Financial Liberalization and Savings Mobilization in Sierra Leone: A Test of Mckinnon’s Complementarity Hypothesis

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Abstract

Over the past two decades, Sierra Leone has been characterized by low levels of financial savings performance. In spite of the adoption of financial liberalization policies in the early 1990s as part of a structural adjustment programme, financial markets are at relatively rudimentary stage of development. This study examines the complementarity between the accumulation of money balances (financial assets) and physical capital accumulation in Sierra Leone in the context of the theoretical underpinnings of McKinnon’s hypothesis. The Autoregressive Distributed Lag (ARDL) approach is employed using annual data for the period 1977-2008. The results indicate some support for McKinnon’s complementarity hypothesis in Sierra Leone. This provides some evidence on the efficacy of financial liberalization as a mechanism to enhance the rate of capital formation. From the results, the study suggests the need to achieve positive real rates of interest to promote financial deepening and facilitate the expansion of domestic capital formation for sustained economic growth.

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Over the past few decades, a large body of empirical literature has underscored the importance of interest rate liberalization and the elimination of other forms of financial repression in stimulating economic growth especially in developing countries. These issues have gained currency following the seminal work of McKinnon (1973) and Shaw (1973). The McKinnon-Shaw hypothesis postulates that government control and intervention in the financial system, which characterized financial sector policies in most developing countries in the 1970s and 1980s, induced distortions that impeded financial deepening and hence economic growth. Ultimately financial market distortions generate low savings and investment levels. Accordingly, the authors have advocated for liberalization of the financial sector as a strategy to remove distortions, promote

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efficiency and development of the sector for sustained economic growth. In other words, the liberalization theory argues for improved economic growth through financial sector reforms (see Ngugi and Kabubo, 1998). The conventional wisdom is that financial liberalization will enhance savings mobilization, deepen financial markets, promote investment and improve the effective implementation of monetary policy. Hence, the evolution of the financial liberalization theory significantly influenced the policy framework of the International Monetary Fund (IMF) and World Bank and provided the basis for the widespread adoption of financial sector reforms in sub-Saharan African (SSA) countries.

Sierra Leone implemented financial sector reforms in the early 1990s as part of a structural adjustment programme to ensure a competitive and efficient financial sector to support development of the economy. A key component of the ongoing financial reforms is the interest rate liberalization policy, which accompanied by other reform measures, should lead to positive real rates of interest and ensure effectiveness and efficiency in mobilizing financial savings. However, this policy has not significantly changed negative real deposit rates realized when the financial sector was characterized by repressive policies in the 1970s and 1980s, to high positive rates and the level of intermediation spread has not narrowed as expected. Consequently, the banking system could not mobilize sufficient financial savings. Relative to GDP, total deposit liabilities accounted for only 19.16 percent in 2008; real deposit rate reached a level of -3.55 percent in 2008 while interest rate spread was relatively high reaching 14.78 percent in 2008. These issues raise the question of what has been achieved by financial liberalization policies.

Broadly speaking, financial markets in Sierra Leone are at relatively rudimentary stage of development despite the adoption of financial liberalization measures over the past two decades. This issue therefore deserves the attention of policymakers given that an understanding of the relevance of financial liberalization policy would have important implications for the ongoing financial reforms. Hence, it would be ideal to evaluate the dynamics of the relationship between financial liberalization, financial savings and physical capital accumulation in the context of the theoretical underpinnings of McKinnon’s (1973) complementarity hypothesis. Such a study will provide greater insight into the policies needed to improve the effective functioning of the financial system and hence enhance domestic resource mobilization. This is important given that external finance in the form of financial capital flows and foreign aid has been rather ineffective in reducing credit constraints faced by developing countries (Addison, 2007 cited in Ang, 2010). Specifically, it is becomingly increasingly clear that there is need to enhance domestic resource mobilization and hence reduce reliance on aid flows, given
the degree of unsustainability of these flows in the wake of the global financial crisis. In effect, a policy of high real interest rates will help to mobilize savings and channel them into more productive investment opportunities. As Laumas (1990) and Pentecost and Moore (2006) argue, the complementarity hypothesis of McKinnon (1973) deals with the effect of financial liberalization on the accumulation of capital, hence economic growth, through a policy of higher real deposit rates. Similarly, Khan and Hassan (1998) posit that the hypothesis provides a useful formulation through which the success of the interest rate liberalization policy can be gauged.

Not much empirical evidence has been provided in support of the McKinnon’s complementarity hypothesis in sub-Saharan African countries. Specifically, the literature to date reveals a clear gap in the context of Sierra Leone. Some research has mainly assessed the validity of this hypothesis within the framework of groups of countries using panel data estimation techniques, rather than on the country case basis (see Moore, 2009). Even though Davies (2007) has given insightful assessment of financial repression and liberalization policies, the complementarity hypothesis is yet to be empirically tested for Sierra Leone.

Against this background, this study seeks to evaluate the efficacy of interest rate liberalization policy in Sierra Leone. This study contributes to the existing literature on financial liberalization in developing countries in two directions. First, unlike some empirical studies, it employs a robust approach, the autoregressive distributed lag (ARDL) to analyze McKinnon’s complementarity hypothesis in Sierra Leone over the period 1977 to 2008. Second, the study provides empirical evidence for a country for which no research has been conducted to evaluate this hypothesis. The results indicate some support for McKinnon’s complementarity hypothesis in Sierra Leone and hence provide some evidence on the efficacy of financial liberalization as a mechanism to enhance the rate of capital formation. From the results, the study suggests the need to achieve positive real rates of interest to promote financial deepening and facilitate the expansion of domestic capital formation for sustained economic growth.

Section two provides an overview of the financial sector reform measures adopted in Sierra Leone. Section three briefly reviews the literature on McKinnon’s complementarity hypothesis. The model, estimation procedure and data are described in section four. Section five discusses the empirical results. Section six presents conclusion and policy issues.
OVERVIEW OF FINANCIAL SECTOR REFORM MEASURES IN SIERRA LEONE

Prior to the adoption of financial sector reforms, the sector in the 1980s was characterized by systemic problems that threatened the health and soundness of the sector. Factors which contributed to the crisis were broadly identified as political interference, fiscal indiscipline, institutional weakness, poor supervision, legislative/judicial inadequacy and macroeconomic instability (see Gilpin, 1998). The authorities adopted policies that inhibited the effective functioning of the sector including the use of direct instruments in the conduct of monetary policy, such as administrative determination of interest rates and directed credit. Interest rates were maintained at relatively low levels to reduce government’s costs of borrowing funds to stimulate domestic industrial and agricultural production. This was accompanied by other macroeconomic policy distortions; with a fixed exchange rate regime, and high fiscal deficits that were largely financed through monetary accommodation. There was also the external problem of the oil price shocks which resulted in increased current account and fiscal deficits and higher inflation.

In 1986, Sierra Leone embarked on a structural adjustment programme in fulfillment of the conditionalities for a loan package from the International Monetary Fund. The adoption of financial sector reforms was a crucial component of the comprehensive conditionality. The reform measures implemented include devaluation, privatization, removal of consumer subsidies, price decontrols, liberalization of interest rates, and public expenditure controls (Emenuga, 2002). These policy interventions, however, did not reverse the economic decline as the programmes were not fully implemented, due in part to the inability of the government to meet the stipulated conditionalities (IMF, 2005). As a result, by 1987, Sierra Leone’s relations with the IMF and World Bank had deteriorated into a non-accrual status, which was largely attributed to the continued buildup of huge debt service arrears.

Inflation rate reached a peak of about 178.7 percent per annum in 1987, culminating in a negative real deposit rate of about -60 percent. The situation resulted in gradual disintermediation as savers attempted to hedge against financial losses and sought alternative investment opportunities. As such, the level of mobilized financial savings was impaired by the considerably low and most often negative real deposit rates. Besides, credit from the banking system was disproportionately allocated, with credit to the government accounting for over 80 percent of total credit (see Davies, 2007). These issues imply that financial sector policies were characterized by severe financial repression during this period.
The economic downturn and high inflation experienced during this period made it difficult for businesses to service their debts. Most banks were riddled with the problems of gross under-capitalization and increasing volume of non-performing portfolios. This was exacerbated further by the slow judicial procedures for loan recovery. Inadequate judicial and legislative support hindered banks’ potential to seek legal redress in the event of default. This created an environment where customers had to default on repayment with impunity, leaving the banks virtually powerless to recover their loans. Most banks therefore adopted a policy of ‘evergreening’ to conceal their losses (Gilpin, 1998)

Consistent with the financial liberalization theory postulated by McKinnon (1973) and Shaw (1973), financial reforms were also implemented within the framework of the structural adjustment programme launched in 1989. These policies included the adoption of a floating exchange rate regime, liberalization of interest rates and trade, elimination of directed credit, adoption of indirect instruments of monetary policy, and other institutional reforms such as those relating to prudential regulation and supervision, restructuring and privatization of some state-owned institutions. The Bank of Sierra Leone was completely restructured in 1993/94 and its supervisory arm strengthened. The Supervision Division was upgraded to a full-fledged Banking Supervision Department and staff strength increased. The Department comprised four divisions - Commercial and Rural Banks Supervision, Other Financial Institutions, Policy and Special Investigations and Follow up Divisions. However, these Divisions were reduced to three (3) in 1997 after merging Policy and Special Investigations and Follow-up Divisions.

