank deposits. Economies with a high level of financial development also possess well-developed and easily accessible financial markets (higher magnitude of financial inclusion), which supports smoother churning of liquidity in the economy. An expansionary monetary policy is expected to increase liquidity of banks, both in forms of loans and deposits through the bank lending channel (Kashyap and Stein, 1997). Through boosting bank reserves, monetary expansion raises bank deposits, which in turn increases as well as widely spreading out loanable funds in the entire economy to intensify the impact of monetary expansion on output growth for short-term stabilization. All these boost up the multiplier effect as well. Therefore, monetary policy is more effectively transmitted in economies which are financially more developed. Previous literature has also testified that financially advanced economies tend to use the banking system more to generate a more powerful multiplier effect through higher liquidity creation for monetary policy loosening, which ultimately exerts positive influence on output expansion (Seth and Kalyanaraman, 2017).

On the contrary, the impact of monetary expansion in financially less developed economies is supposed to exert weaker impact on the real sector, as there are several plausible rationales behind it. Firstly, there are relatively smaller number of banking financial intermediaries, struggling with a lower magnitude of financial inclusion to aid in the transmission of monetary policy. Moreover, for these financially less developed economies, lack of diverse sources of funds and too much reliance on bank financing with hefty cash leakages from the banking system due to lack of trust in banks causes the monetary policy to have a potentially weaker impact on output expansion for short-term stabilization. Consequently, an equivalent infusion of bank liquidity through monetary loosening will contribute to lesser output growth for short-term stabilization in an economy with a less developed financial sector. Moreover, poor governance reduces the trustworthiness of the formal banking sector.



Based on the above theoretical discussion, derived from the literature, the mechanism of how financial development strengthens monetary policy performance can be summarized intuitively, in the following way. In economies with a high level of financial development, when the central bank raises money supply through open market purchase of securities from the banks, it can have prompt and significant impact on the real sector. In these economies, due to good governance and organized structure of the banking market, people tend to rely on the banks more through both keeping their deposits with the banks and borrowing from the banks, as well as using the banking channel for making transaction payments. It ensures minimum leakage from the banking system, which simply augments the monetary policy transmission mechanism. Consequently, it allows the monetary policy to transmit more efficiently with a relatively higher multiplier, along with having shorter policy lags. Moreover, enormous financial depth (size of banks, other financial institutions, and financial markets considered together and compared to a measure of economic output in the country), in these highly financially developed economies ensures a comprehensive coverage of the population by banks and formal financial sector, which offer alternative means of financing, diverse instruments for savings, investments and other financial services. It implies that almost all can safely store their savings in the banks and borrow from the banks cheaply as well as avail the similar services from other formal sources for productive investments to impact the real economy, whenever more money is made available in the banking system through expansionary monetary policy. Higher financial inclusion also works as a catalyst here.

A comprehensive literature review reveals that both pragmatic monetary policy and ever-evolving financial system can affect output growth for short-term stabilization. As the monetary transmission mechanism initially works through the financial sector, notable and fast development of financial system in most economies, coupled with the ever-changing business and policy practices have forced policymakers to envisage its tentative impact on the effectiveness of monetary policy. The probable intuitive rationale, derived from the literature has already depicted that a more developed financial sector enhances monetary policy performance. Although this positive nexus between financial development and monetary policy effectiveness has also been well projected in the literature, there exist contradictory

findings. This contradiction makes the findings of this study extremely important. On one hand, a majority of the empirical studies demonstrates that a more developed financial sector enhances monetary policy performance; on the other hand, the empirical study of Ma and Lin (2016) has also proven the diminishing effectiveness of monetary policy along with financial sector development. From this perspective, consideration of endogeneity in re-analysing the nexus between financial development and the effectiveness of monetary policy has significant theoretical and policy implications. In spite of the growing significance of financial development in explaining monetary policy effectiveness, an in-depth study of the relationship between financial development and monetary policy effectiveness is quite infrequent due to the lack of recognized measures of both monetary policy effectiveness and financial development. However, the researchers are also obstructed by the absence of theoretical foundations underlying this relationship owing to the lack of micro-founded models as well as the unavailability of the required information to construct a robust panel data set to derive based on the cross-country evidence.

In 2006, Krause and Rioja, in their well-articulated paper have tried to trace out the links between financial development and short run stabilization. More precisely, the authors have derived monetary policy efficiency measures (PEMs) using inflation and output gap volatility, stressing on the short-term for a mix of 37 industrialized and developing countries. They have considered a relatively shorter time span of 14 years (1985-1998). Predicting a positive influence of financial development on the scope of action of monetary policy and subsequently improved policy performance, they have investigated the impact that the size and depth of both banking and the capital markets have on policy performance. Deploying GMM estimation techniques, the empirical analysis has considered three financial development measures-private credit, liquid liabilities, and a financial aggregate index composed up of both banking and stock market measures (market capitalization, turnover ratio and value added). They have discovered that more developed financial markets, controlling for central bank independence, inflation targeting and membership to the European Monetary Union could significantly contribute to explaining a more efficient monetary policy implementation. But the study has considered a relatively shorter time span and also has not accounted for the recent developments.

Again, Luis et al. (2010) have attempted to summarize the results of a broad exploratory empirical analysis relating the level of financial development with the effectiveness of monetary policy in their research. The analysis has been conducted based on a panel of more than 60 countries considering the timeframe of 1989-2001. They have calculated measures for financial development, predominantly considering the overall size and depth of the financial intermediaries, the level of activity in the stock market and relative size of the central bank, selected from a wide array of indicators resorting to both principal component analysis and factor analysis. Using the VAR method, they have devised a measure for monetary policy effectiveness (MPE) including information on output, prices and policy instruments. Given the data constraints, simple regression techniques have been deployed to link the dependent variables of the MPE measures, and the independent variables of the financial development factors, along with degree of dollarization and some other relevant macroeconomic variables. Based upon the evidence, they have concluded that in countries with less developed financial systems, monetary policy could have longer lags but higher medium-term impact and monetary contractions could have exerted more intense effects than monetary expansions. The paper has deployed simple regression analysis techniques, disregarding complexities such as heterogeneity of data set and endogeneity. They have also put too much emphasis in finding the proper indicators for both financial development and monetary policy effectiveness. In fact, the results have not even explicitly mentioned the impact of financial development on monetary policy effectiveness.

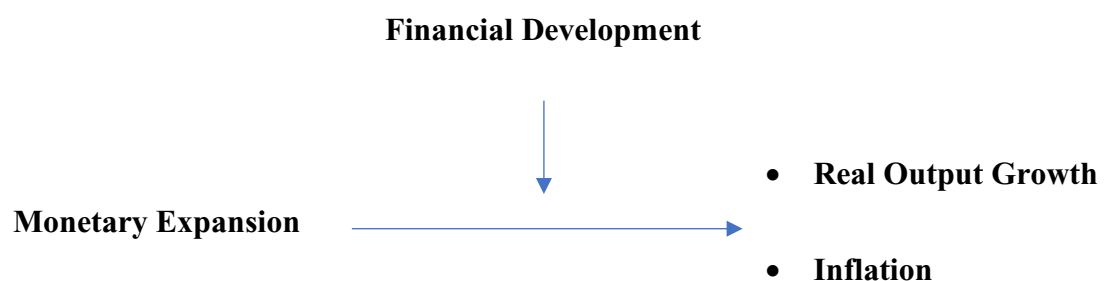
Ma and Lin (2016) have accomplished the most recent study on the enquiry whether financial development influences the effectiveness of monetary policy or not in 2016. Their paper has complemented the literature by providing new evidence on the relationship. Using a panel data set of 41 economies over 2005Q1 to 2011Q4, and primarily relying on static linear panel models, they have found the effectiveness of monetary policy to be negatively correlated with financial development which has been robust across all the different specifications and estimation methods. Moreover, the results have also indicated that the effect of monetary policy on output could decrease more with financial development in developing economies while the effect of monetary policy on inflation could strengthen with financial development in advanced

economies. This latest study, which has been one of the motivations for this existing research, seems to be limited by skewed sampling and selection of improper estimation methods, disregarding possible endogeneity, which appear to be instrumental in influencing the findings.

In spite of recognizing the contribution made by the previous papers, it is quite evident that while illustrating the influence of financial development on monetary policy in affecting both output growth for short-term stabilization and inflation, the issue of endogeneity has not been properly considered or addressed, implicitly assuming unidirectional causality from changes in money supply in a developed financial system to both output growth and inflation. Gurley and Shaw (1967) have advocated the demand-following hypothesis, implying that economic progress forms a more developed financial structure for better sustenance. Boyd et al. (2001) and others have found inflation to adversely affect financial development. Again, in spite of the strong theoretical background of inflation being caused by money supply growth, in a lot of instances, the inflation rate itself could influence the money supply decision of central banks. However, as the previous papers have not considered endogeneity comprehensively, this research has addressed it through the incorporation of the System GMM estimation technique to both output growth and inflation specifications for the aggregated data set. Moreover, the deployed System GMM estimator has also addressed the issue of dynamic panel model bias. The research question can be expressed through the following diagram:

**Figure 2.1**

Financial development and monetary policy



## 2.3 Methodology and data

Considering all the limitations of the previous studies, this research has resorted to more prudent sampling and appropriate estimation techniques for both disaggregated and aggregated data sets, as well as considered the simultaneous causal bias in the estimation process for aggregated data set. Moreover, a lengthy and more recent time frame has been chosen. The following two standard macroeconomic panel data specifications have been deployed to determine the direct impact of money growth rate on output growth for short-term stabilization and inflation econometrically for the disaggregated data set (Method 1):

$$\Delta Y_{i,t} = \beta_0 + \beta^Y \Delta Y_{i,t-1} + \sum_{j=0}^2 \beta_j^M \Delta M_{i,t-j} + \beta^C Crisis_{i,t} + u_{i,t}^Y \quad (1)$$

$$\Delta P_{i,t} = \gamma_0 + \gamma^P \Delta P_{i,t-1} + \sum_{j=0}^2 \gamma_j^M \Delta M_{i,t-j} + \gamma^C Crisis_{i,t} + u_{i,t}^P \quad (2)$$

where  $i$  indexes over economies and  $t$  over time, the  $\beta$ s and  $\gamma$ s are coefficients,  $\Delta Y$  is the real GDP or output growth rate,  $\Delta M$  is the money supply growth rate,  $\Delta P$  is the inflation rate,  $Crisis$ , a dummy variable which is 1 if a country  $i$  at time  $t$  experiences a financial or banking crisis,<sup>1</sup> and zero otherwise;  $u_{i,t}^Y$  and  $u_{i,t}^P$  are the output and inflation shocks, respectively. Following the study of Jovanovski and Mehmed (2015), a 2-year lag in the application of the measures of monetary policy has been considered. Both Karras (1999) and Ma and Lin (2016) have considered (1) and (2) as reduced-form expressions for output growth and inflation. The error terms are modelled as  $u_{i,t}^Y = u_i^Y + w_{i,t}^Y$  and  $u_{i,t}^P = u_i^P + w_{i,t}^P$ , where  $u_i^Y$  and  $u_i^P$  represent the economy specific fixed effects. In spite of the relative convenience and prudence in manipulating the policy rates over the money supply growth by the central banks, easy availability of data has prompted the selection of money supply growth as a measure of monetary expansion. Additionally, interest rate targeting ultimately does end up affecting money supply growth. Following the previous literature (e.g., Demirgüç-Kunt and Levine,

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<sup>1</sup> Detailed definition of the crisis variable has been provided in Laeven and Valencia (2012).

1996; Levine, 2002; Beck et al., 2006; Demirgüç-Kunt et al., 2011; Ma and Lin, 2016), the following single but comprehensive measure for financial development capturing the size of the financial sector has been considered:

$$FD = \text{Domestic credit provided by financial sector (\% of GDP)} + \text{Market capitalization of listed domestic companies (\% of GDP)}$$

In constructing the financial development indicator, both credit and capital markets have been considered to depict the financial structure more comprehensively. It is plausible that a larger value of financial development characterizes a higher level of financial development. The larger and the smaller the values of coefficients in equations (1) and (2) respectively are, the more profound the effects of monetary policy on output growth and inflation are. Given the empirical setup in equations (1) and (2), firstly, the sample economies are classified as per the level of financial development, and then regression analysis is performed for this disaggregated data set. In spite of the prevalence of both simultaneous causal bias and dynamic panel model bias, for the disaggregated data set, the standard static panel linear estimation technique (fixed effect model - FEM) is applied as  $N < T$ . As the data set has displayed heteroskedasticity, autocorrelation and cross-sectional dependence, appropriate corrective measures have been undertaken. Monetary policy effectiveness can be verified by comparing the signs as well as the coefficient sizes of money supply growth rate across the subsamples, highlighting different levels of financial development. To be precise, if financial development positively affects the direct influence of monetary expansion on output growth for short-term stabilization, then the sum of the coefficients of money supply growth in economies with high level of financial development (HFD) is higher than that of economies with low level of financial development (LFD). If financial development favourably affects the direct influence of monetary expansion on inflation, then the sum of the coefficients in HFD is lower than that for LFD.

Rather than focusing on the period specific individual money supply growth coefficients, this study focuses on the sum of the money supply growth coefficients as it can absorb the overall direct impact of monetary policy over a timespan on the outcome variables. Ma and Lin (2016)

have also accomplished that in their study. The following discussion demonstrates how summing up the individual coefficients provides the overall direct impact.

Assuming the original Auto Regressive Distributed Lag Model (2,1) specification to be

$$Y_{i,t} = \beta_0^Y + \beta_0^X Y_{i,t-1} + \beta_0^X X_{i,t} + \beta_1^X X_{i,t-1} + \beta_2^X X_{i,t-2} + v_{i,t}^Y \quad (3)$$

Here, endogenous variable is  $Y_{i,t}$  and the single exogenous variable, with both contemporaneous and lagged impacts (2 year) is  $X_{i,t}$ , standard error term is  $v_{i,t}^Y$ . The specifications, considered in this study allow one or more variables to affect  $Y$  with a lag, if  $X$  changes on temporary basis, immediate change in  $Y$  due to one-unit increase in  $X$  at time  $t$  is  $\beta_0^X$ ,  $\beta_1^X$  is the change in  $Y$ , one period after the temporary change in  $X$ , and  $\beta_2^X$ , is the change in  $Y$ , two periods after the change. At time  $t+3$ ,  $Y$  has reverted back to its initial level:  $Y_{t+3} = Y_{t-1}$ . With the permanent increase in  $X$ , after one period,  $Y$  has increased by  $\beta_0^X + \beta_1^X$ , and after two periods, it has increased by  $\beta_0^X + \beta_1^X + \beta_2^X$ , there are no further changes in  $Y$  after two periods like as the case of temporary changes in  $X$ . It shows that the sum of the coefficients on current and lagged  $X$ s is  $\beta_0^X + \beta_1^X + \beta_2^X$ , which is the total change in  $Y$ , given a permanent increase in  $X$ , which is often of interest in this type of distributed lag models, which prompted Ma and Lin (2016) to resort to that. In other words, after a permanent increase in  $X_t$  at time  $t$ , the change in  $Y_t$  is worth  $\beta_0^X$ . Again, in the next period ( $t+1$ ),  $X_{t+1}$ , brings changes in  $Y_{t+1}$  worth the extent of  $\beta_1^X$ . Finally, at the end of period ( $t+2$ ) the changes in  $Y_{t+2}$  caused by the changes in  $X_{t+2}$  is equivalent to the magnitude of  $\beta_2^X$ . Consequently, the summing of the individual coefficients  $\beta_0^X + \beta_1^X + \beta_2^X$  provides the overall direct impact. Because of the often-substantial correlation in  $X$  at different lags that is, due to multicollinearity, it can be difficult to obtain precise estimates of the individual  $\beta$ s, even when the  $\beta$ s cannot be precisely estimated, we can often get good estimates of the overall direct impact through summing the coefficients. In the similar way, this paper sums up the individual money supply growth coefficients (Method 1) from the dynamic panel data specifications, to derive the overall direct effects for evaluating monetary policy effectiveness.

Along with this empirical framework (Method 1), another empirical setup (Method 2) for the aggregated data set is also deployed, which is considered to be the more appropriate one to

address both the simultaneous causal bias and dynamic panel model bias. In this case, the financial development variable is explicitly included in the regression equations and interacted with the money supply growth. As mentioned previously, this alternative framework (Method 2) is believed to be the more appropriate one from a technical context. This has also been derived from previous research (e.g., Karras, 1999; Berument-Dogan, 2003; Ma and Lin, 2016). The regression specifications for the aggregated data set follow as:

$$\Delta Y_{i,t} = \beta_0 + \beta^Y \Delta Y_{i,t-1} + \sum_{j=0}^2 (\theta_j^M \Delta M_{i,t-j} + \theta_j^{FD} FD_{i,t-j} + \theta_j^{FDM} FD_{i,t-j} \Delta M_{i,t-j}) + \beta^C Crisis_{i,t} + u_{i,t}^Y \quad (4)$$

$$\Delta P_{i,t} = \gamma_0 + \gamma^P \Delta P_{i,t-1} + \sum_{j=0}^2 (\phi_j^M \Delta M_{i,t-j} + \phi_j^{FD} FD_{i,t-j} + \phi_j^{FDM} FD_{i,t-j} \Delta M_{i,t-j}) + \gamma^C Crisis_{i,t} + u_{i,t}^P \quad (5)$$

Equation (4) is the output growth equation that measures the direct effect of financial development on the relationship between money supply growth and real output growth for short-term stabilization and equation (5) is the inflation equation capturing the direct effect of financial development on the relationship between money supply growth and inflation, where  $FD_{i,t}$  is the measure of financial development of country  $i$  at time  $t$ ,  $FD_{i,t-j} \cdot \Delta M_{i,t-j}$  is the interaction term for financial development and monetary expansion;  $\theta$ s and  $\phi$ s are the parameters. To address both simultaneous casual bias and dynamic panel model bias in the combined data set, a two-step GMM Systems estimator, developed by Blundell and Bond (1998) has been applied to provide robust estimates. If financial development positively affects the direct influence of monetary expansion on output growth for short-term stabilization, then for the output growth specification, the sum of the coefficients of the interaction terms must be positive. If financial development favourably affects, the direct influence of monetary expansion on inflation, then for the second regression specification, the sum of the coefficients of the interaction terms must be negative. Following the previous discussion, again for this setup (Method 2), the sum of the coefficients of interactions between money supply growth and level of financial development are focused and analysed, which simply capture overall direct policy impacts.



For quantitative assessment, a panel data set has been constructed, prioritizing the notion of unbiased and logical sampling. The data set is comprised of forty developed, developing and least-developed economies which covers the time span 1992-2014, depending upon data availability. Mostly, published sources like the World Development Indicators and the Financial Development and Structure Database of the World Bank, the International Financial Statistics Database of the International Monetary Fund and Laeven and Valencia (2012) have been exploited as the data sources.

Table 2.1 displays the average values of the quantitative variables of the forty economies over the sample period, while Table 2.2 presents the descriptive statistics. The 2nd, 3rd and 4th columns of Table 2.1 show that output growth, inflation and money supply growth, all vary substantially across the economies.

The differences in magnitudes of the financial development indicator in Table 2.1 advocate that the impact of financial development on the monetary policy effectiveness may be generating diverse growth and price effects across the economies as well as signifying the substantial variability in relative importance of forms of financial instruments, financial intermediaries and financial markets across the economies.

**Table 2.1**

Sample averages of the variables over 1992-2014

Economies	$AVG_{\Delta Y}$	$AVG_{\Delta P}$	$AVG_{\Delta M}$	$AVG_{FD}$
Hong Kong	3.82	2.87	8.72	749.79
Japan	0.81	0.22	1.51	380.67
Switzerland	1.66	0.94	5.37	357.01
Singapore	6.14	1.88	9.24	268.36
USA	2.59	2.43	5.86	320.66
Australia	3.26	2.56	9.42	210.04
UK	2.28	2.24	7.61	270.86
Malaysia	2.75	6.83	12.59	353.27
South Africa	5.68	2.75	13.72	293.34
Austria	1.83	2.11	9.11	115.73
Italy	0.65	2.62	5.39	97.16

Netherlands	1.96	2.15	5.39	196.12
Norway	2.44	2.01	6.78	87.79
Portugal	1.13	2.99	5.39	142.35
Spain	1.91	2.95	5.39	214.33
Belgium	1.74	1.99	5.39	124.15
Canada	2.58	1.81	9.66	213.82
China	10.11	4.58	20.24	137.72
Denmark	1.47	1.99	4.48	147.25
France	1.53	1.58	5.39	149.82
Finland	2.03	1.68	5.39	125.77
Germany	1.35	1.84	5.39	139.77
Ireland	4.86	2.26	5.39	140.32
Sweden	2.18	1.41	6.26	126.25
Israel	3.79	7.88	20.77	46.48
Poland	3.35	7.29	16.91	46.62
Argentina	4.11	7.32	19.55	74.33
Bolivia	3.28	7.23	18.99	46.80
Turkey	3.22	7.39	19.28	47.34
Mexico	3.36	8.45	14.38	48.46
Indonesia	3.53	8.22	20.65	48.01
Philippines	5.74	8.69	20.36	48.46
Cote D Ivory	3.42	8.72	20.49	49.53
Nigeria	3.58	8.84	20.45	50.37
Thailand	3.72	9.08	14.38	51.77
Bangladesh	3.99	9.24	22.08	53.07
Pakistan	4.57	8.11	21.05	53.09
Brazil	4.34	7.87	20.66	52.91
India	4.09	7.68	19.13	53.58
Sri Lanka	4.42	20.17	16.77	63.02

*Note:*  $\Delta Y$  is Real GDP growth rate (%).  $\Delta P$  is Inflation (CPI) rate (%).  $\Delta M$  is Money and quasi money growth rate (%).  $FD$  is Domestic credit provided by financial sector (% of GDP) + Market capitalization of listed domestic companies (% of GDP).  $AVG$  stands for average of the variables.

