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A comparative analysis of dollarization in Tanzania and Argentina

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A COMPARATIVE ANALYSIS OF DOLLARIZATION IN TANZANIA AND ARGENTINA

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Abstract

This study examined the portfolio theory of dollarization of Ize and Yeyati (2003) to see if it holds in Argentina and Tanzania, this study was conducted to see if the variables of the exchange rate volatility and inflation rate fluctuation contribute to dollarization. Moreover, it shows that there is a relationship between the level of dollarization on nominal interest rate, inflation rate and exchange rate as the portfolio theory predict. The Chow test (Chow (1960) was used to test for the equality of coefficients in Argentina and Tanzania as separate samples. The results indicated that the correlation analysis and regression analysis in both countries there is disagreement over the assumptions and showed that exchange rate, inflation rate and interest rates do not have a significant effect on the level of dollarization. This means that the theory of portfolio do not hold for the case of Tanzania and Argentina and it is suggested that because the nature of the relationship is not linear, a new research design can be developed or it simply means that the portfolio theory is incorrect. We recommend that further research be pursued using the same variables as in this study but using different forms, such as using real as opposed to using nominal values, using non-linear forms instead of using a linear estimation method. Or the search for the significant explanatory variable of dollarization and the variables could only be included in a process that calls for the formulation of new theory to replace the current theory. The new variables to be included are government quality, monetary policy agility, individual heterogeneity, domestic debt, default risk, institutional quality and financial integration.

DEDICATION

This study is dedicated to: my family, Ms. Mary Nchimbi – Agwambo, Late Mr. John Agwambo, Mrs. Alpha, Mr. Peter George, Mr. Abraham Okore and Mr. Bernald Agwambo.

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Declaration

I, Agwambo Neema, hereby declare that this research report is my own work and it has not been submitted for a degree before at this or any other university or higher learning institution and will not be presented anywhere else without permission.

SIGNATURE……..
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MARCH 2013

NAME OF SUPERVISOR ……..
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MARCH 2013

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background of the study, the problem statement, and the objectives of the study. In addition, this chapter will also provide the hypothesis to be tested, the significance, the contribution of the study to the body of literature and scholarly work in the field of finance and investment.

1.1 Background of the Study

According to Prock, Soydemir, and Abugri (2003), dollarization is a type of currency substitution which represents a shift away from domestic currency as a store of value, medium of exchange and unit of account to a foreign currency. More specifically, Arteta Carlos (2005) argues that partial or unofficial dollarization as opposed to a formal dollarization, also called currency substitution, is defined as the holding by residents of a significant share of their assets and/or liabilities in the form of foreign-currency-denominated instruments.

Several studies posit that unofficial dollarization represents a lack of faith by residents/citizens in their domestic currency since the private sector does not expect the government to follow through with long-run currency stabilization policies (Honig, 2009). Kessy (2011) postulated that Tanzania has adopted unofficial dollarization as a medium of exchange and unit of value. Moreover, Adam, Kessy, Nyella, and O'Connell (2010) indicated that in 2006, there was an increase of foreign currency deposits equal to a third of the broad money (M2) and foreign currency

deposits of Tanzanian residents with depository corporations (M3). Furthermore, Ngowi (2011) indicated that Tanzanian residents tag prices in dollars. Most common dollar payments are for electronic equipment such as computers, air tickets, house rent and hotels services. It is clear from this that there is a substantial level of unofficial dollarization for transaction purposes going on in Tanzania. In fact, Kessy (2011) insists that most countries that officially recognize dollarization are either relatively small or are heavily reliant on a large neighbouring economy for their income and foreign trade such as Swaziland and Lesotho in Africa. Others suffer from monetary/general economic mismanagement that deteriorates domestic currency value, such as in the case of Zimbabwe and Ecuador.