Several deficiencies were identified in the 1970 Banking Act which were partly amended in 1978 and also in the Banking (Amendment) Decree 1996 issued by the National Provisional Ruling Council (NPRC). In particular, the 1970 Act did no specify capital adequacy requirement for banks apart from the minimum paid up capital requirements for locally incorporated and foreign banks of Le400,000 and Le800,000 respectively. These minimum capital requirements were grossly inadequate overtime as their real value was eroded by inflation. As a result, the Banking (Amendment) Decree 1996 increased the minimum capital requirements for commercial banks to Le300 million and Le600 million for locally and foreign incorporated banks respectively. Commercial banks were

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1 Gilpin (1998) defines evergreening as the practice of using “good money” (i.e. new loans) to refinance “bad money” (i.e. contaminated portfolios). P. 146.
required to maintain a minimum capital adequacy ratio of 6 percent using the adjusted capital base to adjusted asset base. The Decree also made provision for an upward review of the capital adequacy requirement by the Bank of Sierra Leone with the prior approval of the Minister of Finance.

In 2000, the Bank of Sierra Leone and Banking Acts were revised to provide robust legal framework for effective regulation and supervision of existing institutions and also to adequately and effectively license new entrants into the industry. More specifically, these Acts provide for a more independent and effective central bank; strengthening of the banking supervision function; legislative guidelines for the financial sector as a whole, including revised prudential requirements and increased minimum capital requirements. In the Banking Act 2000, the capital adequacy requirement was increased to 15 percent and a provision made for the Bank of Sierra Leone to prescribe a higher minimum paid-up capital requirement over time.\(^2\) The Banking Regulations 2001 issued were based on international prudential standards. The regulations were passed to facilitate the effective implementation of the provisions of the Banking Act 2000. The regulations prescribed the minimum paid up capital for locally incorporated and foreign incorporated commercial banks as Le800,000,000 and Le1,600,000,000 respectively. There were also important regulatory requirements such as the maintenance of minimum liquidity ratio of 40 percent of demand deposits and 20 percent of savings and time deposits. The minimum liquidity ratio includes the minimum cash reserve ratio of 10 percent of total deposits. The minimum capital adequacy ratio of 15 percent of the capital base to the risk weighted asset base was prescribed. New Banking Regulations were revised in 2003. However, the minimum paid up capital requirements of commercial banks, capital adequacy, liquidity and other requirements were maintained.

To prevent potential contagious effects arising from the activities of other financial institutions, some of these institutions were brought under the regulatory and supervisory purview of the Bank of Sierra Leone. Accordingly, the Other Financial Services Act 2001 was enacted, which provides the legislative framework for the regulation and supervision of some ‘other financial institutions’ by the Bank of Sierra Leone. Until 2001, the Bank of Sierra Leone had no authority to regulate and supervise the activities of these institutions.

In 2005, the Bank of Sierra Leone increased the minimum paid up capital of all commercial banks operating in Sierra Leone from Le800 million to Le15 billion by end December 2009, phased over five (5) years. This capital requirement has been further increased to Le30 billion to be maintained by end December 2014. The increase was necessitated by the need to reinforce financial soundness of the banks. The minimum capital adequacy ratio has been fixed at 15 percent; minimum cash reserve ratio is 12 percent of total deposit; and minimum liquidity level of 40 percent of demand deposits and 20 percent of quasi-money.

In 2007, the Sierra Leone Stock Exchange was officially launched to promote medium to long term finance and facilitate the development of the private sector. The Exchange commenced operations in 2009 and its establishment was facilitated by amendment to the Other Financial Services Act 2001, which culminated in the enactment of the Other Financial Services Amendment Act 2007. The latter empowers the Bank of Sierra Leone to issue licenses to and regulate stock exchanges until the Capital Market legislation is enacted, unlike the Other Financial Services Act 2001.

The reforms have encouraged competition in the banking industry. Since 2002 when the civil war ended, there has been a gradual increase in the number of commercial banks operating in the sector. As at the end of December 2008, the number of commercial banks has increased to thirteen (13) as against four (4) banks in the early 1990s. However, in spite of the increasing need to develop the domestic capital market, the financial system remains overwhelmingly bank dominated and inevitably continues to be the predominant source of financing of the private sector. Not surprisingly, the banking industry is still dominated by three commercial banks, namely Sierra Leone Commercial Bank Limited, Rokel Commercial Bank (SL) and Standard Chartered Bank (SL) Limited which accounted for 63 percent of the deposit market in 2008. This proportion reflects gradual improvement as the sector is becoming less concentrated when compared to a share of 88 percent of total deposits in 2004. However, this structure might facilitate collusive behaviour among banks, which has attendant implications for the pricing of financial services. Nevertheless, the increased participation of new banks in the industry has to some extent succeeded in improving the quality of the financial services delivered to customers.

Financial liberalization is expected to stimulate growth by increasing the supply of loanable funds through increases in real interest rates, which attract household savings to bank deposits, and thereby increasing the efficiency of the banking system (see Chirwa and Mlachila, 2004). However, the financial system is still rudimentary and dominated by a retail banking system. The trends in domestic savings ratio and selected financial sector
indicators are shown in figure 1. During the liberalization period, real deposit rate peaked to 11.91 percent in 2002 but deteriorated in the subsequent periods reaching a level of –3.55 percent in 2008. The negative real deposit rates realized in the liberalization era could be partly attributed to the fact that there have been limited variations in nominal deposit rates in recent years, which were accompanied by relatively high inflation rates. Commercial banks set interest rates by taking into consideration the costs associated with the intermediation, branch network and monitoring of advances, etc.

The spread between lending and deposit rates (IRS) is used as a measure of efficiency of the financial intermediation process and is expected to narrow following the liberalization process (see Ngugi, 2001 and Chirwa and Mlachila, 2004). However, the spread has remained relatively high in the reform period, reaching 14.78 percent in 2008. This is indicative of limited competition in the banking sector and its resulting inefficiency. It implies that further progress is needed to enhance efficiency of the financial intermediation process. The negative real deposit rate and apparent inefficiency of the intermediation process in the reform period have been accompanied by low rate of financial savings. The ratio of broad money supply to nominal GDP (M2/GDP) deteriorated from 18.35 percent in 1989 when the structural adjustment programme was launched to 9.93 percent in 1996 but improved gradually to 22.68 percent in 2008. However, this ratio could sometimes measure the extent of monetization rather than financial development; particularly in developing countries where money is used as a store of value in the absence of other more attractive alternatives (see Khan and Qayyum, 2006). Nonetheless, the alternative measures of financial development used revealed a similar trend. The ratio of banking deposit liabilities to GDP (BDLG)\(^3\) deteriorated from 11.08 percent in 1989 to 9.68 percent in 2000 although it improved gradually to 19.16 percent in 2008. Similarly, the ratio of credit to the private sector to GDP (CPSG), which represents an accurate measure of the role of financial intermediaries in channelling funds to the private sector (see Khan and Senhadji, 2003), also declined from 4.64 percent in 1989 to 2.03 percent in 2000 but improved gradually to 6.98 percent in 2008\(^4\). Consequently, the ratio of domestic savings to GDP (DSG)...

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\(^3\) The ratio of banking deposit liabilities to GDP more accurately reflects the proportion of financial savings mobilized in the economy following the liberalization process. It is measured by subtracting currency in circulation from M2 and dividing by nominal GDP.

\(^4\) The trends in the financial depth indicators should be interpreted with caution since the adoption of financial liberalization measures coincided with the civil war (1991-2001), which adversely affected the effective implementation of these reforms and hence the mobilization of financial savings.
also deteriorated from 14.57 percent in 1989 to -8.9 percent in 2005 although recent trends revealed significant improvement as the ratio increased to 8.3 percent in 2007 and further improved to 12.8 percent in 2008.