**Table 2.2**

## Descriptive statistics

Variable	Observation	Average	Std. Deviation	Min	Max
$\Delta Y$	920	3.40	3.41	-13.12	33.73
$\Delta P$	920	10.89	98.65	-4.47	2075.89
$\Delta M$	920	18.51	127.88	-28.62	3280.65
$FD$	920	164.25	152.24	9.05	1381.22

*Note:*  $\Delta Y$  is Real GDP growth rate (%).  $\Delta P$  is Inflation (CPI) rate (%).  $\Delta M$  is Money and quasi money growth rate (%).  $FD$  is Domestic credit provided by financial sector (% of GDP) + Market capitalization of listed domestic companies (% of GDP).

**2.4 Results**

The coefficients in the regression specifications (1) and (2) have been estimated using static linear panel model estimation techniques (Method 1), along with corrections (Fixed Effect Model-corrected) for data structure (auto-correlation, heteroskedasticity and cross-sectional dependence) for the disaggregated data set (Table 2.3 and Table 2.5). A high level of financial development or HFD, mostly comprising of the developed economies, includes the twenty-four most financially developed economies and a low level of financial development, or LFD, contains the sixteen comparatively less financially developed economies (even surprisingly two developed economies are in this group) in the sample based on a benchmark for financial development. As anticipated, the coefficient of the crisis dummy tends to exert significant negative impact on output growth irrespective of the level of financial development, where the magnitude of shock is considerably higher for LFD. The developing economies have experienced significant gradual progress in the capacity to combat both internal and global financial crises through consistent macroeconomic consolidation, having more policy tools at disposal and learning from others, which assisted them immensely during the financial crisis of 2008, but they are still not as well equipped as the developed economies (Lin, 2011). For inflation, the crises do result in exorbitant or significant price shocks in LFD. Although, HFD does experience statistically significant price level distortions, but the magnitude of shock is not as high as that of LFD. In spite of contradicting the standard economic theory of association between financial crisis and a low level of inflation, these findings are not at all puzzling but

rather consistent and perfectly match the recent observations of Williams (2010), the IMF (2013) and Friedrich (2014). Implementation of Quantitative Easing (QE) in the effected economies to counteract the negative effects of the global financial crisis (2008), long term implications of prolonged expansionary monetary policies, stable inflation expectations, long-term decline in the slope of the Phillips curve (IMF, 2013), the role of fiscal policy stance (Friedrich, 2014) could be put forward as tentative explanations for that. The reported results show that both output growth and inflation rate have a considerable degree of persistence, as indicated by the statistically significant positive AR (1) term in all equations.<sup>2</sup> As for the money supply growth coefficients, which are the focus of this paper, Table 2.4 and Table 2.6 demonstrate that the sum of the money supply growth coefficients ( $\beta_0^M + \beta_1^M + \beta_2^M$ ) and ( $\gamma_0^M + \gamma_1^M + \gamma_2^M$ ) are estimated to be significantly positive in equations (1) and (2) respectively, implying that an increase in money supply is associated with higher output growth and inflation across all the economies irrespective of level of financial development. Meanwhile, the higher coefficients for HFD in the output growth specification clearly indicates more effective monetary policy in terms of promoting output growth for short-term stabilization. Again, the lower coefficient size for the inflation specification associated with HFD in Table 2.6, validates that the reliance of the developed world on monetary policy is not a whimsical one, as it is also capable enough in generating controlled inflation. Although for LFD, the monetary policy is significantly contributing to output growth, but it may generate a high level of inflation. Considering the combined results from Tables 2.4 and 2.6, derived from the disaggregated data set (Method 1), it is quite apparent that monetary policy is more effective for HFD in generating both real output growth and controlled inflation as compared to LFD. Surprisingly, these findings contradict the recent study of Ma and Lin (2016).

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<sup>2</sup> The conducted model experiments allowing for more lags in the regressions confirm that the coefficients with higher lag order are statistically insignificant as well as not being the focus of the study which is why they are not reported.

**Table 2.3**

Financial development and monetary policy effectiveness – method 1 results

Dependent variable $\Delta Y_t$		
Independent Variables	HFD Subsample	LFD Subsample
Constant	1.0785*** (1.31)	3.6283*** (0.22)
$\Delta Y_{t-1}$	0.4666*** (0.03)	0.1551*** (0.04)
$\Delta M_t$	0.0207*** (0.003)	0.0020 (0.004)
$\Delta M_{t-1}$	0.0195*** (0.003)	0.0318*** (0.003)
$\Delta M_{t-2}$	-0.008*** (0.003)	-0.0112*** (0.001)
$Crisis_t$	-1.4396*** (0.10)	-3.8258*** (0.33)
Number of Observations	480	320
Number of Economies	24	16

Notes:  $\Delta Y$  is real GDP growth rate (%).  $Crisis$  is the crisis dummy. Method 1 implies Fixed Effect Model with corrections. The period used for estimation is 1992-2014. HFD means economies with high level of financial development and LFD are the less financially developed economies. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively. Robust standard errors are in parentheses.

**Table 2.4**

Impact of financial development and monetary policy effectiveness – method 1

Panel A	HFD		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\beta_o^M + \beta_i^M + \beta_2^M = 0$	0.0322***	0.000	6.58
Panel B	LFD		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\beta_o^M + \beta_i^M + \beta_2^M = 0$	0.0226***	0.000	4.53

Notes:  $\beta_o^M + \beta_i^M + \beta_2^M$  represents the overall direct effect of money supply growth. Panel A and Panel B check the hypotheses for HBD (financially developed economies) and LFD (less financially developed economies) respectively. For testing the significance of sum of coefficients, the null hypothesis is  $H_0: \beta_o^M + \beta_i^M + \beta_2^M = 0$ . Method 1 implies Fixed Effect Model with corrections. The period used for estimation is 1992-2014.

However, they are consistent with the notion that financial development enhances both scope of action and subsequently performance of monetary policy as propagated by the studies of Luis et al. (2010) and Krause and Rioja (2006). Theoretically, the positive influence of financial development on monetary policy effectiveness is also quite plausible and has already been presented in this paper. The differences in the findings, between the two studies, following almost similar methodologies for the disaggregated data set, could be attributable to modifications in estimation techniques and sampling methods. Firstly, this study has adopted more proper Fixed Effect Model-corrected estimates to handle heteroskedasticity, serial-correlation and cross-sectional dependence, which are prevalent in this sub-sampled macro panel (as  $N < T$ ) data (Hsiao, 2007).

**Table 2.5**

Financial development and monetary policy effectiveness – method 1 results

Dependent variable $-\Delta P_t$		
Independent Variables	HFD Subsample	LFD Subsample
Constant	0.6715*** (0.02)	0.5619*** (0.35)
$\Delta P_{t-1}$	0.5236*** (0.006)	0.0227*** (0.01)
$\Delta M_t$	0.0154*** (0.0006)	0.2559*** (0.01)
$\Delta M_{t-1}$	0.0109*** (0.0006)	0.1856*** (0.01)
$\Delta M_{t-2}$	0.0052*** (0.0006)	-0.0391*** (0.005)
$Crisis_t$	0.3221*** (0.02)	9.2123*** (0.55)
Number of Observations	480	320
Number of Economies	24	16

*Note:*  $\Delta P$  is inflation (CPI) rate (%). *Crisis* is the crisis dummy. Method 1 implies Fixed Effect Model with corrections. The period used for estimation is 1992-2014. HFD means economies with high level of financial development and LFD are the less financially developed economies. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively. Robust standard errors are in parentheses.

But it is noteworthy to mention that static linear panel methods may not be perfectly appropriate for the dynamic panel specifications used in this study, justifying the background of the subsequent empirical setup (Method 2). Secondly, as compared to the latest study, a more prudent sampling technique has been applied for this study which contains a balanced and heterogenous mix of developed, developing and even least developed economies. It is found that Ma and Lin (2016) have covered economies possessing relatively developed financial structure (thirty-one out of their forty-one economies are developed economies; and the rest of the economies, which are classified as developing economies, have quite developed financial systems). Their sample has not considered a wide variety of economies to provide a comprehensive coverage of financial development. So, their findings could imply that beyond a threshold level, financial development reduces monetary policy effectiveness, in the economies with relatively developed financial structure.

**Table 2.6**

Impact of financial development and monetary policy effectiveness – method 1

Panel A	HFD		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\gamma_o^M + \gamma_i^M + \gamma_2^M = 0$	0.0315***	0.000	23.93
Panel B	LFD		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\gamma_o^M + \gamma_i^M + \gamma_2^M = 0$	0.4025***	0.000	20.04

*Notes:*  $\gamma_o^M + \gamma_i^M + \gamma_2^M$  represents the overall direct effect of money supply growth. Panel A and Panel B check the hypotheses for HBD (financially developed economies) and LFD (less financially developed economies) respectively. For testing the significance of sum of coefficients, the null hypothesis is  $H_0: \gamma_o^M + \gamma_i^M + \gamma_2^M = 0$ . Method 1 implies Fixed Effect Model with corrections. The period used for estimation is 1992-2014.

These economies possess deep and larger markets, with a wide range of financial instruments and diversified financial intermediaries that might result in weakening of the impact of

monetary transmission due to leakages from the system as well as slack monitoring and supervision, as mentioned earlier. In very highly developed financial systems, complexities in the financial structure impede output growth like what has been experienced during the global financial crisis of 2008, particularly by many developed economies. But this existing study has pointed out that those contrasting findings can be explained through having a well-balanced sample (including more heterogeneous economies), satisfying the notion of prudent sampling to give a comprehensive coverage of financial development (in this sample, half of the economies are developed and the remaining half represents both the developing economies and LDCs). It helps to capture the divergence in financial development, to meaningfully explain that a real gradual shift from a low to high level of financial development can improve monetary policy effectiveness. The regression equations (4) and (5), for the aggregated panel dataset are estimated installing the System GMM estimators (as  $N > T$ ), which are supposed to be the best option for these types of dynamic panel models to tackle both the simultaneous causal bias and dynamic panel model bias. As the concentration of this alternative empirical setup is to cross-check the findings derived from the framework based on Method 1, it has solely focused on the sum of the coefficients of the interaction terms, skipping a detailed discussion on the other coefficients which have altered neither in direction nor in significance of relation, as portrayed in the baseline results.

Tables 2.7 and 2.9 illustrate the results considering the more appropriate techniques (Method 2) to tackle both simultaneous bias and dynamic panel model bias. As this study prioritizes whether monetary policy promotes output growth or not for short-term stabilization, different sets of assumptions (Model 1 and 2) have been incorporated within the System GMM estimation process (Table 2.7) to capture the direct influence of monetary expansion on real GDP growth (but not for inflation in Table 2.9).



**Table 2.7**

Financial development and monetary policy effectiveness – method 2 results

Dependent variable $\Delta Y_t$ (System GMM)		
Independent Variables	Model 1	Model 2
$\Delta Y_{t-1}$	0.31*** (0.13)	0.24*** (0.11)
$\Delta M_t$	-0.03 (0.04)	-0.006 (0.06)
$\Delta M_{t-1}$	0.06*** (0.01)	0.03 (0.04)
$\Delta M_{t-2}$	-0.01 (0.01)	-0.01 (0.02)
$FD_t$	-0.0008 (0.005)	-0.001 (0.004)
$FD_{t-1}$	0.01** (0.006)	0.009* (0.007)
$FD_{t-2}$	-0.01** (0.006)	-0.02** (0.007)
$FD_t \cdot \Delta M_t$	0.0009** (0.0004)	0.0008** (0.0004)
$FD_{t-1} \cdot \Delta M_{t-1}$	-0.0002** (0.0001)	-0.0001 (0.0001)
$FD_{t-2} \cdot \Delta M_{t-2}$	0.00003* (0.00001)	0.00002 (0.00002)
$Crisis_t$	-2.08*** (0.63)	-2.31*** (0.68)
Hansen Test (p-value)	0.72	0.23
Arellano-Bond AR(2) Test (p-value)	0.51	0.80
Number of IVs	27	39
Number of Observations	800	800

Notes:  $\Delta Y$  is real GDP growth rate.  $\Delta M$  is Money and quasi money growth rate (%).  $Crisis$  is the crisis dummy. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively. Robust standard errors are in parentheses. Method 2 implies System GMM estimations. The period used for estimation is 1992-2014. Model 2 considers higher lags for IVs.

For short-term dynamics (Table 2.7), money supply growth has significantly positive lagged impact on real GDP growth rate, implying that monetary expansion at time  $t$ , can contribute to future output growth. Even if there are instances of sign reversals in estimated instantaneous and lagged coefficients of money supply growth on real GDP growth, but almost all of those are insignificant in nature. Econometrically, several justifications can be put forward for this

sign reversal or mixed impacts. Firstly, in this context, the coefficient of money supply growth does not merely capture the sole impact of money supply growth on real GDP growth, as it is interacted with the level of financial development, prevailing in that period. So, even if the individual instantaneous or lagged impact of money supply growth on real GDP growth is positive, the total instantaneous or lagged impact of money supply growth on real GDP growth depends on the sign and strength of the coefficient of interaction term as well, which could rationalize the sign reversals or mixed impact.

**Table 2.8**

Impact of financial development and monetary policy effectiveness – method 2

Panel A	Model 1		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\theta_0^{FDM} + \theta_1^{FDM} + \theta_2^{FDM} = 0$	0.0007	0.09	1.70
$\theta_0^M + \theta_1^M + \theta_2^M = 0$	0.02	0.85	0.28
$\theta_0^{FD} + \theta_1^{FD} + \theta_2^{FD} = 0$	-0.0008	0.03	-2.06
Panel B	Model 2		
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\theta_0^{FDM} + \theta_1^{FDM} + \theta_2^{FDM} = 0$	0.0007	0.10	1.65
$\theta_0^M + \theta_1^M + \theta_2^M = 0$	0.01	0.75	0.35
$\theta_0^{FD} + \theta_1^{FD} + \theta_2^{FD} = 0$	-0.012	0.03	-2.06

Notes:  $\theta_0^{FDM} + \theta_1^{FDM} + \theta_2^{FDM}$  represents the overall direct effect of the interaction between money supply growth and financial development level coefficients. For testing significance of sum of the coefficients of money supply growth and level of financial development interactions, the null hypothesis is  $H_0: \theta_0^{FDM} + \theta_1^{FDM} + \theta_2^{FDM} = 0$ . Panel A and Panel B check the hypothesis for Model 1 and Model 2 respectively. Method 2 implies System GMM estimations. The period used for estimation is 1992-2014. Model 2 considers higher lags for IVs.

Moreover, high standard errors caused by probable high multicollinearity among the explanatory variables ( $\Delta Y_{t-1}$ ,  $\Delta M_{t-2}$ ,  $\Delta M_{t-1}$  and  $\Delta M_t$ ) could be another reason for that. Lastly, proper distinction and interpretation of short-run and long-run impacts can also assist in explaining it. In line with the clarification of Rao and Miller (1971), Baltagi and Pinnoi (1971) noted that

this mixed impact also implies weakening of the long-run impact as compared to the short-run ones.

**Table 2.9**

Financial development and monetary policy effectiveness – method 2 results

Dependent variable – $\Delta P_t$	
Independent Variables	System GMM
$\Delta P_{t-1}$	0.80*** (0.11)
$\Delta M_t$	0.03 (0.24)
$\Delta M_{t-1}$	0.16** (0.08)
$\Delta M_{t-2}$	-0.007 (0.03)
$FD_t$	-0.009** (0.007)
$FD_{t-1}$	0.02*** (0.01)
$FD_{t-2}$	-0.003 (0.01)
$FD_t \cdot \Delta M_t$	0.0002 (0.0005)
$FD_{t-1} \cdot \Delta M_{t-1}$	-0.001*** (0.0001)
$FD_{t-2} \cdot \Delta M_{t-2}$	-0.00002 (0.00003)
$Crisis_t$	1.9324*** (0.93)
Hansen Test (p-value)	0.14
Arellano-Bond AR(2) Test (p-value)	0.35
Number of IVs	27
Number of Observations	800

Notes:  $\Delta P$  is inflation rate.  $\Delta M$  is Money and quasi money growth rate (%).  $Crisis$  is the crisis dummy. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively. Robust standard errors are in parentheses, Method 2 implies System GMM estimations. The period used for estimation is 1992-2014.

Along with that, the insignificant impact of the sum of money supply growth coefficients in both the scenarios (Table 2.8) for the period of three years, supports the notion of monetary neutrality in the long-run. It also highlights that monetary expansion itself might not be that effective in generating economic growth. Similarly, for short-run, as mentioned earlier, financial development can leave both significantly positive and negative lagged impacts (Table 2.7).

Again, like as the previous cases, instantaneous and lagged impacts of financial development on output growth are mixed and mostly insignificant, but the sum of financial development coefficients (Table 2.8), over the time span is significantly negative for both the scenarios indicating the reversal in the finance-growth nexus, which is very much consistent with the recent literature (Rousseau and Wachtel, 2011). The chosen time frame for this research falls well under the period which has experienced either turn-around or weakening of the influence of financial development on output growth.

Notably, in both the scenarios (Table 2.8), the focus of the study, the sum of the coefficients of the interaction terms between financial development and money supply growth, over the period,  $(\sum_{j=0}^2 \theta_j^{FDM} = \theta_0^{FDM} + \theta_1^{FDM} + \theta_2^{FDM})$  calculated as for example, for Model 1,  $0.0007 = 0.0009 - 0.0002 + 0.00003$ , are strictly positive and significant, indicating positive direct influence of financial development on the impact of monetary expansion on real output growth. Considering the sensitivity of System GMM estimations, to different assumptions (Bazzi and Clements, 2013), two separate models - Model 1 and Model 2 are used as a means of robustness check, where, the two models differ only in terms of lag structure (i.e. Model 2 uses higher lags for IVs). It implies that financial development improves monetary policy effectiveness in terms of real GDP growth, which contradicts the findings of Ma and Lin (2016), but perfectly matches with other previous studies as well as the baseline results (Tables 2.4 and 2.6). Moreover, this is absolutely consistent with the intuitive explanation, upholding the probable positive influence of financial development on monetary policy performance that have been presented in this paper. However, the individual interactions between financial development and money supply growth generate significant but meagre both contemporaneous and lagged positive impacts as well as lagged negative impact.

For inflation, as well (Table 2.10), the solitary scenario has exhibited a statistically significant negative impact of the sum of the coefficients ( $\sum_{j=0}^2 \phi_j^{FDM} = \phi_0^{FDM} + \phi_1^{FDM} + \phi_2^{FDM}$ ) calculated as  $(-0.0010 = 0.0002 - 0.001 - 0.00002)$ , perfectly complying with the baseline results implying that financial development weakens the inflationary pressure created by monetary expansion and raises monetary policy effectiveness. The interpretation of negative coefficients on the interaction term between money supply growth and level of financial development, can also imply that the financially developed economies can control inflation better through monetary policy. Even, the individual interactions between financial development and money supply growth generates significantly negative lagged impact on inflation (Table 2.9). However, for short-run, both financial development and money supply growth are detected to exert significant positive impacts on inflation rate (Table 2.9). Theoretically, it has been proven that money supply growth may not always lead to inflation.

**Table 2.10**

Impact of financial development and monetary policy effectiveness – method 2

Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\phi_0^{FDM} + \phi_1^{FDM} + \phi_2^{FDM} = 0$	-0.0010	0.04	-2.00
$\phi_0^M + \phi_1^M + \phi_2^M = 0$	0.18	0.24	0.62
$\phi_0^{FD} + \phi_1^{FD} + \phi_2^{FD} = 0$	0.008	0.04	-2.00

*Notes:* For testing significance of sum of the coefficients of money supply growth and level of financial development interactions, the null hypothesis is  $H_0: \phi_0^{FDM} + \phi_1^{FDM} + \phi_2^{FDM} = 0$ . Method 2 implies System GMM estimations. The period used for estimation is 1992-2014. The sum of the coefficients represent the overall direct effect of the interaction between money supply growth and financial development level coefficients.

The growth in real output either matching or exceeding money supply growth, impreciseness associated with accurate measurement of money supply growth, decline in the velocity of

circulation in quantity theory of money equation,<sup>3</sup> prevailing unutilized capacity during recession, fall in velocity of circulation during liquidity trap – in all the aforementioned circumstances monetary expansion is very unlikely to be associated with inflation. Again, the literature (e.g. M. Gillman et al., 2007) covering numerous studies has exhibited uni-directional causation from inflation to financial development where excessive inflation, is proved to be detrimental for overall development of the financial sector. Considering the literature, the findings of this segment bears prominence and expands the avenue for further research about both the transmission mechanism and uni-directional or bi-directional causal relation among monetary expansion, financial development and inflation.

So, the similarity in findings between the empirical frameworks based on Method 1 and Method 2, signifies the robustness of the findings regarding the positive direct impact of financial development on monetary policy effectiveness and consequently has addressed the historical contradiction. The data structure and types of specifications used in this study strongly recommend relying on the findings derived from the Method 2.

In a comprehensive endeavour to portray the probable positive influence of financial development on monetary policy transmission, Singh et al. (2008) have summarized the key findings based on the literature review. The summary has revealed that although capital account liberalization, as a part of financial liberalization could make domestic monetary policy less effective, but other means of liberalization, such as promotion of greater competition through relaxing entry barriers, interest rate deregulation and gradual shift from the bank-based financial system with a view to financial disintermediation speeds up monetary policy transmission. Correspondingly, they have also argued that various forms of financial innovation, like securitization and derivatives, boosts and accentuates monetary policy transmission. All these findings imply enhancement of monetary policy effectiveness with financial development, validating this study. This positive nexus between financial development and monetary policy effectiveness has also been well projected in the literature, which makes the findings of this study extremely robust.

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<sup>3</sup>This provides an explanation why quantitative easing (increasing the money supply) did not result in inflation between 2009 and 2016 in the USA.

For inflation specification, the insignificant but positive direct impact of the sum of money supply growth coefficients for the period of three years (Table 2.10), resembles the situation that prevailed during the Great Depression. Probably, it signifies more time requirement for full price adjustments. Like as the previous two cases, instantaneous and lagged impacts also tend to be mixed but mostly positive and significant.

The significantly positive direct influence of the sum of financial development coefficients on inflation (Table 2.10), over the time span might be consistent with the findings of financial development raising inflation in countries with relatively high initial inflation rates by De Gregorior and Guidotti (1995). However, the impact of the sum of the coefficients of the interaction terms between financial development and money supply growth on inflation, which is being focused here is significantly negative.