In recent years, policy makers have underscored the need for further reforms in the financial sector to facilitate economic growth and development. These issues are encapsulated in the financial sector development plan (FSDP) of the country. Specifically, the FSDP seeks to provide a framework for creating a sound, diversified, responsive and well-functioning financial system that would provide appropriate support to productive activities, thereby contributing to economic growth and poverty alleviation. The FSDP has four priority areas - to strengthen the commercial banking system and improve its competitiveness; enhance rural financial access through microfinance institutions and community banks; strengthen contractual savings and long term finance; and strengthen the enabling environment through the legislative, regulatory and policy infrastructure.

The FSDP is an important component of the Government’s “Agenda for Change” and has been approved by Cabinet. It is supported by the Government of Sierra Leone, the World Bank, German Development Cooperation and other development partners.
LITERATURE REVIEW

Theoretical Literature

Most developing countries in the 1970s and early 1980s adopted policies that followed the Keynesian approach to economic growth, which advocated for a policy of low interest rate to promote investment and economic growth. By keeping interest rates low, large fiscal deficits were financed without necessarily increasing taxation or inflation (see Ang, 2007). Apart from the imposition of ceilings on interest rates, the other characteristics of financial systems in developing countries included high reserve requirements, selected credit to priority sectors, accommodation of government borrowing and weak monetary controls. The low interest rate policy accompanied by directed and rationed allocation of credit to priority sectors impeded financial deepening (see Khan and Hassan, 1998), which in turn affected the quality and quantity of investment and hence hindered economic growth. In other words, these distortions inhibited financial savings mobilization and credit allocation to the private sector was severely constrained, which impacted negatively on the growth of the banking systems. In a critique of the Keynesian framework, McKinnon described these characteristics as financial repression⁶.

The McKinnon-Shaw framework therefore advocated for the implementation of financial liberalization policies as a way of increasing financial savings mobilization, improving efficiency with which resources are allocated among alternative investment projects and therefore enhancing economic growth. McKinnon (1973) developed a model of developing countries based on two important assumptions. Firstly, investors in a typical developing economy have limited opportunities for external finance and are thus confined to self-finance. Secondly, investment expenditures are lumperier than consumption expenditure and potential investors must first accumulate money balances prior to undertaking relatively expensive and indivisible investment projects. The accumulation of money balances is expected to generate greater investment, a phenomenon referred to as ‘conduit effect’ of money balances. Such a complementary role between money and physical capital is referred to as the complementarity hypothesis (see Ang, 2007)⁷.

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⁶ The term financial repression generally refers to “financial systems with policies that distort domestic financial markets…” (see Ngugi and Kabubo, 1998 P.10).

⁷ Note that McKinnon’s hypothesis is in contrast with the neoclassical approach which suggests that money and capital are substitutes.
Shaw (1973) however focused on the benefits of an efficient and well-functioning financial system. His ‘debt-intermediation’ view suggests that financial intermediaries promote investment and raise output growth through the intermediation process. Shaw argues that higher deposit rates will increase financial savings and expand the role of financial institutions in channeling funds from surplus to deficit units in the economy. The development of the financial system will create the incentive to save, which will raise the volume and efficiency of investment and thus accelerate economic growth.

Nevertheless, the McKinnon (1973) and Shaw’s (1973) models emphasize different aspects of raising finance. McKinnon’s outside model stresses the relationship between the deposit rate and investment and suggests that all finance is raised internally. Unlike McKinnon, Shaw’s model focuses on the importance of the intermediation process and proposes an inside model that provides for raising funds externally. However, these models should be viewed as complementary (Molho, 1986).

Apart from interest rate liberalization, financial liberalization includes a broader spectrum of reforms including privatization of publicly owned financial institutions, removal of restrictions to entry into the banking industry and hence improving competition in financial markets, reduction of reserve requirements, elimination of directed lending, enhancing prudential regulation measures, adopting measures aimed at securities markets development and openness of current and capital accounts.

The McKinnon-Shaw hypothesis has generated very rich strand of literature. In the early 1980s, the neo-structuralists provided an alternative view of the effect of financial liberalization, which criticized the McKinnon-Shaw paradigm for not incorporating the informal financial markets in their framework. The neo-structuralists school, led by Wijnbergen (1983) and Taylor (1983), postulates that financial liberalization may not result in increased output growth in situations of efficient curb markets. In particular, Wijnbergen (1983) argues that financial liberalization is likely to reduce the rate of economic growth by reducing the total real supply of credit available to investors due to the effects on the curb market. The Neo-structuralists assume that households allocate their wealth among gold or currency, bank deposits and curb market loans which are substitutes for one another; commercial banks are subject to fractional reserve banking practices and the curb markets are efficient in intermediating between savers and investors. Based on these assumptions, a rise in the bank deposit rates following financial liberalization will create the incentive for households to shift funds away from curb markets that provide one for one intermediation to the formal banking systems that offer only partial intermediation as a result of fractional reserve banking practices. This reduces total credit supply to the informal sector. Also, the cost of obtaining working
capital from the informal market will increase as informal market rates would rise following the liberalization of interest rates. Hence, some of the beneficiaries of the informal credit market will be crowded out of the credit market as funds are transferred to the formal banking system.

Molho (1986) has emphasized the intertemporal nature of complementarity to argue that the McKinnon and Shaw approaches are not necessarily mutually exclusive. This rests on the fact that in practice, most projects are financed by a combination of own funds (outside money) and borrowed funds (inside money). As such, the author has argued that there is contemporaneous substitutability between deposits and physical capital but intertemporal complementarity with current deposits intended to finance future investment.

Campbell and Mankiw (1990; 1991) have examined the effect of liquidity constraint on private savings rate. The authors argued that in both developed and developing countries, a significant proportion of households are liquidity-constrained which suggests that they cannot even-out consumption over time. Against this background, household’s consumption is largely dependent on the current income as opposed to the prediction of the life-cycle/permanent-income hypothesis. As financial liberalization increases access of households to capital markets (or reduce the number of liquidity-constrained households), consumption is stimulated which lead to a fall in the savings rate. Intuitively, this implies that financial liberalization will have a negative effect on the private savings rate (see Serieux, 2008). Similarly, some authors have also supported the argument that financial liberalization will ease credit constraints and may weaken the incentives for individuals to save (Bayoumi, 1993; Jappelli and Pagano, 1994; Bandiera et al, 2000).

Stiglitz (1994) focused attention on the existence of imperfections in financial markets which have necessitated government interventions in the sector. He argued that government intervention through partially repressed financial systems can reduce market failures and improve the overall performance of an economy. In effect, a partly repressed financial sector has capacity to perform better than a liberalized financial sector. Similarly, Stiglitz (2000) has also linked the increased frequency of financial crises to the liberalization of the financial sector.

Akyuz’s (1995) adopted a three-sector model to differentiate among households, private firms and government. The author argued that a rise in the interest rates as a result of financial liberalization would benefit deposit-holding households who are relatively lower savers compared to firms. Firms may experience a fall in profits because of the higher
cost of debt. Hence, there would be a fall in the private savings rate as the higher-savings firms experience a decline in profit while low-saving households receive a significant proportion of total income. Similarly, public sector savings would also fall as a result of a decrease in tax revenues from interest income, following liberalization, which is accompanied by higher interest payment on government debt. Overall, financial liberalization would lead to an increase in financial savings but a decline in overall savings (Serieux, 2008).

Ogaki et al (1996) have pointed out that the intertemporal elasticity of substitution will approach zero when a significant proportion of households have income near the subsistence level. In this context, the private savings rate is not likely to be responsive to increases in the real rate of interest. In other words, it implies that an increase in the real rate of interest following financial liberalization will have no effect on the private savings rate. However, the private savings rate is expected to be sensitive to a rise in the real interest rate in countries where a significant proportion of households have moved above the subsistence income level.

Ang (2010) has shown that financial deepening and increased banking density are associated with higher private savings but the development of insurance markets and liberalization of the financial system seem to retard the mobilization of private savings. The author argued that the development of the insurance market reduces the incentive to save for precautionary purposes and hence reduces private savings.

In sum, there is no consensus with respect to the role of financial liberalization in influencing domestic resource mobilization. While some authors have not explicitly opposed the role of financial liberalization in enhancing the mobilization of financial savings, it is argued in others that that financial liberalization would lead to a fall in the savings rate. The possible decline or low levels of savings has been attributed to the income distribution effect (Akyuz, 1995), easing liquidity-constraints (Campbell and Mankiw, 1990; 1991; Bayoumi, 1993; Jappelli and Pagano, 1994; Bandiera et al, 2000) and existence of subsistence consumption (Ogaki et al, 1996). It is also implicit in Stiglitz’ (1994) view that financial liberalization may not necessarily increase the mobilization of financial savings and could have the opposite effect as well.

**Empirical Literature**

Empirically, assessing the validity of McKinnon’s (1973) complementarity hypothesis has gained considerable debate in the monetary economics literature. Different estimation techniques have been employed in empirical studies to evaluate the efficacy of the
hypothesis in developing countries by specifying either money demand and savings functions, or money demand and investment functions. However, there is a lack of consensus regarding the empirical evidence on the hypothesis. While the results of some studies provide strong support for the hypothesis, the evidence from others is either contradictory or inconclusive.

Thornton (1990) examined the complementarity relationship in India using both the OLS and two stages least squares (2SLS) estimation techniques. The demand for real money balances (in per capita terms) was expressed as a function of the savings ratio, and simultaneously the savings function was expressed as a function of per capita real money balances. The results of both approaches were consistent with McKinnon’s complementarity hypothesis as the coefficient of real money balances was positive and statistically significant in the savings function and, the coefficient of savings ratio was also positive and statistically significant in the demand for real money balances function.

Laumas (1990) estimated the demand for real time deposits and ratio of investment to income functions in India using the 2SLS estimation technique. The results provide support for the complementarity hypothesis in India. Similarly, Thornton and Poudyal (1990) tested for complementarity in the demand for money function and the savings for Nepal by the same estimation technique. The results show strong support for McKinnon’s complementarity hypothesis in Nepal.

Khan and Hassan (1998) tested McKinnon’s complementarity hypothesis by specifying the savings ratio and demand for real balances functions on the one hand, and on the other hand, by estimating the demand for real money balances and investment function. The results provide evidence of the complementarity hypothesis in both specifications. However, the authors did not account for potential endogeneity in the underlying relationship and hence the estimated coefficients are likely to be biased.

Kar and Pentecost (2001) used the multivariate cointegration and vector error correction models (VECM) to test the complementarity hypothesis between money and capital in Turkey. By specifying the demand for money and investment functions, the results provided evidence on the complementary hypothesis. Using a similar methodology, Pentecost and Moore (2006) estimated the demand for money and investment ratio simultaneously as a system of equations. The results indicate support for McKinnon’s complementarity hypothesis in India.

Gounder (2007) used the ARDL approach to cointegration to test the complementarity relationship between money and physical capital in Fiji. By specifying the savings and
demand for money functions simultaneously, the results suggest some evidence of the McKinnon’s complementarity hypothesis in Nepal. The coefficient of real money balances has the expected positive sign and statistically significant in the savings function. However, the coefficient of domestic saving ratio shows a positive but insignificant effect on the real money balances function.

Moore (2009) examined McKinnon’s complementarity hypothesis for 108 developing countries (including Sierra Leone) by estimating real money balances and investment equations using a panel system of equations. The results provide evidence of the complementarity hypothesis. However, the complementarity hypothesis was not supported in the middle income group of countries, or when countries have attained a certain stage of financial markets development.

In contrast, the findings by Fry (1978) did not support the complementarity hypothesis. By employing the 2SLS estimation technique and using pooled time series data, Fry found negative and statistically significant effect of the domestic savings ratio on the demand for real money balances in 10 Asian countries. The author concluded that it would be necessary “to look much farther down the development ladder . . . to some of the world’s least developed countries in a search for complementarity” (p.474). Similarly, Gupta (1984) adopted the 2SLS approach to examine the complementarity hypothesis using 25 Asian and Latin American Least Developed Countries (LDCs). The results did not find wide support for the complementarity hypothesis. Ozer (2003) did not also support the complementarity hypothesis in Turkey. The author concluded that it is the cost of capital rather than the availability of finance that constrains investment in financially-repressed economies.

In sub-Saharan Africa, the empirical evidence on McKinnon’s complementarity hypothesis has also shown mixed results. Ajewole (1989) adopted an Ordinary Least Squares (OLS) estimation technique to ascertain McKinnon’s complementary relationship in Nigeria. The results provide support of the conduit effect between money assets and other physical assets in Nigeria. The results of Adebiyi (2003) suggest some support for the complementarity hypothesis in seven African countries.

Odhiambo (2004) examined the complementarity hypothesis for Kenya by estimating two separate models. In the first model, the demand for money is expressed as a function of the domestic savings rate and, simultaneously, the savings rate is included in the real money balances function. In the second model, the investment variable is included in the money demand function. The results found strong support for the complementarity hypothesis in both models.
Odhiambo (2005) also tested the relevance of McKinnon's complementarity hypothesis in South Africa by specifying the demand for real money balances as a function of the savings ratio and simultaneously, the savings rate as a function of the demand for real money balances. The study found strong support for McKinnon's complementarity hypothesis. On the contrary however, Mwega et al (1990) estimated private saving rate function and demand for real money balances for Kenya but did not find support for the complementarity hypothesis. Rather, the results suggest that the private savings rate and real demand for money are non-significantly responsive to a representative deposit rate of interest.

From the empirical literature, the rate of interest has been used as a proxy for financial liberalization (see Odhiambo, 2005). The crux of the McKinnon’s complementarity hypothesis is the analysis of the interest rate effects on financial savings and hence domestic savings or investment. However, the financial liberalization process has been associated with the implementation of various measures at different times. It is therefore imperative that we control for the effects of these key changes in the financial policy environment. This issue has been largely ignored in the empirical literature. Without adequately controlling for these policy changes, the empirical results obtained may be explaining most of what happened during the financial liberalization period. Hence, the results may not be representative of the entire study period extended to pre-reform era. This study therefore contributes to the literature by incorporating both factors to provide empirical evidence on Sierra Leone for which no study has been conducted to shed light on the relevance of McKinnon’s complementarity hypothesis.

**MODEL SPECIFICATION, ESTIMATION PROCEDURE AND DATA**

**Model Specification**

The conventional demand for money function expresses real money balances (in per capita terms) as a function of a scale variable and a set of opportunity cost variables. The scale variable captures the function of money as a medium of exchange and it is usually represented by income. The opportunity cost variable(s) proxy the alternatives to holding money balances which include the rate of interest and rate of inflation.

According to the complementarity hypothesis of McKinnon (1973), the demand for real money balances and physical capital accumulation are complements in developing countries. This is based on the idea that in underdeveloped financial markets, there are limited opportunities for external finance and hence potential investors have to accumulate money balances prior to undertaking relatively costly and indivisible
investment projects. The accumulation of money balances is viewed as a “conduit” for capital formation such that money balances and capital formation are complementary assets. In this framework, savers and investors are apparently the same and therefore, a rise in the savings rate implies a rise in the investment rate.

Following the literature and the empirical specifications adopted in Thornton (1990), Khan and Hassan (1998), Odhiambo (2004, 2005) and Gounder (2007), the complementarity hypothesis is tested by specifying the following demand for real money balances and savings functions respectively:

$$\log(RMP) = \alpha_0 + \alpha_1 \log(RGDPP) + \alpha_2 \log(RMP)_{t-1} + \alpha_3 DSG_t + \alpha_4 RIR_t + \alpha_5 INF_t$$
$$+ \alpha_6 WAR + \beta_1 LIB + \epsilon_t \tag{1}$$

$$DSG_t = \beta_0 + \beta_1 GRGDPP_t + \beta_2 \log(RMP)_{t-1} + \beta_3 \log(TOT)_t + \beta_4 \log(AGDP)_t$$
$$+ \beta_5 UR_t + \beta_6 INF_t + \beta_7 WAR + \beta_8 LIB + \nu_t \tag{2}$$

where RMP = per capita real money balances; RGDPP = per capita real GDP; GRGDPP = growth rate of per capita real GDP; DSG = ratio of domestic savings to GDP; RIR = real deposit rate; INF = inflation rate; TOT = terms of trade; AGDP = foreign aid as a percentage of GDP; UR = urbanization ratio; LIB = dummy variable to control for changes in the financial policy environment (1986, 1989-2008 = 1, 0 otherwise) and WAR = dummy variable to account for the effects of the civil war (1991-2001 = 1; 0 otherwise). Real money balances and real income were expressed in per capita terms in order to minimize the problems of heteroscedasticity and spurious association arising from the trend movements in these variables (Thornton, 1990). Per capita real money balances, one-period lagged per capita real money balances, per capita real GDP, terms of trade and ratio of foreign aid to GDP are expressed in natural logarithmic form.