## **2.5 Conclusion**

In spite of the rising inquisitiveness among researchers about the influence of financial development on monetary policy effectiveness, the number of empirical studies exploring the answer is quite limited. This could be due to lack of comprehensive data sets, unanimously agreed upon measures for both financial development and monetary policy effectiveness as well as strong theoretical groundwork underpinning the associations between financial development and monetary policy performance. Moreover, there are significant differences in approaches, methodologies and most importantly in findings. Considering the contradicting findings of the previous research, this study has attempted to derive a set of generalized conclusions about the direction of the relation between financial development and monetary policy effectiveness.

This study (for both aggregated and disaggregated data sets as well as for different estimation techniques - Method 1 and Method 2) has reconfirmed that the direct influence of monetary policy in conjunction with financial development on output growth for short-term stabilization and inflation tends to be positive and negative, respectively, although quite meagre in

magnitude, where the System GMM estimator for the combined data set is thought to be the more appropriate estimation technique as it addresses the endogeneity problem. It implies that financial development enhances monetary policy effectiveness. As monetary expansion, along with financial advancement can cause real GDP growth for short-term stabilization, financial development is instrumental in policy effectiveness. Consequently, the level of financial development must be considered meticulously for appropriate monetary policy formulation.

To conclude, it is noteworthy to point out that this study has not considered the economy specific socio-political-economic backgrounds containing a variety of other factors which could also impact monetary policy performance along with financial development, such as size, autonomy and efficiency of the central bank, membership to a monetary union, explicit inflation targeting regime, divergence in inflation persistence, depth and performance of the stock market, structural breaks, and extent of dollarization. This issue can be addressed in the future research works. Another limitation of this study is a methodological one. Bazzi and Clements (2013) pointed out that use of System GMM estimation technique could be robust to weak instruments to some extent, but might not completely address the risk of weak instrumentation in dynamic panel models, which had been a big problem for the Difference GMM estimator. Consequently, it is acknowledged that this intrinsic issue of weak IVs within the framework of System GMM cannot be resolved right now. Nevertheless, numerous existing high-quality studies have resorted to the System GMM estimation in spite of this flaw. Hopefully, this issue can be completely resolved in future. The greatest limitation of the analyses stems from the almost non-existent theoretical framework for monetary policy transmission incorporating financial development. Based on data availability, further development will not only stimulate more empirical research following the appropriate methodologies but also could encourage development of unexplored research-fields.



## **CHAPTER III: FINANCIAL DEVELOPMENT AND FISCAL POLICY EFFECTIVENESS**

### **3.1 Introduction**

Conventionally, economists and policymakers have emphasized the importance of prudent macroeconomic policies for both short-run stabilization to address business cycle fluctuations as well as for fostering long-run economic growth (Ames et al., 2001). These macroeconomic policies are being influenced by the social, political, institutional, structural, and geographical characteristics of the economies. Of late, some researchers have econometrically endeavored in unearthing the probable influence of financial development on monetary policy effectiveness. A majority of them have detected that financial development raises monetary policy effectiveness through contributing to real GDP growth as means for short-term stabilization.<sup>4</sup> Fiscal policy targets specific macroeconomic variables with the ultimate objective of affecting the real economy. So, scrutinizing whether financial development enhances fiscal policy effectiveness as well should be fascinating for both comparison and policy stance. This research is an attempt to explore econometrically, whether financial development influences the direct effect of fiscal policy stance on output growth for short-term stabilization. This study is expected to have noteworthy theoretical and policy implications for global economies, experiencing speedy financial development and steady reliance on fiscal measures.

Unlike monetary policy, so far, in the literature, regarding the influence of financial development on the effectiveness of fiscal policy to cause output growth for short-term stabilization, there has not been any known theoretical postulation. Conversely, the probable impact of fiscal stance on the development of financial structure has been prominent. As sustainable public finance (Rousseau and Sylla, 2003) is pivotal for a well-organized financial system, so the effect of fiscal policy on the evolution of financial system has received considerable attention, elaborating the role of government regulations and fiscal policy (e.g. La Porta et al., 1998; Levine et al., 2000; Kumhof and Tanner, 2005; Kutivazde, 2011). On the contrary, fiscal expansion and excessive government domestic borrowing is also proven to be

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<sup>4</sup> Krause, S. and Rioja, F. (2006), Luis et al. (2010), Rahman, M. (2018)

detrimental for the development of financial markets through crowding out (Hauner, 2006; Claes et al., 2012; Bua et al., 2014). Considering the prominent contribution of financial development in economic growth, Kutivazde (2011) has demonstrated that prudent government debt structuring develops the domestic bond market and minimizes the adversities of fiscal expansion for promoting long-lasting economic growth. Based upon the research of Caballero and Krishnamurthy (2004), this research has hypothesized that financial development can magnify the positive impact of fiscal expansion on output growth as a means of short-term stabilization, through nullifying the extent of crowding out.

Efficiency or effectiveness of a financial system depends on the smooth functioning of asset transformation and intermediation in serving the requirements of the real economy. The eventual purpose of a financial system is to pool the generated savings (one of the measures of accessibility dimension) and matching those with the financing opportunities for productive investments (depth dimension). An efficient financial system not only pools the domestically generated savings smoothly but also can attract foreign sources. This can minimize the extent of crowding out. Intuitively, economies do differ in financial structure, and, usually, the countries with developed financial systems are supposed to deploy increased income (as a consequence of fiscal expansion which raises aggregate demand following the Keynesian and new-Keynesian suppositions) for savings and growth-enhancing investments more efficiently. This process can continue to raise output, savings, and investments further through exertion of multiplicative impact. Consequently, countries with highly developed financial systems can contribute to output expansion more through reducing the extent of crowding out, as these economies can channel the generated savings more effectively for growth-enhancing investments. Both, theoretically and empirically, Caballero and Krishnamurthy (2004) have confirmed that advanced and emerging economies do differ in financial depth, and lack of financial depth constrains fiscal policy in the form of comparatively larger crowding outs to overturn the standard Keynesian fiscal policy prescriptions. For example, during downturns, advanced economies like Belgium or Italy could pursue expansionary fiscal policy for short-term stabilization, while emerging economies like Argentina could not have the luxury of having such policy options. Citing this, Caballero and Krishnamurthy (2004) postulated

theoretically and provided empirical evidence that crowding out could be systematically larger in emerging markets than those in developed economies and most importantly this difference could be extreme during phases of crises, when the crowding out coefficient exceeds one in emerging market economies.

Considering the depth dimension of a financial system, Caballero and Krishnamurthy (2004) highlighted the supply of funds available to the government and private sectors. The supply of funds available for productive investments in emerging economies is not expected to be as abundant as in advanced ones. Moreover, investing in an emerging market requiring far more expertise than investing in an advanced economy, such as the investors require knowledge and expertise to deal with political risk, exchange rate risk, different extents and forms of corporate, judicial and government corruption, bottlenecks with regard to bureaucracy and inefficient governance. Additionally, mentioning the prevailing segmentation of the emerging markets, they argued that the small set of investors operating in these markets possessed the required investment skills for these markets. They went on to term them as the specialists and even claimed them to be the controller of the liquidity, which was ultimately limiting the financial depth of these countries. In this context, referring back to their previous research (Caballero and Krishnamurthy, 2001; 2002; 2003; 2004), they claimed a country to be encountering a quantity financial-constraint on its borrowing, where external crises had already limited its financial depth. In that scenario they showed that any government expenditure could crowd out the investments and ultimately turn the loose fiscal stance into a contractionary one. They also illustrated two channels through which this crowding out problem could be even amplified, given that the fiscal expansion had worsened the quality of the country's assets. In the first case, the rising share of public debt to private assets could reduce the aggregate liquidity of the country's assets to compel the specialists to increase their required liquidity premium and this further reduced the financial depth. Secondly, if the lack of fiscal discipline sparked investors' fears regarding the fiscal responsibility of the government, specialists could endogenously go on to lower their valuation of the country's assets and reduced financial depth further. In their paper, they provided empirical support for the crowding out hypothesis by examining the differential response of emerging and advanced economies to fiscal shocks. Firstly, they

extended the results in (IADB 1997) and showed that fiscal policy was indeed more procyclical in emerging economies than in advanced economies. Next, they estimated the effect of a fiscal expansion on private investment to demonstrate the coefficient as more negative in emerging economies than in advanced economies. Finally, relying on “difference-in-difference” regression, their main results clearly showed that the difference between the response in crises and in tranquil times was much larger (more negative) in emerging economies than in advanced ones. Consequently, the above discussion in light of Caballero and Krishnamurthy (2004) provides the justification for this existing research i.e., as a means for short-term stabilization, economies with higher financial depth can have more effective fiscal measures for output expansion, as the extent of crowding out is expected to be minimal.

Therefore, in this research, only the depth dimension of financial development has been considered and interacted with fiscal policy stance (both fiscal expansion and fiscal size) to scrutinize the direct impact of financial development on fiscal policy effectiveness, where the capacity to expand output for short-term stabilization, has been considered as the solitary benchmark for policy effectiveness.<sup>5</sup>

The econometric framework, deployed by Ma and Lin (2016) to evaluate the direct impact of financial development on monetary policy effectiveness has been selected to analyze whether financial development influences the direct effects of both fiscal expansion and fiscal size on output growth for short-term stabilization. System GMM estimations to address endogeneity reveal that both fiscal expansion and fiscal size, proxied by annual percentage growth in general government final consumption expenditure and general government final consumption expenditure as a percentage of GDP respectively, along with concurrent financial development, do not influence real GDP growth significantly in the medium term but can have contemporaneous or lagged impacts. Analogous findings, irrespective of the selection of fiscal policy variable, emphasize the robustness of inference, which can be used to extrapolate further for policy prescription. Along with that, this research put forwards a probable explanation to the non-existent theoretical backdrop, indicating that financial development does not impact

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<sup>5</sup> The composite financial development indicator captures both credit and capital market depths

fiscal policy effectiveness. Most importantly, unlike monetary policy, effectiveness of fiscal policy is not influenced by financial development, probably due to the non-complementarity between financial development and fiscal policy, which is also addressed by Park (2015).

After the Introduction, Section 3.2 entails the detailed discussion on the deployed empirical models and methodologies. Section 3.3 provides a brief overview of the datasets. Section 3.4 captures the descriptive analysis regarding the empirical findings. Section 3.5 wraps up with the concluding remarks.

### **3.2 Methodology**

This study scrutinizes whether financial development strengthens or weakens the effects of fiscal policy on GDP growth for short-term stabilization to measure the fiscal policy effectiveness. To investigate this type of research question, an interaction term is frequently used. That is why for the selected econometric framework (Ma and Lin, 2016), deployed in this study, the interaction term between financial development variable and fiscal policy variable is introduced. If the parameter of this interaction term is significantly positive, it suggests that financial development augments the influence of the fiscal policy on real GDP growth for short-term stabilization, enhancing fiscal policy effectiveness and vice versa. Non-significance is of equal importance, as it advocates non-association or non-complementarity between financial development and fiscal policy. The detailed discussion on the deployed framework is as follows:

#### *3.2.1 Dynamic Panel Data Model*

The econometric framework, deployed by Ma and Lin (2016) to evaluate the direct impact of financial development on monetary policy effectiveness, has been utilized to analyze whether financial development influences the direct effects of both fiscal expansion and fiscal size on output growth, covering both the short and medium terms. This framework is quite common in the literature and is based on the previous research works of Ma and Lin (2016) and Karras (1999). The following macroeconomic dynamic panel data specifications have been

deployed to determine the direct influence of financial development on fiscal policy effectiveness:

$$\Delta Y_{i,t} = \beta_0 + \beta^Y \Delta Y_{i,t-1} + \sum_{k=0}^2 (\beta_k^{\Delta G} \Delta G_{i,t-k} + \beta_k^{FD} FD_{i,t-k} + \beta_k^{FD\Delta G} FD_{i,t-k} \cdot \Delta G_{i,t-k}) + \beta^C Crisis_{i,t} + u_{i,t}^Y \quad (1)$$

$$\Delta Y_{i,t} = \beta_0 + \beta^Y \Delta Y_{i,t-1} + \sum_{k=0}^2 (\beta_k^G G_{i,t-k} + \beta_k^{FD} FD_{i,t-k} + \beta_k^{FDG} FD_{i,t-k} \cdot G_{i,t-k}) + \beta^C Crisis_{i,t} + u_{i,t}^Y \quad (2)$$

where  $i$  indexes over economies and  $t$  over time;  $\Delta Y$  is real GDP growth rate of country  $i$  between period  $t$  and  $t-1$ ;  $G$  is the general government final consumption expenditure as a percentage of GDP; covering all government current expenditures for purchases of goods and services to indicate the size of the government across countries and  $\Delta G$  is the annual percentage growth in general government final consumption expenditure as a percentage of GDP, which reflects fiscal expansion. *Crisis*, a dummy variable which captures the prevalence of financial or banking crisis and  $u_{i,t}^Y$  captures the output shock. The  $\beta$ s are the parameters to be estimated. Along with the lagged impact of past growth ( $\beta^Y$ ), these regression equations capture the individual effects of fiscal expansion, fiscal size and financial development on real GDP growth as well as their interactions. Following the study of Jovanovski and Mehmed (2011), a 2-year lag for both  $G$  and  $\Delta G$  have been considered. Following previous literature (e.g., Levine, 2002; Beck et al., 2006; Demirgüç-Kunt et al., 2011; Ma and Lin, 2016), the subsequent single but comprehensive measure for financial development (capturing the depth dimension of both the credit and capital markets) is considered:

$$FD = \text{Domestic credit provided by financial sector (percentage of GDP)} + \text{Market capitalization of listed domestic companies (percentage of GDP)}$$

In constructing the  $FD$  indicator, both the credit and capital markets have been considered to depict the financial structure more comprehensively. It is plausible that a larger value of  $FD$  characterizes a higher level of financial development. The larger the values of fiscal expansion ( $\beta^{\Delta G}$ ), fiscal size ( $\beta^G$ ) and financial development ( $\beta^{FD}$ ) coefficients in equations (1) and (2) are, the more profound the individual effects of fiscal expansion, fiscal size and financial

development are on real GDP growth rate for short-term stabilization. In these output specifications, as mentioned earlier, simultaneous consideration of financial development and fiscal expansion as well as financial development and fiscal size, represented by the interaction terms  $FD_{i,t-k} \cdot \Delta G_{i,t-k}$  and  $FD_{i,t-k} \cdot G_{i,t-k}$  respectively, have captured the probable influence of financial development on fiscal policy effectiveness, i.e. whether financial development strengthens or weakens the impact of fiscal expansion and fiscal size on real GDP growth for short-term stabilization. These are the focus of this study. Significantly positive  $\beta^{FD\Delta G}$  and  $\beta^{FDG}$  coefficients imply that financial development enhances the impact of fiscal expansion and fiscal size on output growth for short-term stabilization as per the hypothesis and vice versa. To address endogeneity, System GMM estimator, developed by Blundell and Bond (1998) is applied for estimation.

Rather than focusing on the period specific individual fiscal policy stance coefficients, this study focuses on the sum of the fiscal policy stance coefficients as it can absorb the overall direct impact of fiscal policy over a timespan on the outcome variables. Ma and Lin (2016) have also accomplished that in their study. The following discussion demonstrates how summing up the individual coefficients provides the overall direct impact.

Assuming the original Auto Regressive Distributed Lag Model (2,1) specification to be

$$Y_{i,t} = \beta_0^Y + \beta_0^X Y_{i,t-1} + \beta_1^X X_{i,t} + \beta_1^X X_{i,t-1} + \beta_2^X X_{i,t-2} + v_{i,t}^Y \quad (3)$$

Here, endogenous variable is  $Y_{i,t}$  and the single exogenous variable, with both contemporaneous and lagged impacts (2 year) is  $X_{i,t}$ , standard error term is  $v_{i,t}^Y$ . The specifications considered in this study allow one or more variables to affect  $Y$  with a lag, if  $X$  changes on temporary basis, immediate change in  $Y$  due to one-unit increase in  $X$  at time  $t$  is  $\beta_0^X$ ,  $\beta_1^X$  is the change in  $Y$ , one period after the temporary change in  $X$ , and  $\beta_2^X$ , is the change in  $Y$ , two periods after the change. At time  $t+3$ ,  $Y$  has reverted back to its initial level:  $Y_{t+3} = Y_{t-1}$ . With the permanent increase in  $X$ , after one period,  $Y$  has increased by  $\beta_0^X + \beta_1^X$ , and after two periods,  $Y$  has increased by  $\beta_0^X + \beta_1^X + \beta_2^X$ , there are no further changes in  $Y$  after two periods like as the case of temporary changes in  $X$ . It shows that the sum of the coefficients on current and lagged  $X$ s is  $\beta_0^X + \beta_1^X + \beta_2^X$ , which is the total direct change in  $Y$ , given a permanent increase in  $X$ , which is often

of interest in this type of distributed lag models, like the case of Ma and Lin (2016). In other words, after a permanent increase in  $X_t$  at time  $t$ , the change in  $Y_t$  is worth  $\beta_0^X$ . Again, in the next period  $(t+1)$ ,  $X_{t+1}$ , brings changes in  $Y_{t+1}$  worth the extent of  $\beta_1^X$ . Finally, at the end of period  $(t+2)$  the changes in  $Y_{t+2}$  caused by the changes in  $X_{t+2}$  is equivalent to the magnitude of  $\beta_2^X$ . Consequently, the summing of the individual coefficients  $\beta_0^X + \beta_1^X + \beta_2^X$  provides the overall direct impact. Because of the often-substantial correlation in  $X$  at different lags that is, due to multicollinearity, it can be difficult to obtain precise estimates of the individual  $\beta$ s, even when the  $\beta$ s cannot be precisely estimated, we can often get good estimates of the overall direct impact through summing the coefficients. In the similar way, this paper sums up the individual coefficients capturing the interactions between fiscal policy stance and level of financial development from the dynamic panel data specifications, to derive the overall direct effects for evaluating fiscal policy effectiveness.

### 3.3 Data

For quantitative assessment, a panel data set is constructed, prioritizing the notion of unbiased and logical sampling. The data set is comprised of sixty developed, developing and least-developed economies and covers the time span 1992-2014. The data for real GDP growth rate, annual percentage growth in general government final consumption expenditure (percentage of GDP), general government final consumption expenditure (percentage of GDP), domestic credit provided by the financial sector (percentage of GDP), market capitalization of listed domestic companies (percentage of GDP) and the variable *Crises* are derived from sources such as The World Development Indicators, Financial Development and Structure Database of the World Bank, International Financial Statistics Database of the International Monetary Fund and Laeven and Valencia (2012).

### 3.4 Results

Tables 3.1 and 3.2 exhibit the System GMM estimation results for specifications (1) and (2). As explained earlier, the significance of the coefficients of the interaction terms exhibits the results of the examination of hypothesis. Notably, the focus of the study, the sum of the



coefficients of the interaction terms ( $\beta_0^{FD\Delta G} + \beta_1^{FD\Delta G} + \beta_2^{FD\Delta G}$ ) in Table 3.3 (Panel A) and ( $\beta_0^{FDG} + \beta_1^{FDG} + \beta_2^{FDG}$ ) in Table 3.3 (Panel B) are statistically insignificant, demonstrating that both fiscal expansion ( $\Delta G$ ) and fiscal size ( $G$ ), combined with financial development ( $FD$ ) cannot directly affect real GDP growth rate in the medium-term. Nevertheless, the individual interactions between financial development and fiscal expansion generate significant but meager contemporaneous positive and lagged negative impacts (Table 3.1). However, the individual interactions between financial development and fiscal size have failed to generate significant contemporaneous or lagged impacts on output growth (Table 3.2). All these confirm the non-existing influence of financial development on the direct effect of fiscal stance on real GDP growth rate. The coefficient of the *Crisis* dummy exerts significant negative impact on output growth, irrespective of fiscal policy variable (-1.68 for fiscal expansion in Table 3.1 and -1.65 for fiscal size in Table 3.2). Real GDP growth rate has moderate degree of persistence (0.40 in Table 3.1 and 0.53 in Table 3.2).<sup>6</sup>

For short-term dynamics, in Table 3.1, fiscal expansion ( $\Delta G$ ) is leaving significant contemporaneous negative and lagged positive impacts on real GDP growth rate, implying that, in spite of concurrent crowding out at time  $t$ , fiscal expansion is able to influence future (up to next 2 years) output expansion. Econometrically, several justifications can be put forward for this sign reversal or mixed impacts. Firstly, in this context, the coefficient of fiscal expansion does not merely capture the sole impact of fiscal expansion on real GDP growth, as it is interacted with the level of financial development, prevailing in that period. So, even if the individual instantaneous or lagged impact of fiscal expansion on real GDP growth is either positive or negative, the total instantaneous or lagged impact of fiscal expansion on real GDP growth depends on the sign and strength of the coefficient of interaction term as well, which could rationalize the sign reversals or mixed impact. Moreover, high standard errors caused by probable high multicollinearity among the explanatory variables ( $\Delta Y_{t-1}$ ,  $\Delta G_t$ ,  $\Delta G_{t-1}$  and  $\Delta G_{t-2}$ ) could be another reason for that. Lastly, proper distinction and interpretation of short-term and medium-term impacts can also assist in explaining it.

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<sup>6</sup>The conducted model experiments allowing for more lags for output growth in the regressions confirm that the coefficients with higher lag order are statistically insignificant as well as not being the focus of the study which is why they are not reported.

**Table 3.1**

Financial development and fiscal policy (expansion) effectiveness – GMM results

Independent Variables	System GMM
$\Delta Y_{t-1}$	0.40*** (0.10)
$\Delta G_t$	-0.16** (0.08)
$\Delta G_{t-1}$	0.06* (0.04)
$\Delta G_{t-2}$	0.09** (0.04)
$FD_t$	-0.007 (0.009)
$FD_{t-1}$	0.006** (0.04)
$FD_{t-2}$	-0.001 (0.006)
$FD_t \cdot \Delta G_t$	0.002** (0.001)
$FD_{t-1} \cdot \Delta G_{t-1}$	-0.008* (0.0004)
$FD_{t-2} \cdot \Delta G_{t-2}$	-0.001** (0.0005)
$Crisis_t$	-1.68** (0.56)
Tests (p-value)	
Hansen Test	0.77
Arellano-Bond AR(2) Test	0.21
Number of IVs	40
Number of Groups	54
Number of Observations	1134

Notes:  $\Delta Y$  is real GDP growth rate (annual percentage). The period used for estimation is 1992-2014.  $\Delta G$  is annual percentage growth in general government final consumption expenditure as a percentage of GDP.  $Crisis$  is the crisis dummy. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively.