To incorporate the reversibility of McKinnon’s complementarity relationship, per capita real money balances function is expressed as a function of the savings ratio and, simultaneously, the savings ratio is a function of per capita real money balances. This specification is based on the assumption that complementarity works both ways; the conditions of money supply have first-order impact on decisions to save and invest (see Fry, 1978; Thornton, 1990; Khan and Hassan, 1998; Odhiambo, 2005; and Gounder, 2007). As Fry argues, McKinnon’s complementarity hypothesis is based on the assumption that investment opportunities are plentiful and that the binding constraint is the supply of saving and not the demand for investible funds. Accordingly, the domestic
savings ratio is substituted for investment to generate a finance motive demand for the domestic money stock (Fry, 1978). A higher savings rate increases the demand for real money balances and vice versa.

According to Khan and Hassan (1998), Odhiambo (2004, 2005) and Gounder (2007), the complementarity relationship is confirmed if the following partial derivatives are positive i.e. $\frac{\partial (RMP)}{\partial (DSG)} > 0$; and $\frac{\partial (DSG)}{\partial (RMP)} > 0$.

Per capita real GDP (scale variable) is expected to be positively related to real money balances, reflecting increased transactions demand for money with increases in real income. Consistent with the financial liberalization hypothesis of McKinnon (1973) and Shaw (1973), real deposit rate is expected to be positively related to real money balances as increases in the real deposit rate will increase the accumulation of real money balances.

The rate of inflation is included to determine the effect of the variable on the accumulation of real money balances. Nasir and Khalid (2004) have indicated that higher inflation can lead to lower savings by increasing uncertainty and in order to maintain the real levels of consumption, higher spending takes place resulting in low levels of saving (household savings). Inflation can also increase savings through real balances effect, where holders of money balances and other financial assets try to restore the real value of their holdings after an increase in prices. Similarly, Gounder (2007) argues that inflation leads to a rise in real money balances in the short run as uncertainty increases the demand for financial assets. Hussein and Thirlwall (1999) have indicated that higher inflation may discourage savings as its real value is falling.

In the savings function, the inclusion of growth rate of per capita real income variable is supported by the life-cycle hypothesis. The hypothesis suggests that the aggregate savings will increase in response to an increase in income growth, through an increase in the savings of active workers relative to the dissavings of people out of the labor force.

The one-period lagged per capita real money balances variable is included in the savings function to test the complementarity hypothesis. From the literature, the hypothesis assumes that potential investors in underdeveloped financial markets must first accumulate money balances prior to undertaking indivisible investment projects. This variable therefore tests the positive impact of real interest rate on domestic savings and hence investment via financial savings mobilization. The ratio of foreign aid to GDP is
added to test the aid-savings hypothesis. The relationship is expected to be negative as aid flows are used for consumption (Ouattara, 2004).

The effect of terms of trade on domestic savings is ambiguous. The traditional argument of the impact of trade on private saving is based on the Harberger-Laursen-Metzler hypothesis, which argues that deterioration in the terms of trade, that is, a reduction in the price of domestically produced goods relative to that of foreign goods, reduces real income and hence saving. However, if it is assumed the private agents smooth consumption across time in the face of volatile and unpredictable income, then the effect is expected to be ambiguous depending on whether movements in TOT are considered to be temporary or permanent (Athukorala and Sen, 2001). When deterioration in terms of trade is considered to be temporary, consumers may respond by increasing absorption in order to offset the decrease in purchasing power of domestic goods and keep real expenditure constant. On the other hand, if terms of trade deterioration is perceived to be permanent, the situation may encourage domestic residents to increase their savings in the current period in order to sustain their real standard of living in the future.

The urbanization ratio captures the influence of demographic variables on the domestic saving rate. The variable is expected to exert a negative influence on domestic savings rate as increased urbanization reduces the need for precautionary savings (Ozcan et al, 2002). Rural residents are more likely to increase savings for precautionary purposes because of higher volatility in income as compared to their urban counterparts.

The dummy variable LIB has been included to control for changes in the financial liberalization environment. The variable is expected to exert positive effect on domestic savings as reform of the financial sector should improve the effective functioning of financial institutions, increase the accumulation of real money balances and lead to a higher savings rate. The WAR dummy was also added to control for the effect of the civil war. The war had adverse effect on the level of economic activity and consequently compromised financial savings mobilization.

**Estimation Procedure**

To empirically analyze McKinnon's complementary relationship, the study utilizes the ARDL modeling approach to estimate both the savings and money demand functions. The literature has documented several advantages of the ARDL modeling approach to cointegration or bounds test over alternatives such as the residual-based approach proposed by Engle and Granger (1987) and the maximum likelihood-based approach proposed by Johansen and Juselius (1990) and Johansen (1991). According to Pesaran and Pesaran (1997), the residual-based cointegration approach is inefficient and can lead
to contradictory results particularly when there are more than two I(1) variables under consideration. The ARDL approach does not require classification of the order of integration of the series since cointegration can be applied regardless of whether the series are I(0) or I(1), or fractionally cointegrated. This eliminates the uncertainty associated with pre-testing the order of integration of the variables. On the contrary, both the residual-based and maximum likelihood-based approaches require that the series are of the same order of integration before cointegration test can be conducted.

Secondly, the ARDL approach incorporates sufficient number of lags to capture the data generating process general to specific modeling framework (Laurenceson and Chai, 2003 quoted in Shrestha, 2005; and Jalil, et. al, 2008). The technique has superior small sample properties as compared to the Engle-Granger and Johansen and Juselius cointegration tests (Pesaran and Shin, 1999). Another advantage is that the approach overcomes the problems of serial correlation and endogeneity. According to Pesaran and Shin (1999), modeling the ARDL with the appropriate lags will correct for both serial correlation and endogeneity problems. Besides, all the variables are assumed to be endogenous and the long run and short run parameters of the model are estimated simultaneously (Khan et al, 2005). Finally, the ARDL technique generally provides unbiased estimates of the long-run model and valid t-statistics even when some of the regressors are endogenous (Harris and Sollis, 2003 quoted in Constant and Yue, 2010). Therefore, this technique is very suitable for addressing the potential simultaneity bias that could characterize equations (1) and (2).

Accordingly, the ARDL representations of equations (1) and (2) can be specified as follows:

\[
\Delta LRMP = \beta_0 + \sum_{i=1}^{p} \beta_1 \Delta LRMP_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta LRGDP_{t-i} + \sum_{i=1}^{p} \beta_3 \Delta DSG_{t-i} + \sum_{i=1}^{p} \beta_4 \Delta RIR_{t-i} + \sum_{i=1}^{p} \beta_5 \Delta INF_{t-i} \\
+ \delta_1 LRMP_{t-1} + \delta_2 LRGDP_{t-1} + \delta_3 DSG_{t-1} + \delta_4 RIR_{t-1} + \delta_5 INF_{t-1} + \gamma_1 LIB + \gamma_2 WAR + \nu_t 
\]

(3)

\[
\Delta DSG = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta DSG_{t-i} + \sum_{i=1}^{p} \alpha_2 \Delta LRMP_{t-i} + \sum_{i=1}^{p} \alpha_3 \Delta LRGDP_{t-i} + \sum_{i=1}^{p} \alpha_4 \Delta LTOT_{t-i} + \sum_{i=1}^{p} \alpha_5 \Delta LAGDP_{t-i} \\
+ \sum_{i=1}^{p} \beta_1 \Delta UR_{t-i} + \sum_{i=1}^{p} \beta_2 \Delta INF_{t-i} + \lambda_1 DSG_{t-i} + \lambda_2 LRMP_{t-i} + \lambda_3 LRGDP_{t-i} + \lambda_4 LTOT_{t-i} + \lambda_5 LAGDP_{t-i} + \beta_1 UR_{t-1} + \lambda_1 INF_{t-1} + \phi_1 LIB + \phi_2 WAR + \epsilon_t 
\]

(4)

Where \(L\) represents natural logarithm, RMP\(1\) is a one-period lagged effect of per capita real money balances, \(\Delta\) is the difference operator and \(p\) is the lag length. The ARDL
model testing procedure begins by first estimating equations 3 and 4 by OLS. The F-test is used to test for the existence of cointegration. The calculated F-statistic for each variable when taken as the dependent variable tests the null hypothesis that the parameters of the lagged level variables are jointly not significant i.e. there is no cointegration relationship among the variables. In the case of equation 3, the null hypothesis of no cointegration can be written as \( H_0 : \delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = 0 \) as against the alternative hypothesis of the existence of cointegrating relationship \( H_1 : \delta_1 \neq \delta_2 \neq \delta_3 \neq \delta_4 \neq \delta_5 \neq 0 \). This is denoted by \( F_{LRMP} (LRMP/DSG, LRGDPP, RIR, INF) \). Similarly, the F-test for the non-existence of long run relationship in equation 4 \( H_o : \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = \lambda_7 = 0 \) is denoted by \( F_{DSG} (DSG/LRMP1, GRGDPP, LTOT, LAGDP, UR, INF) \). The calculated F-statistic is compared with the critical values provided by Pesaran and Pesaran (1997), Pesaran et al (2001) or Narayan (2004). However, due to the limited number of sample observations (32), the critical values in this paper are extracted from Narayan (2004)\(^8\). The critical values are divided into upper and lower critical bounds. The upper critical values assume that all the series are I(1) while the lower critical values assume that all the series are I(0). If the calculated F-statistic exceeds the upper critical value, the null hypothesis of no cointegration will be rejected regardless of whether the series are I(0) or I(1).