In line with the clarification of Rao and Miller (1971), Baltagi and Pinnoi (1971) noted that this mixed impact also implies weakening of the medium or long-term impact as compared to the short-run ones. For the short-run, financial development ( $FD$ ) is detected to exert significant positive lagged impacts on output growth (Table 3.1).

**Table 3.2**

Financial development and fiscal policy (size) effectiveness – GMM results

Independent Variables	System GMM
$\Delta Y_{t-1}$	0.53*** (0.20)
$G_t$	-0.62 (0.70)
$G_{t-1}$	0.17 (0.45)
$G_{t-2}$	0.32 (0.30)
$FD_t$	0.03 (0.03)
$FD_{t-1}$	-0.03 (0.03)
$FD_{t-2}$	0.001 (0.02)
$FD_t \cdot G_t$	-0.003 (0.002)
$FD_{t-1} \cdot G_{t-1}$	0.003 (0.003)
$FD_{t-2} \cdot G_{t-2}$	-0.001 (0.002)
$Crisis_t$	-1.65** (0.64)
Tests (p-value)	
Hansen Test	0.22
Arellano-Bond AR(2) Test	0.49
Number of IVs	44
Number of Groups	54
Number of Observations	1134

Notes:  $\Delta Y$  is real GDP growth rate (annual percentage). The period used for estimation is 1992-2014.  $G$  is general government final consumption expenditure as a percentage of GDP.  $Crisis$  is the crisis dummy. The symbols \*\*\*, \*\* and \* indicate statistical significance at 1% level, 5% level and 10% level respectively.

However, fiscal size ( $G$ ) in Table 3.2, is neither leaving contemporaneous nor lagged significant impact on real GDP growth rate, implying that fiscal size at time  $t$  is unable to influence concurrent or future (up to next 2 years) output growth. Correspondingly, in the short-run,  $FD$  does not impact output growth (Table 3.2).

**Table 3.3**

Impact of financial development and fiscal policy effectiveness

Panel A		Fiscal expansion	
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\beta_0^{FD\Delta G} + \beta_1^{FD\Delta G} + \beta_2^{FD\Delta G} = 0$	-0.007	0.68	-0.41
Panel B		Fiscal size	
Null Hypothesis (Sum of Coefficients = 0)	Sum of Coefficients	p value	Z statistics
$\beta_0^{FDG} + \beta_1^{FDG} + \beta_2^{FDG} = 0$	-0.001	0.53	-0.70

Notes:  $\beta_0^{FD\Delta G} + \beta_1^{FD\Delta G} + \beta_2^{FD\Delta G}$  and  $\beta_0^{FDG} + \beta_1^{FDG} + \beta_2^{FDG}$  represent the overall direct effects. Panel A and Panel B check the hypothesis for fiscal expansion and fiscal size respectively. The period used for estimation is 1992-2014. For testing the significance of sum of coefficients, the null hypotheses are  $H_0: \beta_0^{FD\Delta G} + \beta_1^{FD\Delta G} + \beta_2^{FD\Delta G} = 0$ ;  $H_0: \beta_0^{FDG} + \beta_1^{FDG} + \beta_2^{FDG} = 0$ .

Unlike the monetary policy transmission mechanism, most economists disagree over the basic theoretical effects of fiscal expansion as well as the interpretation of the existing empirical evidence (Perotti, 2007), which is primarily attributed to the subtle differences in assumptions in different schools regarding transmission mechanisms. Several researchers have extensively endeavored to empirically analyze the effects of government spending on economic growth, which substantially vary due to heterogeneous methodologies, selection of expenditure variables (productive or non-productive expenditure) (Gemmell 2004), time-frames (short-run or long-run) and sample economies (Miller and Russek 1997). Consequently, the findings of this study, regarding the impact of fiscal policy variable on output growth in the short-run are consistent with the literature (e.g. Kuk 2007, Gemmel, 2004). Although numerous empirical studies (e.g. Roubini and Sala-i-Martin 1992; King and Levine 1993; Calderon and Liu 2003) have established a positive association between financial development and economic growth, this notion has recently been losing its potency as experts now envisage either a non-existing or non-monotonic finance-growth nexus. (Manganelli and Popov, 2013; Rousseau and Wachtell, 2011). All these justify the nature of short-run dynamics between financial development and output growth in this study.

### 3.5 Conclusion

The lack of empirical studies, exploring interaction between financial development and fiscal policy effectiveness could be due to lack of comprehensive datasets, unanimously agreed upon measures of financial development and fiscal policy effectiveness as well as most crucially due to the inadequate theoretical background. This research has attempted to capture the influence of financial development on fiscal policy effectiveness, defined in terms of the capacity of fiscal variable to expand output for short-term stabilization and can be considered as a substantial contribution to the existing literature. System GMM estimations to address endogeneity reveal that both fiscal expansion and fiscal size, proxied by annual percentage growth in current government final expenditure and general government final consumption expenditure as a percentage of GDP respectively, along with concurrent financial development do not directly influence real GDP growth in the medium term but can have short-run contemporaneous or lagged impacts. So, it puts forward a probable explanation for the non-existent theoretical backdrop and indicates that financial development doesn't impact fiscal policy effectiveness regardless of consideration of fiscal policy variable. Most importantly, as a policy comparison, unlike monetary policy, effectiveness of fiscal policy is not influenced by financial development, probably due to the non-complementarity between financial development and fiscal policy, which is also attested by Park (2015).

To conclude, it is noteworthy to point out that this study has not considered the economy specific socio-political-economic backdrops containing a variety of other factors within the framework, which could also impact fiscal policy performance along with financial development, such as size, efficiency of the government etc. This issue can be addressed in the future research works. Another limitation of this study is a methodological one. Bazzi and Clements (2013) pointed out that use of System GMM estimation technique could be robust to weak instruments to some extent, but might not completely address the risk of weak instrumentation in dynamic panel models, which has been a big problem for the Difference GMM estimator. Consequently, it is acknowledged that this intrinsic issue of weak IVs within the framework of System GMM cannot be resolved right now. Nevertheless, numerous existing high-quality studies have resorted to the System GMM estimation in spite of this flaw.

Hopefully, this issue can be completely resolved in future. The greatest limitation of the analyses stems from the non-existent theoretical framework for fiscal policy transmission mechanism incorporating financial development. Based on data availability consideration of more control variables in the framework as well as further development will not only stimulate more empirical research following the appropriate methodologies but also could encourage development of unexplored research-fields.

## **CHAPTER IV: EFFECT OF FINANCIAL LITERACY ON USAGE OF UNCONVENTIONAL BANKING AND NON-BANKING FINANCIAL SERVICES ACROSS COUNTRIES**

### **4.1 Introduction**

Previous cross-country studies have provided evidence regarding the positive influence of financial literacy on financial inclusion in conventional banking services. The present study extends this topic through investigating whether financial literacy can improve the use of unconventional banking and non-banking financial services too, which have not been examined before in a cross- country framework.

Financial inclusion has been recognized as an enabler for seven of the seventeen Sustainable Development Goals (SDGs), for its capacity to reduce poverty, improve livelihoods and contribute to ultimate economic growth and development. Consequently, the World Bank Group considers financial inclusion to be instrumental for boosting shared prosperity and has put forward an ambitious global goal to reach Universal Financial Access (UFA) by 2020. In that pursuit, the World Bank has come up with The Global Financial Inclusion (“Global Findex”) database for continuous monitoring of the state of financial inclusion across countries. The IMF has also associated financial inclusion with numerous macroeconomic outcomes, such as economic growth, stability and equality (Sahay et al., 2015) and it offers the most comprehensive global supply-side data on financial inclusion in the form of the IMF Financial Access Survey (FAS). As one of the crucial policy tools for achieving the SDGs, Klapper et al. (2016) emphasized financial inclusion, which is usually measured as access to and use of financial services. Demircuc-Kunt et al. (2017) described the possible different forms of financial inclusion and portrayed the associated social benefits with inclusive growth and development. Their study summarized the empirical evidence on how the use of formal banking and non-banking financial services like payments, savings accounts, loans/credits, and insurance as a part of broader financial inclusion can contribute to inclusive growth and economic development around the world, especially for poor households.

Financial literacy is considered as a demand side determinant of financial inclusion. It is well established in the literature that financial inclusion can be enhanced through an array of supply

side and institutional factors. Compared to that, linking financial literacy with financial inclusion is relatively new. Most of the previous studies comes under the category of country specific micro-studies, which are conducted in individual micro settings that entail randomized controlled trials (RCTs) (Cole et al., 2011; Jamieson et al., 2014; Bruhm et al., 2016; Calderone et al., 2018; Horn et al., 2020). These micro-studies cause doubt regarding the extent to which the results can be generalized. Cross-country studies can resolve this issue and assist in generalization. Furthermore, there are some country-specific or small sample based cross-country studies and descriptive studies (Atkinson and Messy, 2013; Kapparov, 2018; Klapper and Lusardi, 2020; Grohmann and Menkhoff, 2020) that discuss the financial literacy-financial inclusion relationship.

In another strand of literature, financial literacy is detected to impact financial behaviour by influencing financial decision making, based on the notion that improved financial literacy exerts both direct and indirect positive effects on financial behaviour such as savings, borrowing, investment etc. In this strand of literature, most of the research was conducted within the developed-economy context and did not consider a large number of countries to generalize the findings (Kaiser and Menkhoff, 2015; Duflo and Saez, 2003; Lusardi and Mitchell, 2007; Campbell, 2006, *inter alios*; Stango and Zinman, 2009, *inter alios*; van Rooij et al., 2011). Kaiser and Menkhoff (2015) also pointed out the associated problems for developing countries, often with even more serious consequences. Doing a meta-analysis of thirty-one studies, they discovered positive correlation between financial literacy and financial behaviour which hinges on the intuition that a rise in financial literacy score is a fundamental catalyst in a causal chain that leads to behavioral improvement (e.g., Grohmann et al. 2015, *inter alios*). But this research does not delve into that topic, rather it focuses on extending the financial literacy-broader financial inclusion relationship through investigating the unconventional banking and non-banking financial services. Grohmann and Menkhoff (2020) also predicted this shift in future research, from scrutinizing the most basic forms of financial inclusion, encompassing access of financial services (bank account and debit card ownership) to usage of financial services (payments, remittance, insurance etc.).



Taking into consideration both access to and usage of financial services, previous cross-country studies have emphasized the most basic forms of financial inclusion. Resorting to conventional banking services, like account ownership, savings, ownership and use of debit cards as the outcome variables, Grohmann et al. (2018) and Grohmann and Menkhoff (2018) accomplished the first large and comprehensive cross-country studies, generalizing the positive influence of financial literacy on financial inclusion. Taking country specific variations into account and addressing possible endogeneity, Grohmann et al. (2018) were the first to demonstrate the beneficial effect of financial literacy on financial inclusion across countries. Moreover, they discovered substitutability between financial literacy and financial infrastructure for “access to finance”. However, regarding “use of financial services”, higher financial literacy was found to complement and strengthen the effect of higher financial depth. As mentioned earlier, in their research, they examined some conventional banking services as financial inclusion variables. Meanwhile, Demirguc-Kunt et al. (2017) described some other possible forms (unconventional banking and non-banking financial services) of financial inclusion, in addition to those conventional banking services. Following the natural line of argument, this study puts forward the empirical research question: does financial literacy also improve the use of unconventional banking (electronic payments) and non-banking financial services (mobile-phone payments, mobile-phone money transfers, life insurance premium payments, and non-life insurance premium payments) alongside conventional banking services in a cross-country framework? Given this research question, this research contributes to the literature through examining some unconventional banking and non-banking financial services, which have not been examined before. This present research is the first cross-country study to consider some other types of financial services for examining the positive influence of financial literacy on financial inclusion. Financial literacy does improve use of electronic/mobile phone payment services such as electronic payment, bill payment through mobile phones and mobile phone remittance. However, financial literacy, which is significantly different from insurance literacy has failed to entice the usage of insurance related services. Consideration of endogeneity also does not alter the findings. Consequently, financial literacy promotes unconventional banking and non-banking financial services in a cross-country setup too.

According to Grohmann and Menkhoff (2020), multi-levelled financial inclusion can be considered as both a more inclusive and far-reaching extension of financial development. Like financial development, financial literacy has the potential to generate a number of positive benefits, like increased growth and reduced inequality within a country. Consequently, they termed the enhancement of financial literacy among all people a desirable policy goal, both from an individual as well as from a macroeconomic perspective and linked it with the key policy goal of financial inclusion of the World Bank as well as other international institutions. Therefore, bearing in mind the growing emphasis on extracting the possible benefits from a broader financial inclusion, the topic seems to be a potent one as it will shed some light on the financial literacy-broader financial inclusion linkage, through covering unconventional banking and non-banking financial services. It is anticipated that the findings of this study will help policy makers, who are promoting financial inclusion for equitable and sustainable growth, to understand how financial literacy affects unconventional banking and non-banking financial services. It will assist them to meticulously consider improving financial literacy through financial education and training as well as awareness building at the macro level as a tool not only for financial inclusion, but also to improve financial behaviour of people for achieving overall financial sector stability. Moreover, the findings of this study can also be useful to academicians for generalizing the causal links between financial literacy and a broader financial inclusion, covering diversified facets.

After the Introduction in Section 4.1, Section 4.2 entails a brief overview of the theoretical developments and the literature. Discussions on the deployed empirical models, methodologies and the data set are featured in Section 4.3. Section 4.4 presents the empirical results and Section 4.5 provides a comprehensive discussion. Section 4.6 wraps up the paper with the concluding remarks.

## **4.2 Literature Review**

Financial inclusion implies people accessing and using a range of appropriate formal financial services effectively, which are provided responsibly and safely to the consumer, preserving sustainability of the service providing financial institutions in a well governed

financial system. In spite of the limited empirical evidence, policies for financial inclusion have attracted great attention from scholars, policymakers, and regulators, as theoretically, it has been associated positively with economic growth and development, especially for developing economies (Levine, 2005; Sarma and Pais, 2011; Sahay et al, 2015; Thi-Hong et al., 2021 etc.). Demirguc-Kunt et al. (2017) provided a brief description of the different forms of financial inclusion – conventional and unconventional banking services and non-banking financial services along with portraying the probable benefits. According to them, the most basic level of financial inclusion begins with having a deposit or transaction account at a bank or other financial institution or through a mobile money service provider, which can be used to make and receive payments, transfer funds and to store or save money. Extending this narrow concept of financial inclusion, they also stressed accessing credit from formal financial institutions as well as formal insurance coverage for risk management. Their study summarized the empirical evidence on how the use of formal banking and non-banking financial services like payments, savings accounts, loans/credits, and insurance as a part of broader financial inclusion can contribute to inclusive growth and economic development around the world, especially for poor households. Yet, they discovered that all financial products are not equally effective in reaching the developmental goals. Considering the mixed findings regarding the impacts of micro-credit and household finances for low-income groups, they also pointed out the shift in research focus in recent years, towards account ownership and agricultural insurance. Although they mentioned some concerns about the generalization and applicability of the findings derived from micro-studies, they highlighted the immense potential of the growing literature on measuring the benefits of broader financial inclusion, covering different types of financial services, both banking and non-banking. Both these issues have been addressed to some extent in this study, as it investigates the influence of financial literacy on a broader financial inclusion through covering some unconventional banking and non-banking financial services in a cross-country setup.

Financial literacy is having the required understanding, knowledge, experience and skills that enables individuals to make informed and effective decisions to navigate the financial system, composed of both formal and informal sectors, for utilizing their financial resources in the best

possible manner. Financial literacy is considered to be a fundamental demand side factor of financial inclusion. As financial inclusion can contribute to financial development significantly, Klapper et al. (2016) put emphasis on financial inclusion, which is usually measured as access to and use of financial services. They also highlighted it as one of the crucial policy tools for achieving the SDGs. For financial inclusion, most researchers have stressed the supply-side, focusing on the infrastructural and institutional aspects of the financial system.

In conventional commercial banking, financial institutions usually accept deposits from the public and provide credits for the purposes of consumption and investment to make profit. But now-a-days, the range of products and services offered by commercial banks have increased manifold as well as being highly diversified. Core banking products include the basic services like holding bank accounts and offering different savings plans for deposit collection, providing numerous categories of credit (bank loans – consumer credit, working capital finance, industrial credit, bank overdraft, credit card etc.), handling cheques (debit card is a sort of cheque) etc. Some of these services are covered by the previous study as means of financial inclusion. This research targets the other forms of banking services, popularly known as unconventional banking services as well as the insurance services, belonging to the non-banking financial services category, as forms of financial inclusion. Electronic fund transfer and payments, mobile phone payments and fund transfers are some popular means of modern-day unconventional banking.

Grohmann et al. (2018) provided the first known cross-country study on the demand side factor of financial inclusion, which is financial literacy. Taking into consideration both access to and usage of financial services, they linked financial literacy with the basic forms of financial inclusion. Resorting to the most basic conventional banking services, like account ownership, savings, ownership and use of debit cards as the outcome variables, Grohmann et al. (2018) and Grohmann and Menkhoff (2018) accomplished the first large and comprehensive cross-country study, generalizing the positive influence of financial literacy on financial inclusion. Considering country specific variations and addressing possible endogeneity, Grohmann et al. (2018) were the first to demonstrate the beneficial effect of financial literacy on financial inclusion across countries. Although they considered a narrow definition of financial inclusion

through covering only the most basic conventional banking services, their pivotal research was the first to discover the substitutability between financial literacy and financial infrastructure for “access to finance”. However, regarding the “use of financial services”, higher financial literacy was found to complement and strengthen the effect of higher financial depth. As mentioned earlier, in their research, they examined some conventional banking services as financial inclusion variables. Meanwhile, Demircuc-Kunt et al. (2017) described some other possible forms (unconventional banking and non-banking financial services) of financial inclusion, in addition to those conventional banking services. Following this line of argument, this study puts forward the empirical research question: does financial literacy also improve the use of unconventional banking (electronic payments) and non-banking financial services (mobile-phone payments, mobile-phone money transfers, life insurance premium payments, and non-life insurance premium payments) alongside conventional banking services in a cross-country framework? Given this research question, this research extends the literature through examining some unconventional banking and non-banking financial services, which have not been examined before.

Grohmann et al. (2018) referred to and summarized three strands of literature in their study - (i) country specific and cross-country studies on financial inclusion, (ii) micro studies on financial inclusion and (iii) micro and cross-country (very small sample) studies on financial literacy. Grohmann and Menkhoff (2020) also put forward a comprehensive literature review in linking financial literacy with financial inclusion. As stated before, most of the previous studies fall under the category of country specific micro-studies, which are conducted in individual micro settings that entail randomized controlled trials (RCTs). These micro-studies (Cole et al., 2011; Jamieson et al., 2014; Bruhm et al., 2016; Calderone et al., 2018; Horn et al., 2020) cause concern regarding the generalization of the findings. Furthermore, there are some country-specific or small sample based cross-country studies and descriptive studies (Atkinson and Messy 2013; Kapparov, 2018; Klapper and Lusardi, 2020; Grohmann and Menkhoff, 2020) that discuss the financial literacy-financial inclusion relationship. Although the evidence from micro studies is generally mixed, it has demonstrated a positive relationship between financial education or financial literacy and financial inclusion. However, the issue of generalization of

the findings still remains. Cross-country studies can resolve this issue and assist with generalization. This worked as one of the major background motivations for the previous study to link financial literacy empirically with the most basic form of financial inclusion in a cross-country set up through covering only a few conventional banking services. As mentioned earlier, this research extends the proposition of the previous study through checking the influence of financial literacy on some unconventional and non-banking financial services in a cross-country setting. Additionally, Kapparov (2018) also tried to link some of the proposed outcome variables of this research with financial literacy in his country specific study. However, his descriptive study did not establish a causal relationship between financial literacy and unconventional and non-banking financial services. This research is the first known cross-country empirical study of that sort. Consequently, the literature review also validates the potency and uniqueness of this research topic.

### 4.3 Methodology and Data

#### 4.3.1 Methodology

In a simple extension of the Grohmann et al. (2018) framework, several new outcome variables (electronic payments, mobile phone used to pay bills, mobile phone used to transfer money, life insurance premium volume share to GDP and non-life insurance premium volume share to GDP), pertaining to unconventional banking and non-banking financial services are considered. To scrutinize the probable influence of financial literacy on these new outcome variables in a cross-country setting, the following specification is deployed:

$$FI_i = \alpha + \beta FL_i + \sum_{k=1}^n \gamma_k X_{k,i} + u_i \quad (1)$$

In contrast to the previous study, the focus variable of this study is  $FI$ ; the measure of financial inclusion, that captures the use of unconventional banking and non-banking financial services.  $X_k$  is a scalar that represents the  $k$ th control variable, where the array of control variables includes country, financial infrastructure and institution-specific characteristics. It is hypothesized that if  $\beta > 0$ , then financial literacy will have the desired positive influence on

the newly examined unconventional banking and non-banking financial services variables, embodying different forms of financial inclusion in a cross-country setting. Following the previous study, this research incorporates both Ordinary Least Squares (OLS) and Instrumental Variable (IV) estimation techniques with robust standard errors. The previous study considered level of numeracy in primary education as an external instrument for tackling endogeneity. In addition to that, one new IV, primary education completion rate, with lagged value is incorporated in this research.

The IV estimations pose a concern due to a significant reduction in sample size. Consequently, another alternative method of estimation, in line with the methodology of Levine and Zervos (1996), Rousseau and Wachtel (2002), Bansak et al., Morin and Starr (2007), Rosseau and Wachtel (2011), Clemens et al. (2012) and others is deployed to address this dual issue of endogeneity and sample size preservation simultaneously. In this estimation method, the periodic average (2014-2017) of the outcome variable is regressed on the initial values (2014) of all the regressors for estimation and this estimation technique is referred here as Lagged OLS. Endogeneity and simultaneous bias have been a concern in empirical economic analysis. Replacing a suspected endogenous explanatory variable with its own lagged value or lagged or initial values of all regressors has been quite common across a wide variety of disciplines in economics and finance. This prevalent practice can be confirmed by numerous studies where the rationale is explicitly put forward with justifying statements like ‘We avoid poor-quality instrumental variables and instead address potential biases from reverse and simultaneous causation by... lagging’ (Clemens et al., 2012); ‘The variables  $\Delta IP$ ,  $I/K$ , and  $STDEV$  are intended to capture effects on utilization of output growth, investment level, and output volatility, respectively; they are included in lagged form to avoid problems with simultaneity’ (Bansak et al., 2007) etc.