On the other hand, if the calculated F-statistic falls below the lower critical value, then the null hypothesis of no cointegration cannot be rejected. If however the calculated F-statistic lies within the lower and upper bounds, then the test is said to be inconclusive. In this context, the unit root tests should be conducted to ascertain the order of integration of the variables. According to Shrestha and Chowdhury (2005), if all the variables are found to be I(1), then the decision is taken on the basis of the upper critical value. However, if all the variables are I(0), then the decision is based on the lower critical bound value.

The next stage involves estimating the long run relationship using the selected ARDL model based on the Schwartz-Bayesian Criterion (SBC) and Akaike Information Criterion (AIC). This is followed by the estimation of the short-run dynamic parameters. The goodness of fit of the estimated ARDL model is examined by conducting a series of

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\(^{8}\) The critical values provided by Narayan (2004) are considered to be more appropriate for ARDL modeling using small samples compared to Pesaran and Pesaran (1997) or Pesaran et al (2001).
diagnostic tests based on the short run estimates. The tests relate to serial correlation, functional form misspecification, non-normality of the errors and heteroscedasticity.

**Data**
The study uses annual data for the period 1977-2008. The ratio of domestic savings to GDP, urbanization ratio, aid (overseas development assistance and official aid) and population were obtained from the World Development Indicators (WDI) CD-ROM and Statistics Sierra Leone Office. The nominal deposit rate, broad money (M2), nominal GDP and consumer price index (CPI, 2000=100) were obtained from the IMF CD-ROM and the Bank of Sierra Leone. Real broad money balances and real GDP were obtained by deflating M2 and nominal GDP by CPI respectively. These series were then divided by population to express in per capita terms. Terms of trade was calculated as the ratio of export price index to import price index. Urbanization ratio was defined as the percentage of the total population living in urban areas. Inflation was calculated as the percentage change in the CPI. Real deposit rate was obtained using the formula: $\text{RIR} = \frac{1 + \text{NDR}}{1 + \text{INF}} - 1 \times 100$ where NDR is the nominal deposit rate of commercial banks and INF is the inflation rate. The growth rate of per capita real GDP ($\text{GRGDPP}$) was calculated as follows: $\text{GRGDPP}_t = \frac{\text{RGDP}_t - \text{RGDP}_{t-1}}{\text{RGDP}_{t-1}} \times 100$

**EMPIRICAL RESULTS**

**Unit Root Test**
Prior to testing for cointegrating relationship among the variables, the order of integration of the variables was tested using the Augmented Dickey-Fuller (ADF) test. This process was meant to ensure that none of the variables was integrated of order 2 i.e. $I(2)$ and hence avoid the problem of spurious results (see Jalil et al, 2008). The unit root test results for all the variables are reported in table 1. The results suggest that the variables are integrated of order one, $I(1)$ i.e. stationary at first difference with the exception of urbanization ratio, terms of trade and growth rate of per capita real income which are stationary in levels, $I(0)$. 

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Table 1: Unit Root Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF test statistic (intercept with no trend)</th>
<th>ADF test statistic (intercept with trend)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lag</td>
<td>Level</td>
</tr>
<tr>
<td>DSG</td>
<td>1</td>
<td>-1.6436</td>
</tr>
<tr>
<td>LRGDPP</td>
<td>2</td>
<td>-2.9742</td>
</tr>
<tr>
<td>GRGDPP</td>
<td>1</td>
<td>-1.9141</td>
</tr>
<tr>
<td>LRMP</td>
<td>1</td>
<td>-1.6596</td>
</tr>
<tr>
<td>UR</td>
<td>2</td>
<td>6.1344</td>
</tr>
<tr>
<td>RIR</td>
<td>1</td>
<td>-1.8104</td>
</tr>
<tr>
<td>LAGDP</td>
<td>1</td>
<td>-1.9086</td>
</tr>
<tr>
<td>INF</td>
<td>1</td>
<td>-1.9108</td>
</tr>
<tr>
<td>LTOT</td>
<td>1</td>
<td>-3.9793</td>
</tr>
</tbody>
</table>

Note—Critical 5% values of ADF without trend and with trend are -2.98 and -3.59 respectively.

Cointegration Analysis

The bounds testing procedure was conducted to determine the existence of long-run relationships in equations (3) and (4). Due to the relatively small sample size (32) and the use of annual data, a lag length of 2 was used in the bounds test. For annual data, Pesaran and Shin (1999) suggest the use of a maximum of 2 lags. The results of the test are given in table 2.

In the per capita real money balances function (3), the computed F-statistic, $F_{c,mr} = 5.4988$ is greater than the upper critical bound value of 4.15 at the 5 percent level of significance. We therefore reject the null hypothesis and conclude that there exists a cointegrating relationship among per capita real money balances and the independent variables. When the other variables are taken as dependent variables, the computed F-statistics were below the lower critical bound (3.002), suggesting that there is no other cointegrating relationship among the variables.

In the savings function (4), the calculated F-statistic, $F_{DSG} = 6.1722$ is higher than the upper critical value of 5.571 at the 1 percent level. This suggests the existence of a long-run relationship among the variables. Similarly, when urbanization ratio is taken as the dependent variable, the calculated F-statistic also exceeds the upper critical value, suggesting the existence of another cointegrating relationship. The result is inconclusive.
in the case of per capita real money balances and the F-statistics when the regression was normalized on the other variables were below the lower critical value. However, the domestic savings to GDP ratio was taken as the dependent variable.  

Table 2: Bounds Test Results

<table>
<thead>
<tr>
<th>Equation</th>
<th>K</th>
<th>Critical Value-Restricted Intercept and no Trend</th>
<th>Calculated F-Statistic</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>I(0)</td>
<td>I(1)</td>
<td></td>
</tr>
<tr>
<td>Equation 3</td>
<td>4</td>
<td>3.002</td>
<td>4.150</td>
<td>$F_{LRM} = 5.4988$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F_{DSG}(\cdot) = 1.0514$,</td>
<td>$F_{LRGDPP}(\cdot) = 1.7031$,</td>
<td>$F_{INF}(\cdot) = 1.5025$,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F_{RIR}(\cdot) = 0.4316$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equation 4</td>
<td>6</td>
<td>3.871</td>
<td>5.571</td>
<td>$F_{DSG} = 6.1722$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F_{LRM1}(\cdot) = 5.3045$,</td>
<td>$F_{GRGDPP}(\cdot) = 1.9327$,</td>
<td>$F_{INF}(\cdot) = 1.8307$,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$F_{LTOT}(\cdot) = 1.2319$,</td>
<td>$F_{LAGDP}(\cdot) = 1.059$,</td>
<td>$F_{RDR}(\cdot) = 12.7718$</td>
</tr>
</tbody>
</table>

Note: k represents the number of regressors; the critical values were extracted from Narayan (2004).

Short-Run Dynamics

Once cointegrating relationship has been established in both equations, the short-run dynamic parameters were estimated using the Schwarz Bayesian Criterion (SBC). The SBC provides a more parsimonious number of lags than other criteria such as Akaike Information Criterion (AIC).

Per Capita Real Money Balances Function

The results of the estimated error correction model for the selected ARDL(2,2,0,2,2,0,1) model are reported in table 3. The selected ARDL model passes the tests of functional form, normality, heteroscedasticity and autoregressive conditional heteroscedasticity (ARCH effect) but there exists the problem of serial correlation although at the 10 percent level. However, the ARDL model has been shown to be robust against residual

---

9 A similar approach was adopted in the empirical studies of Fosu and Magnus (2006) and Constant and Yuen (2010) for Ghana and Ivory Coast respectively when more than one cointegrating relationship was found.
autocorrelation. Therefore, the presence of autocorrelation does not affect the estimates (Laurenceson and Chai, 2003 p.30, quoted in Shrestha and Chowdhury, 2005). The structural stability of the model is also examined using the cumulative sum and cumulative sum of squares tests on the recursive residuals. The plots of these tests as shown in figure 2 suggest that the selected model is stable over the study period as they fall within the 5 percent critical bounds.