In analysing the impact of financial literacy on the outcome variables, representing different types of unconventional banking and non-banking financial services, three types of regressors are considered. The focus variable, financial literacy is a demand side variable i.e., financially literate consumers are expected to create the demand for financial products and services. But as per the postulations of the previous study, financial literacy is supposed to impact the

outcome variables together with the supply side. Country and institution specific factors must also play a pivotal role in that regard. In line with the previous estimation framework, this research considers financial sector depth, bank branch penetration, and other institutional factors such as strength of legal index and cost of doing business as regressors to represent the supply side and state of the institutional development. Along with these, country specific characteristics are also incorporated within the framework as control variables. Following the methodology of the previous study, three cases are considered for estimation which is derived from specification (1).

Case 1

$$FI_i = \alpha + \beta FL_i + u_i \quad (2)$$

Case 2

$$FI_i = \alpha + \beta FL_i + \gamma_1 GDP_i + \gamma_2 Pop_i + \gamma_3 Sec\ edu_i + \gamma_4 Ter\ edu_i + u_i \quad (3)$$

Case 3

$$FI_i = \alpha + \beta FL_i + \gamma_1 GDP_i + \gamma_2 Pop_i + \gamma_3 Sec\ edu_i + \gamma_4 Ter\ edu_i + \gamma_5 Fin\ depth_i + \gamma_6 Bank\ branch_i + \gamma_7 Legal\ rights_i + \gamma_8 Doing\ business_i + u_i \quad (4)$$

In the first case, only the demand side factor financial literacy is considered as the sole right-hand side variable. However, usage of unconventional banking and non-banking financial services is expected to also depend on other characteristics of development, especially on the financial infrastructure. Consequently, case two and case three take into account country characteristics and country and institutional characteristics as well as financial infrastructure respectively. But in the Results and Discussion sections of the paper, only the estimated results of case three (which considers all the factors – demand and supply side factors as well as country and institutional characteristics) are presented and analysed, as it provides a more comprehensive coverage. However, estimated results of case one and case two are reported in the Appendix (Tables A 4.6 to A 4.11). This also serves as a means for robustness check.



For re-examining whether the nature of the relationship between financial literacy and the unconventional banking and non-banking financial services is casual or not, IV estimation technique is employed, as in Grohmann et al. (2018). They proposed contemporary numeracy in primary school as a suitable instrument for financial literacy, as they perceived it to possess the required characteristics of a good instrument, i.e., highly correlated with financial literacy and free from having a direct link to the outcome variables manifesting financial inclusion. In their paper, they provided a detailed discussion in that regard justifying their propositions. Consequently, in this research, the exact IV used by them is considered. Additionally, this research introduces one new IV - primary education completion rate, with lagged value. To nullify the probable contemporaneous influence of education on the outcome variables as well as to satisfy the conditions of having the foundations of good financial literacy in the early part of the life that might entice financial inclusion later, the lagged values of the new IV are considered. It is anticipated that the new IV will contribute to financial literacy for stimulating access and usage of unconventional banking and non-banking financial variables like electronic payments, mobile phone payments and remittances at a later stage of life with a lagged impact. Moreover, both the IVs are observed to be highly correlated with the financial literacy variable, albeit with one caveat. The previous study experienced quite a reduction in the sample size even after using the imputation method for generating educational IV, as the data on those were not available for all the countries. For this research, the dataset, derived from the World Development Indicators Database, is utilized for the new IV, rather than resorting to any sort of intrapolation. But this also reduces the sample size significantly. When this relatively small sample on IVs is matched with the observations on the outcome variables for estimation, which are also relatively smaller than those of the outcome variables used in the previous study, the whole sample size experiences a sizeable reduction. That is why the use of IV estimation technique is to some extent has adversely affected through the reduction of sample size. Consequently, unlike the previous study, this research emphasizes the alternative method (Lagged OLS) to tackle the endogeneity issue.

### 4.3.2 Data

Country, financial infrastructure and institution-specific control variables (per capita real GDP, working age population, secondary education, tertiary education, private credit-GDP ratio, bank-branch penetration, strengths of legal rights, and ease of doing business), are derived from the framework of the previous study along with the entire data set. The previous study utilized the cross-country financial literacy data as described in Klapper, et al. (2015) and matched those with the World Bank's Findex data set on the "access to finance" and "use of financial services" (Demirguc-Kunt and Klapper, 2012; Demirguc-Kunt and Klapper, 2013; Demirguc-Kunt et al., 2015). To accomplish the first cross-country study, the data for the control variables, representing country specific characteristics were extracted from the World Bank Database. In the process, along with extending the single country specific micro studies, the previous study contributed to the literature, primarily through authenticating the findings of positive and systematic influence of financial literacy on conventional banking services as a manifestation of financial inclusion. For extension purpose, in this research, the data on various outcome variables (reported in Table 4.1), representing unconventional banking and non-banking financial services, are once again collected from the World Bank's Findex database.

The variable financial literacy is of crucial importance for this research. In fact, both the previous cross-country study and this research have been feasible due to the availability of country level data sets on financial literacy, documenting the degree of financial literacy for 143 countries as described in Klapper et al. (2015). As mentioned before, the Findex data set of the World Bank, on access to and use of financial services (2013; Demirguc-Kunt and Klapper, 2012; Demirguc-Kunt et al., 2015), is matched with this country level financial literacy data. The variable "financial literacy" is constructed from five survey items, which are collected by Gallup, together with the World Bank, and the Global Financial Literacy Centre. The representative surveys covered more than 1000 adults per country for 143 countries in 2014 and included questions on four concepts: risk diversification, inflation, interest rate and interest compounding, which were derived with slight modifications, from the literature on measuring financial literacy (Lusardi and Mitchell, 2014; Xu and Zia, 2012). The item on risk diversification was simplified for ensuring wider coverage of countries beyond the advanced

economies and the item on interest rate was adapted from Cole et al. (2011). The financial literacy score, proposed in Klapper et al. (2015), is used in this study as a dummy variable, giving a “1” if questions on at least three out of four financial literacy concepts are answered correctly by a person. The score per country is the proportion of 1000 people asked that can answer questions on three out of four concepts correctly. For example, the question to address the understanding of interest rate, is: “Suppose you need to borrow USD 100. Which is the lower amount to pay back: USD 105 or USD 100 plus three percent?” The response categories are: “a) 105 USD, b) 100 USD plus three percent, c) don’t know, d) refuse”. 50 percent of all respondents across the world provided the right answer “b”, while the remaining 50 percent answered either “a”, “c” or “d”. Although this measure of financial literacy is imperfect, it is in line with the literature, and most importantly, it allows the economists to trace the probable impact of financial literacy on different forms of financial inclusion such as availing conventional and unconventional banking services and non-banking financial services at the country level. The list of the countries, used in the regression analysis is provided in Table A 4.5 of Appendix. The selection of countries was made based on the availability of data.

Table A 4.1 lists all the right-hand side variables and IVs used in this research, as well as contains the corresponding summary statistics, brief description and the data sources for the deployed variables. The previous study provided quite a detailed description on the data i.e., it comprehensively presented the reasoning behind the selection of a particular variable in the framework, the construction process of the variable and the data sources. Based on that, the data for this existing research comprises these five groups of variables: (i) financial literacy, (iii) use of financial (unconventional banking and non-banking) services, which are basically the outcome variables, (ii) general country characteristics, (iv) country financial infrastructure and (v) country institutional characteristics. Demircuc-Kunt et al. (2017) already provided a through discussion on the different forms of financial inclusion along with portraying the probable benefits which include unconventional banking and non-banking financial services like payments, remittance and insurance services.

**Table 4.1****Summary Statistics: Financial literacy and outcome variables**

	Observations	Mean	SD	Min	Max	Sources
Financial literacy	143	36.60	13.79	13.25	71.34	Klapper, et al. (2015)
Electronic payments used to make payments	124	41.17	30.82	2.02	98.12	World Bank, Global Findex Database, 2014
Mobile phone used to pay bills	119	2.50	3.50	0	18.56	World Bank, Global Findex Database, 2014
Mobile phone used to send money	74	3.70	8.02	0	48.70	World Bank, Global Findex Database, 2014
Life insurance premium volume to GDP (%)	117	1.68	2.38	0.002	13.08	World Bank, Global Findex Database, 2014
Nonlife insurance premium volume to GDP (%)	120	1.18	0.79	0.052	4.99	World Bank, Global Findex Database, 2014
Average (2014-2017) Electronic payments used to make payments	128	44.47	29.77	2.24	98.35	World Bank, Global Findex Database, 2018
Average (2014-2017) Mobile phone used to send money	85	5.40	8.32	0	49.41	World Bank, Global Findex Database, 2018
Average (2014-2017) Life insurance premium volume to GDP (%)	120	1.61	2.34	0.0016	14.91	World Bank, Global Findex Database, 2018
Average (2014-2017) Nonlife insurance premium volume to GDP (%)	125	1.15	0.75	0.05	4.96	World Bank, Global Findex Database, 2018
Average (2014-2017) Mobile phone used to pay bills	127	4.79	5.21	0	27.83	World Bank, Global Findex Database, 2018

*Notes:* Financial literacy is the proportion of the adult population that can answer at least three out of four questions regarding risk diversification, inflation, interest and interest compounding correctly. Electronic payments used to make payments is the percentage of respondents who used electronic payments in the past 12 months to make payments on bills or to buy. Mobile phone used to pay bills is the percentage of respondents who report using a mobile phone to pay bills in the past 12 months. Mobile phone used to send money is the percentage of respondents who report using a mobile phone to send money in the past 12 months. Ratio of life insurance premium volume to GDP where Premium volume is the insurer's direct premiums earned (if Property/Casualty) or received (if Life/Health) during the previous calendar year. Ratio of nonlife insurance premium volume to GDP where Premium volume is the insurer's direct premiums earned (if Property/Casualty) or received (if Life/Health) during the previous calendar year.

According to them, one of the most basic forms of financial inclusion begins with having a deposit or transaction account at a bank or other financial institution or through a mobile money service provider, which can be used to make and receive payments, transfer/remit funds and to store or save money. The previous study focused on the ‘access to financial services’, part i.e., having an account with a financial institution or having a debit card. Consequently, in this research, the ‘use of unconventional and non-banking financial services’ like payments, transfer of funds or remittances are covered. They also pointed out the shift in research focus in recent years, towards non-banking financial services like agricultural insurance, highlighting the social and economic importance of insurance services. Unlike the previous study this research has incorporated insurance services as outcome variables, where both choice of the appropriate outcome variable and data availability at country level, might have affected the results.

Table 4.1, reporting the descriptive statistics for the outcome variables and financial literacy shows that all the outcome variables have a sufficiently large number of observations (more than 115) except for one, which is mobile phone used to send money. Table A 4.1 in Appendix also confirms that all the deployed control variables have a sufficiently large sample size (more than 120 observations). The IV used in the previous study i.e., level of numeracy of primary school children, has more than 100 observations. But the newly incorporated IV for this research (primary education completion rate, has only around 50 observations and consequently, the IV estimations significantly reduce the sample size. In spite of that, the incorporation of the new IV is motivated by few pragmatic considerations. Firstly, the new IV is strongly correlated with the original IV used in the previous study. Secondly, its addition is expected to sheerly improve the first stage estimations as, theoretically, these IVs are expected to be closely associated with financial literacy. The previous study did clearly justify the link between numeracy level among primary school children and financial literacy. Similarly, the new IV should influence financial literacy. Lastly, using the lagged values of the IV is based on the proposition that higher level of primary education will exert significant positive lagged impact on the future financial behaviour of the people, such as use of both conventional banking and unconventional and non-banking financial services. Regarding the outcome variables,

Table 4.1 also exhibits that around 41 percent of all adults captured by the survey have resorted to electronic payments. The larger variation across countries for electronic payments than that of financial literacy implies that people representing the extreme country cases – either hardly have access to electronic payment means, or almost everyone is using those, which have been clarified in details in the Discussion section. For the other two indicators, that represent mobile phone remittance and bill payment services, only around 2 percent of the people covered in the survey have access and usage. This is a very insignificant proportion implying huge scarcity of these services. However, the variations in the usage of these two services are relatively low as compared to electronic payments. For insurance related services access and usage, only around 1 percent of all adults being captured by the survey can utilize insurance services in general. The descriptive statistics in Table 4.1, regarding the chief regressor, financial literacy, which is measured as a score over four items is 36.6. It means that less than 37 percent of the survey participants provided three or four correct answers on four concepts, that capture the dimensions of financial literacy across all the countries. The score per country varies between 13 percent (Yemen) and 71 percent (Norway).

As per Lusardi and Mitchell (2014), the data on financial literacy exhibits certain patterns, such as higher financial literacy score is prevailing generally in high income countries. The average score for two questions is almost the same for lower-middle and upper middle-income countries. Although respondents in low-income countries are found to be doing better than middle-income countries in some cases, the high-income countries have a significantly higher average score for all questions. Moreover, income is related to financial literacy within countries.

#### **4.4 Results**

The results for the effects of financial literacy on unconventional banking and non-banking financial services considering case 3, represented through the selected five outcome variables are presented in this section in three segments. Firstly, the OLS estimation results are shown in Table 4.2 for all the outcome variables. However, there is a concern regarding the endogeneity problem, as it can make the estimated coefficients to be biased. But usual IV estimations might

reduce the sample size significantly as evident from the previous study, which also experienced a reduction in the number of significant coefficients for IV estimations. Consequently, keeping in mind both these issues, the results derived through the method of regressing the periodic averages of the outcome variables on the initial values of the regressors to tackle the perceived endogeneity are reported and discussed next in Table 4.3. This technique of ameliorating the simultaneous impact through using initial values of all the regressors is quite a standard approach. For convenience, it is termed as Lagged OLS and it has been adopted frequently by many researchers and economists in the past. This method also preserves the sample size, in fact, it raises the number of observations due to periodic average and concurrently takes care of the simultaneous bias. Lastly, the conventional IV estimation results are shown in Table 4.4, where along with the IV used in the previous study, one new educational IV is tried.

The analysis begins with examining electronic payments in column (1) of Table 4.2. The results show a positive and significant relationship between (0.82) financial literacy and electronic payment. Additionally, as per the theoretical proposition, log GDP per capita has a large positive and significant effect (12.07). Financial depth is also reported to have a significantly positive coefficient (0.09). The education variables are not found to be significant. The indicator for bank branch penetration turns up with a significant coefficient having the expected positive sign (0.03). Finally, population share is detected to exert a significant negative influence on electronic payments (-1.17). The consideration of further variables, which are related to both the developmental process of the country and its financial structure, plausibly might reduce the coefficient of financial literacy. Other things remaining unchanged, a one percentage point increase in the proportion of financially literate people in a country is expected to increase the rate of accomplishing electronic payments among the respondents by 0.82 percentage points.

**Table 4.2**

Financial literacy and unconventional banking and non-banking financial services – OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.82*** (0.15)	0.10*** (0.03)	0.19** (0.09)	0.005 (0.02)	0.004 (0.006)
Private credit/GDP	0.09** (0.04)	0.01 (0.01)	0.01 (0.01)	0.02*** (0.01)	0.006*** (0.001)
Bank branches per km <sup>2</sup>	0.03* (0.02)	-0.009* (0.005)	-0.02 (0.02)	-0.01 (0.01)	-0.0003 (0.001)
Log GDP pc	12.07*** (2.74)	0.28 (0.59)	-3.44* (2.04)	0.20 (0.27)	0.22 (0.14)
Population share	-1.17*** (0.35)	-0.14** (0.05)	-0.39* (0.21)	-0.10*** (0.03)	-0.02 (0.01)
Secondary education	-0.01 (0.11)	-0.03** (0.01)	0.0002 (0.06)	-0.002 (0.01)	0.006 (0.005)
Tertiary education	0.21 (0.16)	0.08*** (0.03)	-0.17** (0.08)	-0.01 (0.01)	-0.002 (0.006)
Strength of legal rights index	0.38 (0.59)	0.19* (0.12)	-0.09 (0.28)	-0.08 (0.05)	0.006 (0.02)
Ease of doing business	-0.10 (0.06)	0.01 (0.01)	-0.05 (0.04)	-0.01** (0.005)	-0.002 (0.003)
Constant	-32.53 (32.59)	3.35 (6.19)	59.35** (30.83)	6.36** (2.59)	-0.62 (1.72)
R <sup>2</sup>	0.80	0.42	0.28	0.52	0.44
Observations	108	105	66	102	105

Notes: Table 4.2 reports OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 3.



**Table 4.3**

Financial literacy and unconventional banking and non-banking financial services – Lagged OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.84*** (0.14)	0.16*** (0.03)	0.18** (0.07)	0.008 (0.02)	0.004 (0.006)
Private credit/GDP	0.09** (0.03)	0.01 (0.01)	0.03 (0.02)	0.02*** (0.01)	0.006*** (0.001)
Bank branches per km <sup>2</sup>	0.04** (0.02)	-0.002* (0.008)	-0.04 (0.03)	-0.01 (0.01)	-0.0003 (0.001)
Log GDP pc	9.79*** (2.61)	0.37 (0.67)	-2.97* (1.39)	0.10 (0.23)	0.21 (0.14)
Population share	-0.97*** (0.38)	-0.18** (0.08)	-0.41* (0.19)	-0.08*** (0.03)	-0.01 (0.01)
Secondary education	-0.01 (0.11)	-0.04** (0.03)	0.05 (0.06)	0.0004 (0.01)	0.005 (0.004)
Tertiary education	0.21 (0.14)	0.11*** (0.04)	-0.16** (0.08)	-0.01 (0.01)	-0.003 (0.007)
Strength of legal rights index	0.17 (0.54)	0.17* (0.13)	0.06 (0.26)	-0.08 (0.05)	0.006 (0.02)
Ease of doing business	-0.11 (0.07)	0.01 (0.01)	-0.03 (0.02)	-0.01** (0.005)	-0.001 (0.003)
Constant	-18.18 (32.34)	6.46 (7.63)	52.47** (20.87)	5.51** (2.29)	-0.63 (1.69)
R <sup>2</sup>	0.81	0.47	0.33	0.51	0.43
Observations	112	111	76	105	109

Notes: Table 4.3 reports Lagged OLS (values from 2014 of all the regressors are considered as initial values and used, and for the dependent variable, the average value for period 2014-2017 is considered) with robust standard errors in parenthesis showing effects of financial literacy on different types of unconventional banking and non-banking financial services;

\*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 3.

**Table 4.4**

## Financial literacy and unconventional banking and non-banking financial services – IV Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-life insurance premium volume to GDP (%)
	(1)	(2)	(3)	(4)	(5)
Financial literacy	3.43*** (1.17)	0.17** (0.08)	0.33* (0.18)	-0.04 (0.15)	-0.03 (0.03)
Private credit/GDP	0.07 (0.09)	0.008 (0.008)	-0.004 (0.03)	0.01 (0.01)	0.004 (0.002)
Bank branches per km <sup>2</sup>	0.28* (0.15)	-0.003 (0.02)	0.05 (0.05)	0.01 (0.01)	0.001 (0.004)
Log GDP pc	-11.54 (14.52)	-1.31 (0.97)	-10.99** (3.06)	0.85 (1.27)	0.77 (0.47)
Population share	0.82 (1.51)	-0.11 (0.09)	-0.74** (0.24)	-0.21 (0.17)	-0.08 (0.06)
Secondary education	-0.26 (0.61)	-0.03 (0.03)	-0.14 (0.09)	0.02 (0.05)	0.02 (0.01)
Tertiary education	-0.43 (0.62)	0.10** (0.04)	-0.44** (0.17)	0.01 (0.06)	0.005 (0.01)
Strength of legal rights index	-1.16 (2.72)	0.12 (0.20)	-0.96 (0.66)	-0.06 (0.11)	0.05 (0.05)
Ease of doing business	0.11 (0.28)	0.01 (0.01)	-0.18** (0.06)	-0.02 (0.02)	0.001 (0.006)
Constant	-20.47 (98.44)	13.98*** (4.98)	174.65*** (27.73)	8.30 (5.34)	-1.67 (3.19)
R <sup>2</sup>	0.34	0.62	0.90	0.45	0.26
Observations	39	39	19	39	39

Notes: Table 4.4 reports IV regression results with robust standard errors in parentheses, showing the effect of financial literacy on different types of unconventional banking and non-banking financial services. \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. (1) to (5) use 2 variables as IV - level of numeracy of primary school children (2014) and primary education completion rate (2008). This table corresponds to case 3.

Next, column (2) of Table 4.2 reports the influence of financial literacy on the proportion of the population using mobile phones for paying bills. The same pattern is being observed i.e., there exists a significant positive relation between financial literacy and mobile phone bill payments (0.10). However, the extent of impact is not as strong as compared to that for electronic payments. The results indicate that a one percentage point increase in the share of people knowledgeable about financial services raises the share of the population using mobile phones for bill payment by 0.10 percentage points. The indicator for bank branch penetration has a significant coefficient, but this time with a negative sign (-0.009).

Once again, population share exerts a significant negative influence on mobile phone bill settlement (-0.14), like electronic payments. Surprisingly, this time the educational variables are significant, specifically, the significantly positive influence of tertiary education (0.08) is quite meaningful.

In column (3) of Table 4.2, the analysis is extended for another mobile phone service-related outcome variable, i.e., mobile phone services used for remittance. It displays the link between the proportion of the population that is financially literate and the proportion of the respondents that used a mobile phone to send money; the coefficient is once again positive as expected and statistically significant (0.19). The strength of influence is slightly stronger, too. A strong negative influence from per capita real GDP (-3.44) is quite interesting and it needs an in-depth discussion. However, the impact of population share is once again significantly negative (-0.39). This time, secondary education has failed to leave any significant impact on mobile remittance, and tertiary education is found to exert a significantly negative influence (-0.17).

For the first time, this cross-country study links financial literacy with insurance related outcome variables. Columns (4) and (5) of Table 4.2 show that financial literacy does not influence access and usage of both life-insurance and general insurance related services. This is theoretically reasonable and the justifications are provided later in the Discussion

section. Among the control variables, financial depth is found to exert significant positive influence on usage of insurance services, which is quite plausible.

In Table 4.3, again the results for the five outcome variables are reported. As discussed earlier, this time, for tackling the perceived endogeneity and preserving the sample size, a different estimation method is deployed, which has been termed as the Lagged OLS. All five columns in Table 4.3 shows the persistence of the findings regarding the influence of financial literacy on the outcome variables (as found in Table 4.2), i.e., consideration of endogeneity through the Lagged OLS estimation method also does not change the positive and significant impact of financial literacy on electronic payments (0.84), mobile phone bill payments (0.16) and mobile phone remittance (0.18). The non-significance of financial literacy to stimulate usage of insurance related services is also evident once again.

Lastly, the IV estimation results are presented in Table 4.4. Once again if the results in Table 4.4 are analyzed, it is apparent that the significant and positive influence of financial literacy on three of the outcome variables are persistent. However, for IV estimations, the size of the positive and significant financial literacy coefficients for the three outcome variables (3.43, 0.17, 0.33) are generally larger than those of OLS (0.82, 0.10, 0.19) and Lagged OLS (0.84, 0.16, 0.18) estimations.

So, the results reported in all the three tables (Table 4.2, Table 4.3 and Table 4.4), using different estimation techniques (OLS, Lagged OLS and IV), simply confirm the significantly positive influence of financial literacy on electronic payments, mobile phone bill settlements and mobile phone fund transfers.

#### **4.5 Discussion**

This section facilitates a comprehensive discussion of the estimated results to interpret and derive implications. The positive and significant log per capita GDP coefficient in Table 4.2 implies that most of the electronic payment transactions are taking place in the

comparatively affluent economies. The significant positive coefficient of financial depth indicates that supply side is also important along with the demand side factor, financial literacy for electronic payments. The previous study suggested crowding out of the potential impact of educational variables by the correlated GDP variable as one of the possibilities for the non-significance of the education variables, which is observed in Table 4.2. The positive impact of bank branch penetration indicates that, in spite of infrastructural development through having more bank branches, technology savvy financially literate people may prefer digital methods for payment transactions. The above results indicate that both demand and supply sides can contribute to promoting electronic payments. According to the previous study, the negative coefficient on the share of the adult population for accessing and using financial services is quite difficult to interpret economically.

To explain further the positive and significant influence of income level of a country on electronic payment transactions the following discussion is incorporated. In spite of its growing popularity among developing economies like China and India, Turban et al. (2008) has confirmed that electronic payments are hugely popular in the developed world, particularly in North America. But negative coefficient on per capita GDP for mobile phone remittance (as found in Table 4.2) might have numerous implications. Firstly, the lowest correlation (0.07) found in Table A 4.4, between financial literacy and mobile phone remittance means that financial literacy and capability are not prerequisites to facilitate fund transfer or handle money through mobile phone. Simple basic knowledge regarding mobile phone operation might be sufficient in that regard. Moreover, it might also indicate a heavy reliance on the mobile phones for both inward and outward remittance by the relatively underdeveloped economies, to fill in the infrastructural gap as well as to serve the huge unbanked population in a hassle-free and comparatively less expensive manner. Several academic studies and reports have confirmed that. For example, in 2008, the World Bank estimated that over 75 percent of the total USD397

billion remittances went to the developing countries, with developing countries in the Asia Pacific accounting for the bulk of total remittance receipts (Ratha et al., 2009). Given that, and the rapidly increasing mobile ownership levels in the developing countries (ITU, 2009), the huge potential for using mobile phones for money transfer services was also well predicted and documented in the literature (2014.GSMA, State of the Industry, Mobile Financial Services for the Unbanked).

Intuitively, it seems difficult to interpret the negative coefficient on the share of working age population implying that the larger the working age population is, the lower will be the use of electronic payments, mobile phone financial transactions and insurance coverage. This is to some extent consistent with the mixed findings of Klapper et al. (2015), who demonstrated the youngest adults (below 35 years) to be financially more literate in the major emerging economies. But for the major advanced economies, they discovered financial literacy rates to be the lowest among the youngest (24 -35) and oldest (above 50 years) adults and highest for the adults aging 36-50. However, research studies linking financial literacy with age, using the US data, have also found financial literacy to be consistently low among the mixed group of young adults (e.g., Lusardi et al., 2010). There are also existing models that predicted a non-monotonic pattern i.e., financial knowledge would increase only up to a certain age. Empirical studies also documented that among the three age groups (18-34, 35-54, 55 or older), the oldest group tended to have the highest score on financial literacy and financial capability (Xiao and Chen, 2015). All these seem to support an increase in both financial literacy and financial capability with age in America. In contrast, the pattern of financial behaviour was detected to be more complicated, where the age group 25-34 showed the highest number of desirable financial behaviors as compared to those of both young adults (18-24) and age group 45-54. Whereas, the latest annual report by FinTech start-up Plaid confirmed fast fintech adoption (digital banking, payment, remittance etc.) in the U.S.A., which had been mostly prevalent among the younger generations. These country specific

studies cannot shed much light to the cross-country context. Moreover, the observed opposite patterns in terms of the influence of age on becoming financially literate and capable as well as resorting to electronic payment means and mobile phones for facilitating financial transactions, have made the discussion more complicated.

The significantly positive influence of financial literacy on mobile phone bills payment in Table 4.2 shows that financially literate people tend to prefer using FinTech services at their fingertips for convenience. The negatively significant bank branch penetration indicator implies that infrastructural development in form of high bank branch penetration might encourage people to settle the bills through bank branches, rather than resorting to more risky mobile phone means. The positive and relatively stronger influence of tertiary education indicates that higher education can promote use of this sort of sophisticated mobile phone services.

The negative influence from per capita real GDP indicates the preference of mobile phone remittance among the developing world as discussed earlier. Once again, the negative influence of working age population is a bit tricky to explain from the view point of economics as mentioned before. The negative coefficient on tertiary education indicates that higher education might have encouraged people to rely on more safer banking channels for remittance/fund transfer.

The persistence of the OLS results in Table 4.3, which used the Lagged OLS estimation method, clearly highlights and confirms that the demand side, in the form of financial literacy, plays an important role in promoting unconventional banking and non-bank financial transactions. This is in addition to the influence that is exerted by general economic development and improvements in financial and overall infrastructure.

For Table 4.4, it is already mentioned that the IV estimation method results in slightly higher coefficients for financial literacy variable on the three outcome variables as compared to those of both OLS and Lagged OLS. This is quite natural and even the

previous study has also reported that (more than 4-fold increase in one of the financial literacy coefficients for IV estimation as compared to the OLS estimation). Moreover, the number of significant regressors also declines for IV estimations which might raise some questions regarding the stability of the estimation framework. Again, the previous study has also went through similar decline. The substantial drop in observations for IV estimations, can be put forward as the chief reason for the reduced number of significant coefficients along with others. Moreover, the countries remaining in the sample for IV estimation might possess certain characteristics which have resulted in a stronger influence of financial literacy on the outcome variables. For example, it is demonstrated later in this section that the advanced economies tend to have both the greatest number of financially literate people as well as the highest number of electronic payments. When a lot of the developing economies are dropped from the IV estimation sample, for not having the IV data, then, the impact of financial literacy on electronic payments is expected to be simply exaggerated as compared to other estimation techniques. So, the results reported in all the three tables (Table 4.2, Table 4.3 and Table 4.4), using different estimation techniques, simply confirm the significantly positive influence of financial literacy on electronic payments, mobile phone bill settlements and mobile phone fund transfers.

This research has detected positive and significant impact of financial literacy on three of the outcome variables like the previous study. Again, in line with the previous study, usually the strength of impact for OLS estimations is weaker i.e., the estimated OLS coefficients on financial literacy are comparatively smaller. Moreover, like the previous study, the IV estimations report larger coefficients than those of the OLS estimations. The newly incorporated Lagged OLS estimations, controlling for endogeneity report coefficients almost identical to OLS estimations. Although financial literacy has failed to impact insurance usage, this non-association is also of equal significance and justifiable.



The positive influence of financial literacy on these three outcome variables has also been projected in the relatively new literature, which is made up of a few country-specific and micro studies. It makes the findings of this study robust. Exploiting the data from a survey conducted by the Bank of Japan, Yoshino et al. (2020) detected that higher financial literacy in Japan is positively associated with a higher likelihood of using FinTech services, especially electronic money and mobile phone payments more frequently. They claimed their study to be the very first one to investigate the role of financial literacy in adopting FinTech products among developed and developing countries. Again, using representative nationwide Chinese household data, Niu et al. (2020) also discovered education to have statistically significant and economically important effects on the usage of various FinTech services including digital banking and mobile payment. The 2019 Global FinTech Adoption Index also confirmed fast global FinTech adoption, claiming it to be mainstream in all surveyed markets where only four percent of global consumers were unaware of FinTech money transfer and payment services. The report also stated seventy-five percent of the consumers to possess experience of using at least one money transfer or payment service.

While there are limited studies that have highlighted behavioral factors in the context of insurance decision making, the research on financial literacy with a specific focus on insurance is far more limited (Tennyson, 2011). Lin et al. (2019) extended the literature and investigated the influence of factors like financial literacy on individuals' insurance decision making. Their findings claimed financial literacy not necessarily to be translated into insurance literacy, which is relatively advanced and complex; consequently, needing more specialized education to improve insurance literacy for efficient insurance decision making. Furthermore, they opined that there could exist a positive association between insurance literacy and insurance decision-making at the individual level under certain conditions. Wang et al. (2021) spotted a positive association between various measures of financial literacy and both the probability of holding life insurance and the premium

paid. But actually, the findings of these country specific studies are mixed. Some studies, like Lin et al. (2017) and Allgood and Walstad (2016) detected positive association between financial literacy and insurance service usage, but the others, like Mahdzan and Victorian (2013) have reported no relationship. Consequently, in this study, financial literacy has failed to exert any influence on either life or general insurance usage. Selection of more appropriate outcome variables or appropriate specification or a larger sample size might have resulted in both statistically and economically significant relationship.

One of the objectives of regression analysis is to isolate the relationship between each regressor and the dependent variable to facilitate the interpretation of the regression coefficients i.e., the mean change in the dependent variable for each one-unit change in a regressor keeping the other regressors constant. Otherwise, multicollinearity among the regressors can adversely impact the regression results in the form of both making the coefficients sensitive to minor changes in the model and also weakening of the statistical power of the regression model. However, even if multicollinearity affects only some specific control variables but not the chief experimental variable, then results can still be reliably interpreted. Consequently, Tables A 4.2 and A 4.3 report the multicollinearity and VIF among the regressors. The results of both tables clearly indicate that there are no problematic issues regarding multicollinearity in this research.

#### **4.6 Conclusion**

This research examines the influence of financial literacy on the usage of some unconventional banking and non-banking financial services at cross-country level, which have not been examined before. This present research is the first cross-country study to consider some other types of financial services for examining the positive influence of financial literacy on financial inclusion. Financial literacy does improve use of electronic/mobile phone payment services such as electronic payment, bill payment

through mobile phones and mobile phone remittance. However, financial literacy, which is significantly different from insurance literacy has failed to entice the usage of insurance related services. Consideration of endogeneity also does not alter the findings. Consequently, financial literacy promotes usage of unconventional banking and non-banking financial services in a cross-country setup too. As mentioned before, considering the growing importance of extracting all the possible benefits from a broader financial inclusion, linking financial literacy with unconventional banking and non-banking financial services is of great significance. It implies that the positives of financial inclusion could be magnified if financially literate people are prepared to engage in a broader financial inclusion through availing a wide range of available unconventional banking and non-banking financial services.

Unobserved heterogeneity, causing the observables to correlate with the unobservable has been a pervasive problem in cross-sectional data analysis. It has been a major motivation for using panel data that can deploy various methods to control for the possibly correlated, time-invariant heterogeneity without observing it. As this study is using cross-sectional data analysis, it is a limitation that it could not deal with the individual, country specific unobserved heterogeneity through the available least-squares estimation technique.

It is anticipated that the findings of this study will help policy makers to meticulously consider improving financial literacy through financial education and awareness building at the macro level as a tool for financial inclusion as well as to improve financial behaviour of the people for achieving financial stability. Definitely, more comprehensive studies need to be conducted in this untapped research field to have a grasp on the issues, which are necessary for prudent and fruitful policy formulation.

## Appendix

The raw correlations among financial literacy and the five outcome variables as well as the correlations among the outcome variables are reported in Table A 4.4. Financial literacy is moderately correlated with electronic payments (0.66) which might have some implications for interpretation, which will be elaborated later in the Discussion section. Other than that, financial literacy is found not to be strongly correlated (0.07-0.32) with any of the outcome variables, especially its correlation with mobile phone remittance is quite low (0.07). Regarding the correlation among the outcome variables, mobile phone bills payment and mobile phone remittance exhibit strong correlation (0.87), which is understandable. However, the others again have low to moderate degree of correlation (0.02-0.50).

Tables A 4.6 to A 4.11 in the Appendix report the estimated results of case one and case two, using OLS (Tables A 4.6 and A 4.7), Lagged OLS (Tables A 4.8 and A 4.9) and IV estimation techniques (Tables A 4.10 and A 4.11). Considering the comprehensive coverage of all the factors, estimated results for case three are reported and discussed in the Results section as mentioned before. However, analysis of Tables A 4.6 to A 4.11, in the Appendix, provides desired robustness check. Apart from few exceptions, estimated coefficients on financial literacy for case one and case two, irrespective of estimation technique (OLS, Lagged OLS and IV) perfectly match the estimated results of case three in the Results section (Tables 4.2, 4.3 and 4.4) as discussed earlier. It means that financial literacy constantly exerts a significant positive influence on electronic payments, mobile phone payments and mobile phone fund transfers/remittance. In general, case two provides a better goodness of fit than case one as it covers more regressors. On the contrary, case one ensures a slightly larger sample. Apart from a couple of exceptions, consistently, the coefficients on financial literacy are higher for case one, irrespective of technique of estimation (OLS, Lagged OLS and IV). It is understandable that incorporation of more control variables in case two and case three lowers the magnitude

of impact of financial literacy on the outcome variables. Interestingly, financial literacy is also found to leave significant positive influence on insurance services usage consistently for both case one and case two, especially for OLS and Lagged OLS techniques. Moreover, influence of financial literacy is found to be insignificant on mobile remittance. Significantly small sample for IV estimation as well as non-consideration of more relevant infrastructural variables (e.g., level of ICT development, extent of mobile phone subscription and internet usage, features of the insurance sector) might have obstructed evaluating the true impact of financial literacy on mobile phone remittance and insurance usage and caused the impacts to be insignificant. As a caveat, this research retains the exact estimation framework of the previous study at cross-country level for simplicity, and extends in terms of only checking new outcome variables (unconventional banking and non-banking financial services), deploying alternative estimation technique (Lagged OLS) and incorporating new IV (lagged values of primary education completion rate). However, future research can explore new supply side and institutional variables to develop a better framework for analysing the influence of financial literacy on unconventional banking and non-banking financial services.

Having established a positive and significant influence of financial literacy on electronic payments, mobile phone bills payment and mobile phone fund transfer/remittance empirically at cross-country level for all the three cases, this research has endeavoured in justifying the findings in light of previous empirical studies and acceptable reports. Now, it is worthy to put forward some additional data analysis and estimation results. This will enable us to better grasp the scenario as well as the causal link between financial literacy and usage of unconventional and non-banking financial services. This will also provide a better understanding of the prevailing mechanism. Table A 4.12 presents the ranking of the top fifteen economies based on the level of financial literacy and also in terms of usage of the three outcome variables, which have been found to be significantly and positively influenced by financial literacy i.e., electronic payments,

mobile phone bills payment and mobile phone fund transfer/remittance. Table A 4.12 unfolds a very contrasting scenario, which is extremely intriguing as well. It is found in Table A 4.12 that all top fifteen economies, in terms of having the greatest number of financially literate people, are classified as the advanced economies by the International Monetary Fund's World Economic Outlook Database, October 2018. In other words, these are nothing but the developed economies. This pattern of financial literacy across countries have been first identified by Klapper et al (2015). It implies that the most financially literate people are found in the developed economies, and consequently, these economies tend to offer a plethora of financial services of different sorts to meet the sophisticated demand side. Therefore, the underlying financial and institutional structures or in other words the level of financial sector development are expected to deal with this huge and diversified demand. The table also confirms that the top fifteen economies facilitating the greatest number of electronic payment transactions are also all advanced economies. This perfectly matches with the previously mentioned fact of high correlation between financial literacy and electronic payments (Table A 4.4). So based on these, it can be argued that the developed supply side (developed financial sector) and ICT infrastructure, prevailing in these advanced economies, simply can push the financially literate consumers to frequently adopting electronic payments. This is also well supported by the presented results of Table A 4.13 and Table A 4.14. These two tables report the simple OLS estimation results for top half and bottom half of the economies respectively, classified based on the level of financial literacy. Table A 4.13 shows that in spite of considerable sample size reduction, for the top half, financial literacy is still able to exert a significant positive influence on electronic payments. However, for the bottom half in Table A 4.14, this influence turns to be insignificant as well as declines substantially in magnitude. Table A 4.12 exhibits that all top fifteen economies with the highest amount of mobile phone remittance are all the developing economies as per the classification of the International Monetary Fund's World Economic Outlook Database, October 2018.

However, these economies neither possess a large number of financially literate people nor their supply side, and ICT infrastructure is supposed to be as developed as the advanced economies. It implies that even a little amount of financial literacy is sufficient enough to exploit the ICT infrastructural and supply side developments to result in a positive and significant association between financial literacy and mobile phone remittance through mass adoption of relatively cheaper and easy to use options. Prevailing enormous demand, inadequate supply, complexity and expense associated with the existing banking or other formal options, risky informal means, all these might have worked in this regard as catalysts. Table A 4.13 and Table A 4.14 also support this, as in Table A 4.13, for the top half, which is comprised of all most all the advanced economies; the coefficient on financial literacy for mobile phone remittance turns out to be insignificant as well as declines in magnitude. However, similar to as mentioned before, in Table A 4.14, for the bottom half, representing primarily the developing economies, the same coefficient is still exerting significant influence and in fact becomes stronger in extent. Previous studies like Demirgüç-Kunt et al. (2018) already recommended this use of new financial technology, more preciously, mobile money as a means for overcoming financial exclusion. This supposition derives from the fact that almost every adult in developing economies, even if minimally financially literate, owns a mobile phone. Although the phones might not necessarily be smart phones, mobile fund transfer can be implemented conveniently with them. There are also numerous success stories in that regard, such as Kenya (Suri, 2017). However, along with its enormous benefits for users (Aron, 2018), mobile money is not free from any limitation, for example, it can still leave out certain segments of the population (e.g., women, old people, people who are relatively less well-off, people living in underdeveloped localities without these facilities) and can also cause confusion and misunderstanding regarding pricing. Hamdan et al. (2020) also pointed out the gap between active users and account holder to be a concern using the case study of rural Uganda.

For mobile phone bill payments, it is detected in Table A 4.12 that both the advanced and developing economies are placed among the top facilitating countries. It implies that the causal link between financial literacy and mobile bill payments works differently than the other two extreme cases. And this is perfectly consistent with the reported coefficients in both Table A 4.13 and Table A 4.14, where for both the top half and bottom half, financial literacy does not lose its significant positive impact on mobile phone bill payments.

The Lagged OLS estimations are also deployed for analyzing the top and bottom halves and reported in Table A 4.15 (top half) and Table A 4.16 (bottom half). As there are no significant differences in findings from the OLS estimators, those have not been discussed separately again in this section. Just one exception, for the bottom half, significant positive impact of financial literacy on electronic payments is detected. So, two contradicting cases for the bottom half, for OLS and Lagged OLS estimators, cast considerable doubt regarding the significant impact of financial literacy on electronic payments in the developing economies, which does not at all violate the postulations mentioned earlier. For IV estimations, the sample size becomes extremely small, which is why those are not reported in the Appendix.



**Table A 4.1**

Summary Statistics: control variables and IVs

	Mean	SD	Min	Max	Observation	Description	Source
GDP per capita	18230.11	17862.26	711	91368	136	GDP per capita purchasing power parity, constant 2011 USD	World Bank, World Development Indicators 2014
Population share between 15-64 year old	63.68	6.85	47	85	141	Proportion of the population that is between 15 and 64 year old	World Bank, World Development Indicators 2014
Secondary education	0.51	0.16	0	1	142	Proportion of population that has completed secondary school	World Bank, Global Findex 2014
Tertiary education	0.16	0.14	0	1	142	Proportion of population that has completed tertiary education	World Bank, Global Findex 2014
Private credit to GDP	60.50	48.06	4	260	126	Private credit by deposit money banks and other financial institutions to GDP, designed to measure financial depth	World Bank, Global Financial Development 2014
Strength of legal rights index	5.14	2.89	0	12	141	Strength of legal rights index measures the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders and thus facilitate lending	World Bank, World Development Indicators 2014
Ease of doing business index	85.39	55.41	1	187	140	Ease of doing business ranks economies from 1 to 190, with first place being the	World Bank, World Development Indicators 2014

						best, a high ranking (a low numerical rank) means that the regulatory environment is conducive to business operation	
Branches of commercial banks per 1,000 km <sup>2</sup>	37.55	137.83	0	1382	129	Number of branches per 1000 km <sup>2</sup>	IMF, Financial Access Survey 2014
Level of numeracy of primary school children (2014)	38.84	8.04	15.62	58.92	101	As defined in Grohmann et al. (2018)	Grohmann et al. (2008)
Primary education completion rate (2008)	82.80	17.84	34.89	100	47	The percentage of population ages 25 and over, completing primary education	World Development Indicators, 2008

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*Notes:* The data on numeracy in primary school is derived from Grohman et al. (2008) where they imputed the missing values using the data on numeracy in secondary school. Primary education completion rate (2008) is the percentage of population aging 25 and over that attained or completed primary education.