The coefficient of the lagged error correction term has the expected negative sign and it is statistically significant at the 1% level. The significant and correctly signed coefficient further confirms the existence of a long-run relationship between per capita real money balances and the explanatory variables. The coefficient implies that 45% of the disequilibrium caused by previous year’s shocks adjust back to restore long-run equilibrium in the current year.

The estimated coefficient for domestic savings ($dDSG$) has the expected positive sign but is statistically not significant. The positive relationship agrees with McKinnon’s complementarity hypothesis. Gounder (2007) found positive but insignificant impact of domestic savings on the demand for real money balances for Fiji while Thornton (1990), Khan and Hassan (1998), Odhiambo (2004) and Odhiambo (2005) found positive and statistically significant effect for India, Pakistan, Kenya and South Africa respectively. Nonetheless, the coefficient of a one period lagged domestic saving ratio has a significant positive effect on the accumulation of real money balances. The result suggests that domestic savings and hence investment is complementary with per capita real money balances after a lag of one year. This might be attributed to the seeming delay in implementing investment projects, partly as a result of institutional, administrative and legal bottlenecks encountered in establishing businesses and investing in Sierra Leone. However, this result conflicts with the empirical results of Mwega et al (1990) which do not provide evidence on the complementarity hypothesis in Kenya. In this study, the private savings rate was used to test the complementarity hypothesis. Due to the paucity of data on private savings rate in Sierra Leone, the domestic savings rate is used in this study, consistent with most empirical studies.

Per capita real income has the expected positive sign and it is significant at the 1% percent level, which is consistent with the transactions demand for money hypothesis. The results of Thornton (1990) and Odhiambo (2004) found positive and significant coefficient for India and Kenya respectively. In Odhiambo (2005), the coefficient bears the expected positive sign but statistically insignificant for South African while Gounder (2007) found negative and statistically insignificant coefficient for Fiji.
The coefficient of real deposit rate has the expected positive and significant effect (5 percent level) on per capita real money balances. A one-period lagged deposit rate is positive and statistically significant at the 1% level. The significantly positive relationship is consistent with the financial liberalization theory of McKinnon (1973) and Shaw (1973) and concurs with the findings by Odhiambo (2005) and Gounder (2007) for South Africa and Fiji respectively. The result suggests that the Bank of Sierra Leone should pursue policies aimed at changing the negative real deposit rates to positive levels in order to foster capital formation.

The rate of inflation has positive but insignificant effect on per capita real money balances. However, a one-period lagged inflation exerts a positive and statistically significant impact at the 1% level, which might be attributed to the real balances effect. The result implies that economic agents have attempted to restore the real value of their holdings after the previous year's high levels of inflation by increasing savings. Sierra Leone has been characterized by relatively high levels of inflation over the years. Due to underdeveloped financial markets and hence the absence of alternative financial instruments (except government securities), economic agents have attempted to protect the real value of money by increasing the holdings of financial assets. However, this result contradicts the findings by Thornton (1990) and Odhiambo (2005) for India and South Africa respectively in which a negative association was established. Financial markets in these economies are considered to be more developed relative to financial markets in Sierra Leone economy.
Table 3: Short Run Results of Per Capita Real Money Balances, ARDL (2,2,0,2,0,2,2,1)
Dependent variable- dLRMP

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>dLRMP1</td>
<td>-0.3198</td>
<td>0.1306</td>
<td>-2.4485**</td>
</tr>
<tr>
<td>dDSG</td>
<td>0.0028</td>
<td>0.0037</td>
<td>0.8127</td>
</tr>
<tr>
<td>dDSG1</td>
<td>0.0144</td>
<td>0.0036</td>
<td>3.9864***</td>
</tr>
<tr>
<td>dLRGDPP</td>
<td>0.5561</td>
<td>0.1246</td>
<td>4.4630***</td>
</tr>
<tr>
<td>dINF</td>
<td>0.0042</td>
<td>0.0026</td>
<td>1.6182</td>
</tr>
<tr>
<td>dINF1</td>
<td>0.0062</td>
<td>0.0016</td>
<td>3.9306***</td>
</tr>
<tr>
<td>dRIR</td>
<td>0.0142</td>
<td>0.0059</td>
<td>2.3996**</td>
</tr>
<tr>
<td>dRIR1</td>
<td>0.0143</td>
<td>0.0033</td>
<td>4.3694***</td>
</tr>
<tr>
<td>dWAR</td>
<td>-0.1167</td>
<td>0.0600</td>
<td>-1.9448*</td>
</tr>
<tr>
<td>dLIB</td>
<td>0.2933</td>
<td>0.0744</td>
<td>3.9441***</td>
</tr>
<tr>
<td>dINPT</td>
<td>-1.3878</td>
<td>1.1128</td>
<td>-1.2471</td>
</tr>
<tr>
<td>ECM (-1)</td>
<td>-0.4538</td>
<td>0.1034</td>
<td>-4.3878***</td>
</tr>
</tbody>
</table>

**ecm = LRMP +0 .7418E-3*DSG  -1.2252*LRGDPP +  0.013057*INF + 0.0071344*RIR +0.25717*WAR + 0.10903*LIB + 3.0579*INPT**

R-Squared                               0.93082                      R-Bar-Squared                   0.85670
S.E. of Regression                    0.074410                  F-stat.    F( 11,  18)   17.1244[0.000]
Mean of Dependent Variable   -0.013720                 S.D. of Dependent Variable      0.19656
Residual Sum of Squares           0.077515                Equation Log-likelihood        46.8090
Akaike Info. Criterion                30.8090                  Schwarz Bayesian Criterion     19.5994
DW-statistic                                2.7239

ARCH Test: F(2, 12) =0.64654 (0.541)
Serial Correlation F (1, 13) = 4.5621 (0.052)
Functional Form F (1, 13) = 0.58304 (0.459)
Normality CHSQ (2) = 1.1447 (0.564)
Heteroscedasticity F (1, 28) = 0.71713 (0.404)

Note: ***, **, * imply significant at the 1, 5 and 10 percent levels respectively.

The coefficient of the dummy variable for key changes in the financial policy environment (LIB) has the expected positive and significant effect, which highlights the importance of financial liberalization policies in enhancing the accumulation of money balances. The negative and significant impact of the war dummy implies that the civil war had compromised the accumulation of financial savings.

**Domestic Savings Function**
The results of the short run dynamic model associated with the selected ARDL model ARDL(1,0,2,0,2,0,2,0) are reported in table 4. The diagnostic tests suggest that there are
no problems with serial correlation, functional form misspecification, non-normality of
the residuals, heteroscedasticity and autoregressive conditional heteroscedasticity
(ARCH) effect. The cumulative sum (CUSUM) and cumulative sum of squares
(CUSUMSQ) plots from recursive estimation of the model also indicate stability as the
graphs lie within the 5% level of significance (see figure 3). The coefficient of the lagged
error correction term (-0.54) has the expected negative sign and it is statistically
significant at the 1% level. The magnitude suggests an average adjustment process.