**Table A 4.2**

Correlation among regressors

	GDP per capita	Population share between 15-64	Secondary education	Tertiary education	Private credit to GDP	Strength of legal rights index	Ease of doing business index	Bank branches per 1000 km <sup>2</sup>	Financial Literacy
GDP per capita	1.00								
Population share 15-64	0.71	1.00							
Secondary education	0.55	0.39	1.00						
Tertiary education	0.68	0.52	0.26	1.00					
Private credit to GDP	0.62	0.48	0.26	0.50	1.00				
Strength of legal rights index	-0.01	0.04	0.07	0.09	0.11	1.00			
Ease of doing business index	-0.77	-0.68	-0.51	-0.63	-0.63	-0.33	1.00		
Bank branches per 1000 km <sup>2</sup>	0.30	0.20	0.14	0.25	0.31	-0.11	-0.21	1.00	
Financial literacy	0.57	0.19	0.36	0.48	0.45	0.20	-0.55	0.17	1.00

**Table A 4.3**

VIF among regressors

Variable	VIF	1/VIF
GDP per capita	5.12	0.19
Ease of doing business index	4.30	0.23
Population share 15-64	2.53	0.39
Financial literacy	2.36	0.42
Tertiary education	2.18	0.45
Private credit to GDP	1.82	0.54
Strength of legal rights index	1.57	0.63
Secondary education	1.51	0.66
Bank branches per 1000 km <sup>2</sup>	1.15	0.86
Mean VIF	2.51	

**Table A 4.4**

Correlation among financial literacy and outcome variables

	Financial literacy	Electronic payments	Mobile phone bill payments	Mobile phone remittance	Life insurance premium	Non-Life insurance premium
Financial literacy	1.00					
Electronic payments	0.66	1.00				
Mobile phone bill payments	0.30	0.42	1.00			
Mobile phone remittance	0.06	0.16	0.86	1.00		
Life insurance premium	0.18	0.32	0.14	0.02	1.00	
Non-Life insurance premium	0.31	0.41	0.14	-0.05	0.49	1.00

**Table A 4.5**  
Country List

Country	Country	Country
Afghanistan	Greece	Philippines
Albania	Guatemala	Poland
Algeria	Guinea	Portugal
Angola	Honduras	Romania
Argentina	Hungary	Russian Federation
Armenia	India	Saudi Arabia
Australia	Indonesia	Senegal
Austria	Iraq	Serbia
Azerbaijan	Ireland	Slovak Republic
Bangladesh	Israel	Slovenia
Belgium	Italy	South Africa
Belize	Jamaica	Spain
Benin	Japan	Sri Lanka
Bhutan	Jordan	Sudan
Bolivia	Kazakhstan	Sweden
Bosnia and Herz.	Kenya	Switzerland
Botswana	Korea, Rep.	Tanzania
Brazil	Kuwait	Thailand
Bulgaria	Kyrgyz Rep.	Togo
Burundi	Latvia	Tunisia
Cambodia	Lebanon	Turkey
Cameroon	Luxembourg	Uganda
Chad	Macedonia, FYR	Ukraine
Chile	Madagascar	United Arab Emirates
China	Malawi	United States
Colombia	Malaysia	Uruguay
Congo, Dem. Rep.	Mali	Venezuela, RB
Congo, Rep.	Malta	Vietnam
Costa Rica	Mauritania	West Bank and Gaza
Cote d'Ivoire	Mauritius	Yemen, Rep.
Croatia	Mexico	Zambia
Cyprus	Moldova	
Czech Republic	Mongolia	
Denmark	Montenegro	
Dom. Republic	Namibia	
Ecuador	Nepal	
Egypt, Arab Rep.	Netherlands	
El Salvador	New Zealand	
Estonia	Nicaragua	
Finland	Niger	
France	Nigeria	
Georgia	Pakistan	
Germany	Panama	
Ghana	Peru	

**Table A 4.6**

Financial literacy and unconventional banking and non-banking financial services – OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	1.75*** (0.09)	0.15*** (0.02)	0.08 (0.05)	0.07*** (0.01)	0.03*** (0.003)
Constant	-24.74*** (3.71)	-3.07*** (0.71)	1.01 (1.69)	-0.97** (0.48)	0.16 (0.15)
R <sup>2</sup>	0.60	0.33	0.01	0.17	0.23
Observations	124	119	74	117	120

Notes: Table A 4.6 reports OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 1.

**Table A 4.7**

Financial literacy and unconventional banking and non-banking financial services – OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	1.00*** (0.16)	0.12*** (0.03)	0.23*** (0.09)	0.03 (0.02)	0.01** (0.006)
Log GDP pc	12.14*** (2.51)	-0.23 (0.46)	-2.71** (1.30)	0.91*** (0.31)	0.30*** (0.08)
Population share	-0.58* (0.36)	-0.09** (0.04)	-0.21* (0.12)	-0.07 (0.04)	-0.007 (0.01)
Secondary education	0.07 (0.11)	-0.03** (0.01)	0.009 (0.06)	-0.009 (0.01)	0.002 (0.003)
Tertiary education	0.36** (0.15)	0.09*** (0.02)	-0.11* (0.07)	0.007 (0.02)	-0.0009 (0.006)
Constant	-83.42*** (16.84)	5.89 (3.97)	33.87** (12.95)	-3.54** (1.54)	-1.80*** (0.53)
R <sup>2</sup>	0.78	0.44	0.28	0.28	0.35
Observations	121	116	73	114	117

Notes: Table A 4.7 reports OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 2.



**Table A 4.8**

Financial literacy and unconventional banking and non-banking financial services – Lagged OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	1.69*** (0.09)	0.24*** (0.03)	0.07 (0.06)	0.07*** (0.01)	0.03*** (0.003)
Constant	-19.31*** (3.65)	-4.42*** (1.00)	2.80 (1.93)	-0.90** (0.48)	0.14 (0.15)
R <sup>2</sup>	0.59	0.39	0.01	0.14	0.23
Observations	128	127	85	120	125

Notes: Table A 4.8 reports Lagged OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 1.

**Table A 4.9**

Financial literacy and unconventional banking and non-banking financial services – Lagged OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	1.00*** (0.15)	0.19*** (0.03)	0.20*** (0.07)	0.03* (0.01)	0.01** (0.006)
Log GDP pc	10.92*** (2.28)	0.05 (0.62)	-2.19** (1.27)	0.75*** (0.26)	0.30*** (0.08)
Population share	-0.48 (0.36)	-0.14* (0.08)	-0.36** (0.16)	-0.05 (0.04)	-0.004 (0.01)
Secondary education	0.07 (0.10)	-0.03 (0.02)	0.05 (0.05)	-0.007 (0.01)	0.002 (0.003)
Tertiary education	0.35** (0.14)	0.12*** (0.04)	-0.11* (0.06)	0.007 (0.02)	0.0002 (0.006)
Constant	-73.98*** (15.96)	5.23 (4.29)	39.52*** (10.95)	-3.24** (1.43)	-1.92*** (0.46)
R <sup>2</sup>	0.77	0.49	0.31	0.29	0.38
Observations	125	124	84	117	122

Notes: Table A 4.9 reports Lagged OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 2.

**Table A 4.10****Financial literacy and unconventional banking and non-banking financial services – IV Results**

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	2.60*** (0.36)	0.15** (0.05)	-0.54 (0.55)	0.13*** (0.05)	0.03*** (0.01)
Constant	-53.98*** (14.38)	-3.73** (1.84)	21.52 (20.94)	-3.32** (1.84)	0.10 (0.50)
R <sup>2</sup>	0.40	0.43	0.10	0.15	0.18
Observations	43	43	21	43	43

Notes: Table A 4.10 reports IV regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 1.

**Table A 4.11****Financial literacy and unconventional banking and non-banking financial services – IV Results**

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	3.90** (1.64)	0.12 (0.09)	0.30* (0.16)	0.08 (0.13)	0.02 (0.04)
Log GDP pc	-14.28*** (18.08)	-0.71 (1.04)	-7.65** (2.63)	0.46 (1.16)	0.31 (0.50)
Population share	1.11 (1.92)	-0.17* (0.09)	-0.57** (0.24)	-0.12 (0.12)	-0.03 (0.03)
Secondary education	-0.53 (0.67)	-0.02 (0.02)	-0.05 (0.09)	0.02 (0.05)	0.005 (0.01)
Tertiary education	-0.67 (0.86)	0.10** (0.04)	0.03 (0.09)	0.003 (0.06)	-0.007 (0.02)
Constant	-1.97 (75.92)	14.98 (4.92)	104.88*** (21.32)	1.02 (6.25)	-0.70 (2.81)
R <sup>2</sup>	80	0.66	0.81	0.26	0.31
Observations	41	41	20	41	41

Notes: Table A 4.11 reports IV regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 2.

**Table A 4.12**

## Country Ranking

Country Rank	Financial literacy	Electronic payments	Mobile Phone bills	Mobile phone remittance
1	Norway	Denmark	Kenya	Kenya
2	Denmark	Norway	Australia	Uganda
3	Sweden	Sweden	United States	Tanzania
4	Israel	Finland	Canada	Zimbabwe
5	Canada	Netherlands	Ireland	Cote d'Ivoire
6	United Kingdom	New Zealand	United Kingdom	Rwanda
7	Netherlands	United Kingdom	New Zealand	Botswana
8	Germany	Canada	Norway	Ghana
9	Australia	Estonia	Sweden	South Africa
10	Finland	Belgium	Netherlands	Namibia
11	New Zealand	Germany	Botswana	Zambia
12	Czech Republic	Australia	United Arab Emirates	Cambodia
13	United States	Austria	Belgium	Mali
14	Switzerland	Spain	Bahrain	Mongolia
15	Belgium	Luxembourg	Hong Kong	Philippines

**Table A 4.13**

Financial literacy and unconventional banking and non-banking financial services Top Half – OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.73*** (0.27)	0.09* (0.05)	0.02 (0.26)	0.01 (0.03)	0.007 (0.009)
Private credit/GDP	0.04 (0.06)	0.01 (0.01)	0.01 (0.02)	0.03*** (0.01)	0.006** (0.002)
Bank branches per km <sup>2</sup>	0.03 (0.03)	-0.008 (0.005)	-0.05 (0.05)	0.002 (0.004)	-0.0002 (0.0008)
Log GDP pc	12.91** (5.94)	0.20 (1.57)	-2.73 (7.01)	0.41 (0.68)	0.06 (0.21)
Population share	-1.48** (0.65)	-0.15 (0.12)	-0.52 (0.54)	-0.16 (0.08)	-0.02 (0.02)
Secondary education	0.08 (0.26)	-0.01 (0.05)	0.09 (0.22)	0.006 (0.02)	0.002 (0.006)
Tertiary education	0.27 (0.25)	0.11* (0.05)	0.006 (0.13)	0.0008 (0.02)	-0.002 (0.007)
Strength of legal rights index	0.16 (1.13)	0.35 (0.26)	-0.03 (0.76)	-0.15 (0.12)	0.01 (0.04)
Ease of doing business	-0.19** (0.09)	0.02 (0.02)	-0.005 (0.12)	-0.01 (0.008)	-0.004 (0.003)
Constant	-11.45 (52.39)	1.83 (13.05)	57.17 (70.32)	7.80** (4.52)	1.48 (1.96)
R <sup>2</sup>	0.77	0.37	0.25	0.57	0.61
Observations	58	57	32	57	57

Notes: Table A 4.13 reports OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 3.

**Table A 4.14**

Financial literacy and unconventional banking and non-banking financial services Bottom Half – OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.48 (0.31)	0.14*** (0.05)	0.32** (0.15)	0.05* (0.03)	0.04* (0.02)
Private credit/GDP	0.13** (0.06)	0.002 (0.006)	-0.006 (0.02)	0.008 (0.006)	0.002 (0.003)
Bank branches per km <sup>2</sup>	0.13 (0.12)	0.004 (0.01)	-0.03 (0.05)	0.02* (0.01)	0.009 (0.009)
Log GDP pc	10.03** (2.76)	0.15 (0.43)	-3.13 (2.23)	0.08 (0.25)	0.25 (0.17)
Population share	-1.00** (0.45)	-0.09** (0.05)	-0.45 (0.33)	-0.04 (0.04)	0.004 (0.02)
Secondary education	0.02 (0.14)	-0.04** (0.02)	-0.02 (0.07)	-0.01 (0.02)	0.003 (0.01)
Tertiary education	0.10 (0.34)	0.04 (0.05)	-0.34 (0.17)	-0.02 (0.02)	0.001 (0.02)
Strength of legal rights index	0.28 (0.66)	-0.03 (0.07)	-0.27 (0.36)	-0.14* (0.07)	-0.04 (0.03)
Ease of doing business	-0.04 (0.09)	-0.007 (0.008)	-0.08 (0.06)	-0.02** (0.006)	-0.001 (0.004)
Constant	-25.21 (47.19)	4.75 (6.39)	57.17 (70.32)	3.94 (3.06)	-2.52 (2.45)
R <sup>2</sup>	0.58	0.39	0.45	0.47	0.51
Observations	50	48	34	45	48

Notes: Table A 4.14 reports OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 3.

**Table A 4.15**

Financial literacy and unconventional banking and non-banking financial services Top Half – Lagged OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.60** (0.27)	0.16* (0.08)	-0.09 (0.16)	-0.01 (0.03)	0.007 (0.008)
Private credit/GDP	0.03 (0.05)	0.01 (0.02)	0.02 (0.02)	0.03*** (0.01)	0.006** (0.002)
Bank branches per km <sup>2</sup>	0.04** (0.02)	-0.01 (0.008)	-0.07 (0.05)	0.0009 (0.003)	-0.0002 (0.0008)
Log GDP pc	11.62** (5.29)	-0.80 (1.55)	-1.82 (4.39)	0.15 (0.53)	0.02 (0.17)
Population share	-1.48** (0.65)	-0.26 (0.18)	-0.73* (0.39)	-0.15** (0.06)	-0.01 (0.01)
Secondary education	0.05 (0.25)	-0.02 (0.07)	0.09 (0.22)	0.01 (0.01)	0.002 (0.005)
Tertiary education	0.27 (0.23)	0.18** (0.08)	0.006 (0.13)	0.008 (0.01)	-0.002 (0.006)
Strength of legal rights index	0.22 (1.03)	0.32 (0.33)	0.23 (0.59)	-0.18* (0.11)	0.02 (0.03)
Ease of doing business	-0.19** (0.09)	-0.01 (0.02)	0.01 (0.09)	-0.009 (0.007)	-0.004 (0.003)
Constant	13.26 (47.78)	19.72 (13.62)	63.02 (52.10)	8.64** (3.97)	1.31 (1.70)
R <sup>2</sup>	0.78	0.45	0.41	0.59	0.61
Observations	60	60	36	59	59

Notes: Table A 4.15 reports Lagged OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% levels, respectively. This table corresponds to case 3.



**Table A 4.16**

Financial literacy and unconventional banking and non-banking financial services Bottom Half – Lagged OLS Results

	Electronic payments used to make payments	Mobile phone used to pay bills	Mobile phone used to send money	Life insurance premium volume to GDP (%)	Non-Life insurance premium volume to GDP (%)
Financial literacy	0.60** (0.28)	0.17*** (0.05)	0.30** (0.15)	0.06* (0.03)	0.04* (0.02)
Private credit/GDP	0.13** (0.05)	0.01 (0.009)	0.004 (0.03)	0.009 (0.006)	0.002 (0.003)
Bank branches per km <sup>2</sup>	0.13 (0.12)	-0.01 (0.02)	0.02 (0.05)	0.02* (0.01)	0.009 (0.009)
Log GDP pc	7.90*** (2.87)	0.55 (0.63)	-2.42 (1.60)	0.03 (0.25)	0.27 (0.17)
Population share	-0.74 (0.49)	-0.06 (0.08)	-0.32 (0.26)	-0.01 (0.04)	0.004 (0.02)
Secondary education	0.009 (0.13)	-0.04** (0.02)	0.04 (0.06)	-0.01 (0.02)	0.002 (0.009)
Tertiary education	0.16 (0.33)	0.02 (0.06)	-0.32 (0.18)	-0.02 (0.03)	0.001 (0.03)
Strength of legal rights index	0.03 (0.66)	-0.07 (0.08)	-0.28 (0.30)	-0.11* (0.07)	-0.04 (0.03)
Ease of doing business	-0.04 (0.09)	-0.009 (0.01)	-0.06 (0.05)	-0.01* (0.005)	-0.001 (0.004)
Constant	-20.42 (50.39)	-0.63 (8.72)	46.35 (31.01)	2.10 (2.35)	-2.65 (2.42)
R <sup>2</sup>	0.54	0.34	0.36	0.47	0.42
Observations	52	51	40	46	50

Notes: Table A 4.16 reports Lagged OLS regression results with robust standard errors in parentheses, showing effect of financial literacy on different types of unconventional banking and non-banking financial services; \*\*\*, \*\* and \* denote significance at the 1%, 5% and 10% respectively. This table corresponds to case 3.

## **CHAPTER V: CONCLUSION**

Studies elucidating the role of financial sector development in economic growth and development are expected to have both policy implications and provide a direction on future research. Knowledge on positive finance-growth nexus and determinants of financial sector development has provided guidance on proper policy reforms and the need for further research on the political, legal, regulatory, and policy determinants of financial development. Financial system needs to evolve with the continuous growth process causing the interplays to modify. Our knowledge and understanding of the finance-growth nexus will also keep advancing based on the latest modelling of the dynamic interactions between the evolution of the financial system and economic growth (Smith, 2002). Consequently, the periphery of the discipline will also expand, bringing in new dimensions to the fore. Bearing all these in mind, Levine et al. (2005) attempted to put forward a host of ideas regarding probable future research incorporating finance-growth nexus. The influence of financial development on macroeconomic policy effectiveness can be one of them. Contrasting findings, inadequate theoretical frameworks and scarce research have made this topic quite appealing. Consequently, it is expanded upon in the first two studies of this research. Again, interaction between financial literacy, a demand side proponent and overall financial structure i.e., the supply side can influence the financial behaviour in the developed economies and can also contribute to financial inclusion in the developing world. These topics, specifically the latter one, are relatively unexplored. That is why it has been considered for the last study of the research.

Incorporating an appropriate estimation technique to address endogeneity, the second chapter demonstrates that the direct influence of monetary policy in conjunction with financial development on output growth for short-term stabilization and inflation tends to be positive and negative, respectively. It implies that financial development enhances monetary policy effectiveness. As monetary expansion, combined with financial

development can cause output expansion for short-term stabilization, so, financial development is instrumental in policy effectiveness and consequently, must be considered meticulously for appropriate monetary policy formulation. Both pragmatic monetary policy and ever-evolving financial systems can affect output growth as a means for short-term stabilization. As the monetary transmission mechanism initially works through the financial sector, notable and fast development of financial systems in most economies, coupled with the ever-changing business and policy practices have forced policymakers to predict tentative impacts of financial development on the effectiveness of monetary policy.

The third chapter reveals that both fiscal expansion and fiscal size, in conjunction with concurrent financial development, do not directly impact real GDP growth significantly in the medium-term but can have contemporaneous or lagged impacts. Most importantly, as a policy comparison, unlike monetary policy, effectiveness of fiscal policy is not influenced by financial development, probably due to the non-complementarity between financial development and fiscal policy.

The last chapter is the first cross-country study to consider some other types of financial services for examining the positive influence of financial literacy on financial inclusion. Bearing in mind the growing emphasis on extracting the possible benefits from a broader financial inclusion, this topic is timely as it will shed some light on the financial literacy-broader financial inclusion linkage through covering unconventional banking and non-banking financial services. Financial literacy does improve use of electronic/mobile phone payment services such as electronic payment, and bill payment through mobile phones and mobile phone remittance. However, financial literacy, which is significantly different from insurance literacy, has failed to entice the usage of insurance related services. Consideration of endogeneity also does not alter the findings. Consequently, financial literacy promotes unconventional banking and non-banking financial services in a cross-country setup. Policy makers should be encouraged to improve financial

literacy through financial education and training at the macro level to promote financial inclusion where a developed financial structure could be an underlying precondition. According to Grohmann and Menkhoff (2020), multi-levelled financial inclusion can be considered as both a more inclusive and far-reaching extension of financial development. Like financial development, financial literacy has the potential to generate a number of positive benefits, like increased growth and reduced inequality within a country. Consequently, enhancement of financial literacy among all people must be a desirable policy goal, both from an individual as well as from a macroeconomic perspective. It is anticipated that the findings of this study will help policy makers, promoting financial inclusion to understand how financial literacy affects unconventional banking and non-banking financial services. It will assist them to meticulously consider improving financial literacy through financial education and training as well as awareness building at the macro level as a tool not only for financial inclusion, but also to improve financial behaviour of people for achieving overall financial sector stability. Moreover, the findings of this study can also be useful to academicians for generalizing the causal links between financial literacy and a broader financial inclusion, covering diversified facets.

## REFERENCES

- Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60(2), 323–351.
- Allgood, S., & Walstad, W. B. (2016). The effects of perceived and actual financial literacy on financial behaviours. *Economic Inquiry*, 54(1), 675–697.
- Ames, B., Brown, W., Devrajan, S., & Izquierdo, A. (2001). *Macroeconomic Policy and Poverty Reduction*. Washington DC: International Monetary Fund.
- Atkinson, A., & Messy, F. (2013). Promoting Financial Inclusion through Financial Education: OECD/INFE Evidence, Policies and Practice. OECD Working Papers on Finance, Insurance and Private Pensions, No. 34.
- Bagehot, W. 1873 (1962). *Lombard Street: A Description of Money*. Homewood, IL: Richard D. Irwin.
- Baltagi, B., & Pinnoi, N., (1971). Public Capital Stock and State Productivity Growth: Further Evidence from an Error Components Model. *Empirical Economics*, 20(2), 351-359.
- Bansak, C., Morin, N., & Starr, M. (2007). Technology, capital spending, and capacity utilization. *Economic Inquiry*, 45(3), 631–645.
- Bazzi S., & Clemens, M. A. (2013). Blunt instruments: Avoiding common pitfalls in identifying the causes of economic growth. *American Economic Journal: Macroeconomics*, 5(2), 152-186.
- Beck, T., Lundberg, M., & Majnoni, G. (2006). Financial intermediary development and growth volatility: do intermediaries dampen or magnify shocks. *Journal of International Money and Finance*, 25(7), 1146-1167.
- Bencivenga, V. R., & Smith, B. D. (1991). Financial intermediation and endogenous growth. *The Review of Economic Studies*, 58(2), 195–209.
- Bernanke, B., S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic Perspectives*, 9(4), 27-48.

- Bernanke, B. S., Reinhart, V. R., & Sack, B. P. (2004). Monetary policy alternatives at the zero bound: an empirical assessment. *Brookings Papers on Economic Activity*, 35(2), 1-100.
- Berument, H., & Dogan, B. (2003). Openness and the effectiveness of monetary policy: empirical evidence from Turkey. *Applied Economics Letters*, 10(4), 217-221.
- Blinder, A. S. & Stiglitz, J. E. (1983). Money, credit constraints, and economic activity. *American Economic Review*, 73(2), 297-302.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115-143.
- Boyd, J. H., Levine, R., & Smith, B. (2001). The impact of inflation on financial sector performance. *Journal of Monetary Economics*, 47(2), 221-248.
- Bruhn, M., de Souza Leão, L., Legovini, A., Marchetti, R., & Zia, B. (2016). The impact of high school financial education: Evidence from a large-scale evaluation in Brazil. *American Economic Journal: Applied Economics*, 8(4), 256-295.
- Brunner, K., & Meltzer, A. H. (1968). What did we learn from the monetary experience of the United States in the great depression? *Canadian Journal of Economics*, 1(2), 334-348.
- Bua G., Pradelli J., & Presbitero A. F. (2014). Domestic public debt in low-income countries. The World Bank Policy Research Working Paper, No. 6777.
- Caballero, R., J., & Krishnamurthy, A. (2001). International and Domestic Collateral Constraints in a Model of Emerging Market Crises. *Journal of Monetary Economics*, 48(3), 513–548.
- Caballero, R., J., & Krishnamurthy, A. (2002). A Dual Liquidity Model for Emerging Markets. *American Economic Review*, 92(2), 33-37.
- Caballero, R., J., & Krishnamurthy, A. (2003). Excessive Dollar Debt: Underinsurance and Domestic Financial Underdevelopment. *Journal of Finance*, 58(2), 867-893.
- Caballero, R., J., & Krishnamurthy, A. (2004). Smoothing Sudden Stops. *Journal of Economic Theory*, 119(1), 104-127.

- Caballero, R., J., & Krishnamurthy, A. (2004). Fiscal policy and financial depth. National Bureau of Economic Research Working Paper Series, No. 10532.
- Cagan, P. (1956). *The monetary dynamics of hyperinflation in Studies in the Quantity Theory of Money* by Friedman, M. Chicago.
- Caldero'n, C., & Liu, L. (2003). The direction of causality between financial development and economic growth. *Journal of Development Economics*, 72(1), 321– 334.
- Calderone, M., Fiala, N., Mulaj, F., Sadhu, S., & Sarr, L. (2018). Financial education and savings behaviour: Evidence from a randomized experiment among low-income clients of branchless banking in India. *Economic Development and Cultural Change*, 66(4), 793-825.
- Campbell, J.Y. (2006). Household Finance. *Journal of Finance*, 61 (4), 1553-1604.
- Carranza, L., Galdon-Sanchez, J.E., & Gomez-Biscarri, J. (2010). Understanding the Relationship between Financial Development and Monetary Policy. *Review of International Economics*, 18(5), 849-864.
- Claeys, P., Moreno, R., & Suriñach J. (2012). Debt, interest rates, and integration of financial markets. *Economic Modelling*, 29(1), 48-59.
- Cole, S., Sampson, T., & Zia, B. (2011). Price or knowledge: What drives demand for financial services in emerging markets. *Journal of Finance*, 66(6), 1933-1967.
- De Gregorio, J., & Guidotti, P. E. (1995). Financial development and economic growth, *World Development*, 23(3), 433-448.
- Demirgüç-Kunt, A., & Levine, R. (1996). Stock market development and financial intermediaries: stylized facts. *World Bank Economic Review*, 10(2), 291-321.
- Demirgüç-Kunt, A. & Maksimovic, V. (1998). Law, finance, and firm growth. *The Journal of Finance*, 53(6), 2107–2137.
- Demirgüç-Kunt, A., Feyen, E. & Levine, R. (2011). The evolving importance of banks and securities markets. World Bank Policy Research Working Paper, No. 5805.

- Demirguc-Kunt, A., & Klapper, L. (2012). Measuring Financial Inclusion: The Global Findex Database. World Bank Policy Research Paper, No. 6025.
- Demirguc-Kunt, A., & Klapper, L. (2013). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Papers on Economic Activity*, 44(1), 279–340.
- Demirguc-Kunt, A., Klapper, L., Singer, D., & Van Oudheusden, P. (2015). The global Findex database 2014: Measuring financial inclusion around the world. World Bank Policy Research Working Paper, No. 7255.
- Demirguc-Kunt, A., Klapper, L., & Singer, D. (2017). Financial inclusion and inclusive growth – A review of recent empirical evidence. World Bank Policy Research Paper, No. 8040.
- Duflo, E., & Saez, E. (2003). The Role of Information and Social Interactions in Retirement Plan Decisions: Evidence from a Randomized Experiment. *Quarterly Journal of Economics*, 118 (3), 815-842.
- Fama, E.F., & Jensen, M.C. (1983). Separation of ownership and control, *The Journal of Law and Economics*, 26(2), 301–325.
- Fischer, D., R. (1977). Inflation, capital, and deficit finance. *Journal of Money, Credit and Banking*, 9(1), 141-150.
- Friedrich, C. (2014). Global inflation dynamics in the post-crisis period: what explains the twin puzzle? Bank of Canada Working Paper 2014–36.
- Friedman, M. (1956 [1969]). *The quantity theory of money- a restatement in Studies in the Quantity Theory of Money*, M. Friedman, ed., Chicago, IL: University of Chicago Press. Reprinted in R.W. Clower (ed.), *Monetary Theory*, Penguin Books, 94-111.
- Friedman, M., & Schwartz, A., J., (1963). A monetary history of the United States, 1867–1960. National Bureau of Economic Research Books.
- Gemmell, N. (2004). *Fiscal Policy in a Growth Framework*. In: T. Addison and A. Roe, eds. *Fiscal Policy for Development: Poverty, Reconstruction and Growth*. Great Britain: Palgrave Macmillan, 149-176.



- Gertler, M., Gali, J., & Clarida, R. (1999). The science of monetary policy: a new Keynesian perspective. *Journal of Economic Literature*, 37(4), 1661-1707r.
- Gillman, M., Harris, M., N., & Kejak, M., (2007). The interaction of inflation and financial development with endogenous growth. Money, Macro and Finance Research Group Conference 2006, 29.
- Goldsmith, R.W. (1969). Financial Structure and Development. New Haven, CT: Yale University Press.
- Global FinTech Adoption Index (2019). EY Global FinTech Adoption Index, accessed November, 2021 [https://www.ey.com/en\\_gl/ey-global-fintech-adoption-index](https://www.ey.com/en_gl/ey-global-fintech-adoption-index)
- Greenwood, J., & Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *Journal of Political Economy*, 98(5, Part 1), 1076–1107.
- Grossman, S.J., & Hart, O.D. (1986). The costs and benefits of ownership: A theory of vertical and lateral integration. *Journal of Political Economy*, 94(4), 691–719.
- Grohmann, A., Kouwenberg, R., & Menkhoff, L., (2015). Childhood Roots of Financial Literacy. *Journal of Economic Psychology*, 51(C), 114–33.
- Grohmann A., Kluhs, T., & Menkhoff, L. (2018). Does financial literacy improve financial inclusion? Cross country evidence. *World Development*, 111(C), 84-96.
- Grohmann, A., & Menkhoff, L. (2018). Financial literacy promotes financial inclusion in both poor and rich countries. German Institute for Economic Research *Economic Bulletin*, 7 (41), 399-407.
- Grohman A., & Menkhoff, L. (2020). The Relationship between Financial Literacy and Financial Inclusion. Discussion Papers of German Institute for Economic Research, No. 1914.
- Gurley, J.G., & Shaw, E.S. (1955). Financial aspects of economic development. *The American Economic Review*, 45(4), 515–538.
- Gurley, J. G., & Shaw, E. S. (1967). Financial structure and economic development. *Economic Development and Cultural Change*, 15(3), 257-268.

- Hauner, D. (2006). Fiscal Policy and Financial Development. International Monetary Fund Working Papers 06/26.
- Horn, S., Jamison, J. Karlan, D., & Zinman, J. (2020). Does lasting behavior change require knowledge change? Evidence from savings interventions for young adults. National Bureau of Economic Research Working Paper, No. 28011.
- Hsiao, C. (2007). Panel data analysis-advantages and challenges test. *Sociedad de Estadística e Investigación Operativa*, 16(1), 1-22.
- Inter-American Development Bank. (1997). Latin America after a Decade of Reforms, Inter-American Development Bank, Economic and Social Progress in Latin America series.
- International Monetary Fund. (2013). The dog that didn't bark: has inflation been muzzled or was it just sleeping. World Economic Outlook, Chapter III.
- International Monetary Fund. (2014). IMF Advanced Economies List. World Economic Outlook, May 1998, p. 134. Retrieved 15 January 2014.
- Jamieson, J. C., Karlan, D., & Zinman, J. (2014). Financial education and savings accounts: Complements or substitutes: Evidence from Ugandan youth clubs, National Bureau of Economic Research Working Paper, No. 20135.
- Jayaratne, J., & Strahan, P.E. (1996). The finance–growth nexus: Evidence from bank branch deregulation, *The Quarterly Journal of Economics*, 111(3), 639-670.
- Jovanovski, T., & Mehmed, M. (2015). The phenomenon of lag in application of the measures of monetary policy. *Economic Research -Ekonomika Istraživanja*, 24(2), 154-163.
- Kaihatsu, S., Koga, M., Sakata, T. & Hara, N. (2018). Interaction between Business Cycles and Economic Growth. Bank of Japan Working Paper Series, No. 18-E-12.
- Kaiser, T., & Menkhoff, L. (2015). Does Financial Education Impact Financial Literacy and Financial Behavior, and if So, When? Discussion Papers of German Institute for Economic Research, No. 1562.

- Kapparov, K. (2018). Financial Inclusion and Financial Literacy in Kazakhstan. Asian Development Bank Working Paper, No. 876.
- Karras, G. (1999). Openness and the effects of monetary policy. *Journal of International Money and Finance*, 18(1), 13-26.
- Kashyap, A. & Stein, J. (1997). What Do a Million Banks Have to Say about the Transmission of Monetary Policy? *The American Economic Review*, 90(3), 407-428.
- Keynes, J. M. (1936) The general theory of employment, interest, and money. Retrieved <http://etext.library.adelaide.edu.au/k/k44g/k44g.html>
- Kimball, M. S. (1995). The quantitative analytics of the basic neo-monetarist model. *Journal of Money, Credit and Banking*, 27(4), 1241-1277.
- King, R.G., & Levine, R. (1993a). Finance, entrepreneurship and growth. *Journal of Monetary Economics*, 32(3), 513-542.
- King, R.G., & Levine, R. (1993b). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3), 717-737.
- Klapper, L., & Lusardi, A. (2020). Financial literacy and financial resilience: Evidence from around the world. *Financial Management*, 49(3), 589-614.
- Klapper, L., El-Zoghbi, M., & Hess, J. (2016). Achieving the sustainable development goals – The role of financial inclusion. CGAP Working Paper.
- Klapper, L., Lusardi, A., & van Oudheusden, P. (2015). Financial literacy around the world: Insights from the standards and poor's ratings service global financial literacy survey.
- Krause, S., & Rioja, F. (2006). Financial development and monetary policy efficiency. *Emory Economics*, 0613.
- Kukk, K. (2007). Fiscal policy effects on economic growth: short run vs long run. Working Papers in Economics, School of Economics and Business Administration, Tallinn University of Technology, 77-96.

- Kumhof M., & Tanner, E. C. (2005). Government Debt; A Key Role in Financial Intermediation. International Monetary Fund Working Paper, No. 05/57.
- Kutivadze N. (2011). Public debt and financial development. University of Milano Working Paper No. 2011-13.
- La Porta R., Lopez-de-Silanes F., Shleifer A., & Vishny R.W. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1133-1155.
- Laeven, L., & Valencia, F. (2012). Systemic banking crises database: an update. International Monetary Fund Working Paper, No. 12/163.
- Levine, R. (1991). Stock markets, growth, and tax policy. *The Journal of Finance*, 46(4), 1445-1465.
- Levine, R., & Zervos, S. (1996). Stock market development and long-run growth. The World Bank Policy Research Working Paper Series 1582.
- Levine, R., & Zervos, S. (1998a). Stock markets, banks, and economic growth. *American Economic Review*, 88(3), 537-558.
- Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: causality and causes. *Journal of Monetary Economics*, 46(1), 31-77.
- Levine, R. (2002). Bank-based or market-based financial systems: which is better? *Journal of Financial Intermediation*, 11(4), 398-428.
- Levine, Ross, 2005. *Finance and Growth: Theory and Evidence*. Handbook of Economic Growth, in: Philippe Aghion & Steven Durlauf (ed.), Handbook of Economic Growth, edition 1, volume 1, chapter 12, pages 865-934, Amsterdam, The Netherlands: Elsevier Science, Elsevier.
- Lin, J. Y. & Pleskovic, B. (2011). Annual world bank conference on development economics-global 2010: lessons from East Asia and the global financial crisis. World Bank Publications, No. 2555.
- Lin, C., Hsiao, Y., & Yeh, C-Y. (2017). Financial literacy, financial advisors, and information sources on demand for life insurance. *Pacific-Basin Finance Journal*, 43(C), 218-237.

- Lin, X., Bruhn, A., & William, J. (2019). Extending financial literacy to insurance literacy: a survey approach. *Accounting and Finance, Accounting and Finance Association of Australia and New Zealand*, 59(S1), 685-713.
- Loan, T-H. V., Anh, T. V., Nhan, T. N. & Duc H. V. (2021). Financial inclusion and economic growth: An international evidence. *Emerging Markets Finance and Trade*, 57(1), 239-263.
- Lucas, R.E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, 22(1), 3–42.
- Luis C., José E. G. S., & Javier G. B. (2010). Understanding the relationship between financial development and monetary policy. *Review of International Economics*, 18(5), 849-864.
- Lusardi, A., & Mitchell, O. (2007a). Baby boomer retirement security: The roles of planning, financial literacy, and housing wealth. *Journal of Monetary Economics*, 54 (1), 205–24.
- Lusardi, A., & Mitchell, O. (2007b). Financial literacy and retirement preparedness: Evidence and implications for financial education. *Business Economics*, 42 (1), 35–44.
- Lusardi, A., Olivia, S. M., & Vilsa, C. (2009). Financial literacy among the young: Evidence and implications for consumer policy. Centre for Research on Pensions and Welfare Policies, Turin (Italy) Working Papers, No. 91.
- Lusardi, A., & Mitchell, O. S. (2014). The economic importance of financial literacy: Theory and evidence. *Journal of Economic Literature*, 52(1), 5–44.
- Ma, Y., & Lin, X. (2016). Financial development and the effectiveness of monetary policy. *Journal of Banking & Finance*, 68(C), 1-11.
- Mahdzan, N., & Victorian, S. (2013). The determinants of life insurance demand: a focus on saving motives and financial literacy. *Journal of Asian Social Science*, 9(5), 274-284.
- Manganelli, S., & Popov, A. (2013). Financial dependence, global growth opportunities, and growth revisited. *Economics Letters*, 120(1), 123-125.

- Miller, S. and F. Russek. (1997). Fiscal Structures and Economic Growth: International Evidence. *Economic Inquiry*, 35(3), 603-613.
- Miller, M.H. (1998). Financial markets and economic growth. *Journal of Applied Corporate Finance*, 11(3), 8-14.
- Milton, F. (2005). The quantity theory of money: a restatement in *The Optimum Quantity of Money*, 51-67. (Original work published 1956).
- Niu, G., Wang, Q., & Zhou, Y. (2020). Education and FinTech adoption: Evidence from China. Available at <http://dx.doi.org/10.2139/ssrn.3765224>
- Park, J. H. (2015). Financial Development, Fiscal Policy and Macroeconomic Volatility. PhD thesis, University of York. <http://etheses.whiterose.ac.uk/id/eprint/16287>.
- Perotti, R. (2007). In search of the transmission mechanism of fiscal policy. In Acemoglu, D., Rogoff, K., & Woodford, M. *Macroeconomics Annual*, 22, 169-226. National Bureau of Economic Research. 2008.
- Rahman, M. (2018). Financial development and monetary policy efficiency: Unravelling the empirical contradiction and discovering the true relation. *Economics Bulletin*, 38(1), 281-296.
- Rajan, R., & Zingales, L. (1998). Financial dependence and growth. *The American Economic Review*, 88(3), 559-586.
- Rao, P., & Miller, R. (1971). *Applied Econometrics*. Belmont, CA: Wadsworth.
- Ratha, D., Mohapatra, S. & Plaza, S. (2008). Beyond Aid: New sources and innovative mechanisms for financing development in Sub-Saharan Africa. Policy Research Working Paper.
- Robinson, J. (1952). The rate of interest and other essays. In *The generalization of the general theory*. MacMillan: London.
- Romer, P. M. (1986). Increasing returns and long-run growth. *Journal of Political Economy*, 94(5), 1002-1037.
- Romer, P.M. (1990). Endogenous technological change. *Journal of Political Economy*, 98(5, Part 2), S71-S102.

- Roubini, N., & Sala-i-Martin, X. (1992). Financial repression and economic growth. *Journal of Development Economics*, 39(1), 5-30.
- Rousseau, P. L., & Wachtel, P. (2002). Inflation thresholds and the finance-growth nexus. *Journal of International Money and Finance*, 21(6), 777-793.
- Rousseau, P. L., & Sylla, R. (2003). Financial systems, economic growth, and globalization. NBER Chapters in *Globalization in historical perspective*, 373-416 National Bureau of Economic Research, Inc.
- Rousseau, P. L. & Wachtel, P. (2011). What is happening to the impact of financial deepening on economic growth? *Economic Inquiry*, 49(1), 276-288.
- Sahay, R., Cihak, M., N'Diaye, P. M., Barajas, A., Mitra, S., Kyobe, A. J., Yousefi, S. R., & Mooi, Y. N. (2015). Financial inclusion: Can it meet multiple macroeconomic goals? International Monetary Fund Staff Discussion Notes, No. 15/17.
- Sarma, M., & Pais. J. (2011). Financial inclusion and development. *Journal of International Development*, 23(5), 613-628.
- Seth, R., & Kalyanaraman, R. (2017). Effect of financial development on the transmission of monetary policy. *Theoretical Economics Letters*, 7(4), 795-813.
- Schumpeter, J.A. (1912). *Theorie der wirtschaftlichen Entwicklung*. Dunker & Humblot, Leipzig. The Theory of Economic Development translated by R. Opie. Harvard University Press, Cambridge, MA, 1934.
- Singh, S., Razi, A., Endut, N. & Ramlee, H. (2008). Financial market developments and their implications for monetary policy. *Bank for International Settlements*, 39, 49-99.
- Smith, B.D. (2002). Taking intermediation seriously. *Journal of Money, Credit, and Banking*, 35(6), 1319-1357.
- Stango, V., & Zinman. J. (2009). Exponential Growth Bias and Household Finance. *Journal of Finance*, 64 (6), 2807-2849.
- Stiglitz, J. E., & Weiss, A. (1981). Credit rationing in markets with imperfect information. *The American Economic Review*, 71(3), 393-410.

- Svensson, L. E. O. (2002). Monetary policy and real stabilization Proceedings - Economic Policy Symposium - Jackson Hole, Federal Reserve Bank of Kansas City, 261-312.
- Tennyson, S. (2011). Consumers' insurance literacy: evidence from survey data. *Financial Services Review*, 20(3), 165–179.
- Tobin, J. (1969). Money and income: post hoc ergo propter hoc? Cowles Foundation Discussion Papers 283.
- Tihomir, J. & Mehmed, M. (2011). The Phenomenon of Lag in Application of the Measures of Monetary Policy. *Economic Research*, 24(2), 154-163.
- Turban, E., King, D., Lee, J. K., Liang, T-P., Turban, D. C., & Outland, J. (2015). *Electronic Commerce*. Springer Texts in Business and Economics, Springer.
- van Rooij, M., Lusardi, A., & Alessie, R. (2011). Financial Literacy and Stock Market Participation. *Journal of Financial Economics*, 101(2), 449-472.
- van Rooij, M., Lusardi, A., & Alessie, R. (2012). Financial Literacy, Retirement Planning and Household Wealth. *Economic Journal*, 122(560), 449-478.
- Wang, H., Zhang, D., Guariglia, A., & Fan, G. (2021). Growing out of the growing pain?: Financial literacy and life insurance demand in China. *Pacific-Basin Finance Journal*, 66(C).
- Warburton, C. (1945). The monetary theory of deficit spending. *Review of Economics and Statistics*, 27(2), 74-84.
- Williams, J. (2010). Sailing into headwinds: the uncertain outlook for the U.S. economy, presentation to a joint meeting of the San Francisco and Salt Lake City Branch Boards of Directors, Salt Lake City, Utah.
- Woodford, M. (2010) Imperfect common knowledge and the effects of monetary policy National Bureau of Economic Research Working Paper, No. 8673.
- World Bank. (2014). Global Financial Development Report 2014: Financial Inclusion. Washington, DC.
- World Bank. (2018). World Economic Outlook. 134-135. Retrieved 31 October 2018.



- World Bank. (2018) World Economic Outlook, Database-WEO Groups and Aggregates Information. Retrieved 31 October 2018.
- World Bank. (2020). World Development Indicators, The World Bank Group, accessed July, 2020.
- Yoshino, N., Morgan, P. J., & Long, T. Q. (2020). Financial literacy and FinTech adoption in Japan. Asian Development Bank Working Paper, No.1095.
- Xiao, J. J., Chen, C. & Sun, L. (2015), Age differences in consumer financial capability. *International Journal of Consumer Studies*, 39(4), 387-395.
- Xu, L., & Zia, B. (2012). Financial literacy around the world. World Bank Policy Research Paper, No. 6107.