Table 4: Results for Domestic Savings Function, ARDL (1,0,2,0,2,0,2,0)
Dependent Variable-dDSG

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>T-Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>dLRMP1</td>
<td>12.1137</td>
<td>2.5428</td>
<td>4.7639***</td>
</tr>
<tr>
<td>dINF</td>
<td>0.0334</td>
<td>0.0281</td>
<td>1.1896</td>
</tr>
<tr>
<td>dINF1</td>
<td>-0.0778</td>
<td>0.0294</td>
<td>-2.6470**</td>
</tr>
<tr>
<td>dGRGDPP</td>
<td>-0.0038</td>
<td>0.0744</td>
<td>-0.0508</td>
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<td>dLTOT</td>
<td>12.2478</td>
<td>3.7986</td>
<td>3.2243***</td>
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<tr>
<td>dLTOT1</td>
<td>4.3342</td>
<td>3.2428</td>
<td>1.3366</td>
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<tr>
<td>dUR</td>
<td>-0.0850</td>
<td>0.3401</td>
<td>-0.2499</td>
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<tr>
<td>dLAGDP</td>
<td>-12.4698</td>
<td>4.1544</td>
<td>-3.0016***</td>
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<tr>
<td>dLAGDP1</td>
<td>-7.4113</td>
<td>3.0820</td>
<td>-2.4048**</td>
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<tr>
<td>dLIB</td>
<td>16.7210</td>
<td>5.2407</td>
<td>3.1906***</td>
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<td>dINPT</td>
<td>-45.6929</td>
<td>33.7221</td>
<td>-1.3550</td>
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<tr>
<td>ECM(-1)</td>
<td>-0.5404</td>
<td>0.1413</td>
<td>-3.8251***</td>
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R-Squared                                             0.86050                                 R-Bar-Squared                  0.72099
S.E. of Regression                               3.4071                                    F-stat.    F( 11,  17)
Mean of Dependent Variable              -0.13876                                S.D. of Dependent Variable
Residual Sum of Squares                     162.5153                               Equation Log-likelihood       -66.1396
Akaike Info. Criterion                          -81.1396                                Schwarz Bayesian Criterion -91.3943
DW-statistic                                           2.5767

Diagnostic Tests
ARCH Test: F(2, 12) = 0.14982 (0.862)
Serial Correlation F (1, 13) = 2.9648 (0.109)
Functional Form F (1, 13) = 0.86815 (0.368)
Normality    CHSQ (2) = 1.8956 (0.388)
Heteroscedasticity F (1, 27) = 1.3259 (0.260)

Note: *** and ** imply significant at the 1 and 5 percent levels respectively.
The coefficient of a one-period lagged per capita real money balances (dLRMP1) has the expected positive sign and significant at the 1% level, which implies that accumulation of money balances is a conduit for capital formation. This implies that the interest rate liberalization policy would enhance the mobilization of financial savings, which would in turn stimulate domestic savings and hence investment. This result is supportive of McKinnon’s complementary hypothesis and consistent with the findings by Thornton (1990), Thornton and Poudyal (1990), Khan and Hassan (1998), Odhiambo (2004), Odhiambo (2005) and Gounder (2007).

The coefficient of the growth rate of per capita real GDP exerts a negative but insignificant effect on per capita real money balances. This suggests that domestic savings may have taken place independently of growth rate of per capita real income. The result is rather not surprising given the prolonged decline in economic performance of the country over the years. The results might also be attributed to the absence of any real trend in the variable (see Thornton and Poudyal, 1990). The results of Odhiambo (2004, 2005) found positive but insignificant impact of real GDP growth in Kenya and South Africa while Gounder (2007) showed a negative and significant effect on domestic savings ratio in Fiji.

The coefficient of aid to GDP ratio appears theoretically consistent. The variable exerts a negative and statistically significant effect on domestic savings at the 1 percent level. Similarly, a one-period lagged variable also has a statistically significant negative impact on domestic savings at the 5 percent level. This negative association could be explained by two important factors. Firstly, aid flows to Sierra Leone have been consistently used to finance government consumption, in line with the argument of Boone (1996) and the World Bank (1998). Over the past few years, the largest share of financing of government expenditure has originated from external donor assistance. Until recently, external budgetary support accounted for over 60 percent of the total budget. A second factor explaining the relationship is the financing of the recurrent costs of projects (see Ouattara, 2004). Due to paucity of data, aid was not disaggregated into project aid and financial programme aid in the estimation of the domestic savings model. However, regarding project aid, the government is often required to finance the cost of implementing some donor sponsored projects. Prime examples are those relating to the educational sector in which the government is often responsible for the payment of salaries of teachers and other personnel and incurs costs relating to the maintenance of the school buildings, and the provision of materials such as books and other teaching aid. As such, the financing of these activities would increase government consumption, reduce public savings and hence domestic savings.
Changes in the rate of inflation have positive but insignificant impact on domestic savings. However, a one period lagged inflation exerts a negative effect, suggesting that domestic savings rate responds to changes in the rate of inflation with a time lag. The result implies that high inflation rate or an unstable macroeconomic environment creates uncertainty in the financial system and lead to a lower savings or investment rate. This is indicative of the negative impact of the relatively high rates of inflation experienced in Sierra Leone over the years.

Terms of trade variable appears to exert a positive and statistically significant (1 percent level) impact on domestic savings. The implication is that a temporary improvement in terms of trade, which leads to a transitory increase in income, should lead to higher savings rather than higher consumption (Obstfeld, 1982). This finding is in line with the predictions of Harberger-Laursen-Metzler hypothesis. Sierra Leone has been characterized by limited productive capacity which is reflected in the narrow export base and hence the reliance on imported goods to meet domestic demands. The result therefore suggests the need for the government to create the enabling environment to boast exports, which may translate into increased income and hence a rise in domestic savings.

The dummy variable LIB representing the effect of key policy changes has a positive and statistically significant effect at the 1 percent level. This implies that reform of the financial sector has positive impact on domestic savings and hence the rate of capital formation. Observe that the dummy variable WAR was dropped from the estimated domestic savings function because it was not statistically significant. Also, increasing urbanization has a negative but insignificant effect on the domestic savings rate.

The adjusted $R^2$ values of both the savings function and per capita real money balances suggest a good fit of the estimated models. Both models are also jointly significant at the 1 per cent level as indicated by the probability value of the F-statistic.
Figure 2: CUSUM and CUSUMSQ of Per Capita Real Money Balances

Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
CONCLUSION AND POLICY RECOMMENDATIONS

Sierra Leone has been characterized by low levels of financial savings performance in spite of the adoption of financial liberalization policies in the early 1990s as part of a structural adjustment programme. The study has employed the Autoregressive Distributed Lag (ARDL) approach to evaluate the efficacy of financial liberalization in Sierra Leone over the period 1977-2008, in the context of the McKinnon’s complementarity hypothesis. The results of the short-run dynamic models indicate some support for the hypothesis in Sierra Leone. The coefficient of domestic savings ratio is
positive and a one-period lagged domestic savings ratio exerts a positive and statistically significant effect on the accumulation of per capita real money balances. Similarly, a one-period lagged per capita real money balances exerts the expected positive and significant effect on domestic savings, implying that the accumulation of real money balances is a conduit for capital formation. These results provide some evidence on the efficacy of financial liberalization as a mechanism to enhance the rate of capital formation for sustained economic growth.

Important policy implications can be inferred from the findings of this study. The short run dynamic results indicate that real deposit rate and one-period lagged real deposit rate exert a positive and statistically significant effect on per capita real money balances. This finding underscores the need to pursue policies aimed at changing the negative real deposit rates to positive levels in order to promote financial deepening and facilitate the expansion of domestic capital formation. A policy suggestion is that the authorities should adopt measures which would alter the structure within which commercial banks operate and hence enhance competition in the banking industry. More specifically, two important policy recommendations are worth noting.

Firstly, to facilitate competition between the dominant banks and new entrants in the banking industry, the authorities should expedite the privatization of the state owned Sierra Leone Commercial Bank and government controlled Rokel Commercial Bank. Increased competition will ensure competitive pricing, raise the nominal deposit rate and improve efficiency of the financial intermediation process.

Secondly, the Bank of Sierra Leone should create the enabling regulatory and supervisory framework to encourage innovation in the spectrum of financial services or products offered. The financial sector reforms adopted in recent years have encouraged regional and international banks with capacity to compete with the established domestic commercial bank. However, the industry is still dominated by three banks and financial savings mobilization remains generally low. By encouraging financial innovation, this policy will attract more savers into the formal financial system, increase competition in the industry and ensure market determined interest rates.

The results have shown that domestic savings and hence investment is complementary with per capita real money balances after a lag of one year. This issue should be considered in the determination of the money supply by the Bank of Sierra Leone.

Terms of trade is found to increase domestic savings rate, consistent with the predictions of the Harberger-Laursen-Metzler hypothesis. In effect, this result suggests the need for
the authorities to implement policies aimed at broadening the export base of commodities. Specifically, the adoption of pro-export policies such as encouraging financial institutions to extend credit to exporting firms, creating export processing zones and the enabling legal environment to boast export capacity deserve the attention of policy makers. Hence, this result supports recent efforts by the government to increase domestic productive capacity through the adoption of measures to encourage mechanized agriculture, develop road infrastructure, attract investment in the mining sector and facilitate the use of advanced information communication technology (ICT).

Aid flows were found to exert significantly negative effect on domestic savings, implying that these flows have been ineffective in stimulating domestic savings. This issue points to the fact that the government should implement policies to enhance domestic revenue collection and eventually reduce reliance on external donor assistance to support the budget.

Finally, for a successful policy of financial liberalization, the authorities should ensure that appropriate fiscal and monetary policies are formulated and implemented to reduce the rate of inflation to low levels.
REFERENCES