Argentina in 1991 to 2001 implemented dollarization by adopting currency board (De la Torre, Yeyati, & Schmukler, 2002). In 2001 Argentina had a large budget deficit. It had acquired support from its state-owned bank with the aim of financing its deficit through open market operations. However, due to a higher deficit it led to a mismatch of assets and liabilities in bank balance sheets (De la Torre, Yeyati, & Schmukler, 2002). At the end of 2001 there was a banking crisis as well as a mountain of foreign debt to pay off or service which led to the weakening of the Argentinean peso currency against the dollar. Calvo and Mishkin (2003) argued that due to sharp depreciation of Argentina peso currency it made more difficult to repay the loan. Furthermore, the country had a prolonged past experience of weak monetary policy and the central bank authority lacked the discretion to operate independent (Calvo & Mishkin, 2003).

Research has established that with an increase in foreign deposits in onshore banking systems has a potential of adjusting the negative effect of inflation. Consequently, domestic residents sought to protect themselves against high inflation environments by using foreign currency as a medium of exchange. Since banks accept foreign currency deposits, this actually increases the ability of banks to provide more loans

which lead to financial deepening because its credit market expands in those economies that are experiencing hyper-inflationary pressures. On the other hand, it might cause financial instability in a well-functioning economy if the banks and residents hold dollar deposits and do not hedge themselves against exchange rate risk. In turn, this will potentially cause currency mismatch on the balance sheet/s of financial institution/s and may as well lead to a currency crisis (Nicoló, Honohan, & Ize, 2005).

In addition, Garcia-Herrero (1997) postulated that Argentina had both a currency and a banking crisis in 1995 because most of its residents shifted from holding peso domestic currency and started holding cash in dollars. They as well deposited their dollars in domestic banks. That currency mismatch created a further mismatch of assets and liabilities held by the bank which resulted into the banking crisis. Furthermore, Lange and Sauer (2005) maintain that this kind trend in dollarization imposes three costs to a country, namely: loss of monetary sovereignty, the loss of seigniorage revenue and the loss of being the lender of last resort by the central bank. Stanley (1982) calculated the seigniorage revenue for a set of countries which are Industrial countries, Oil-exporting countries, Asian countries, Middle Eastern countries and African countries. This study found that from 1960 to 1970 seigniorage revenue accounted for about 10% of public revenue and about 1% of Gross National Income (GNI) in developing countries. Adenutsi (2008) estimated the degree of dollarization by using a correlation matrix which showed there is a relationship between tax on holding money balances (inflation tax) and the value of finance expenditures by printing money (seigniorage) for 20 developing countries from 1996 to 2005. Adenutsi (2008) found the following negative correlations: for Belarus -67%, Botswana -37%, Burundi -49% Estonia -21% , Tanzania -32%, Cambodia -21%, Kyrgyz Republic -89% and Lithuania -10%. This implies that the above countries have a cost sideways of their seigniorage maximizing inflation Laffer curves.

Several studies were done on the South American context during the currency crisis of Argentina and Mexico and found high inflation to be a major cause of shifting from domestic to foreign-dominated currency usage. According to Kamin and Ericsson (2003), dollar deposits in the bank and dollar currency holdings in circulation were found to respond inversely to macroeconomic shocks, such as hyper-inflation. In Argentina, dollar deposits fell suddenly and uncontrollably while dollar currency holding moved in an upward direction. Indeed, high inflation caused residents to lose confidence in their domestic currency, hence as a precautionary step against losing their money, they resorted to holding foreign currency.

Other researchers hold the view that an increase in the foreign deposit component as in bank (deposit dollarization) is seen as a rational exchange rate fluctuation hedge (Nicoló et al., 2005). A study in Nigeria using Granger Causality tests by Yinusa (2008) found that there is a bi-directional relationship between nominal exchange rate volatility and dollarization. Nevertheless, dollarization has been explained more by the nominal exchange rate. The major argument in support of this causality is that exchange rate depreciation has the effect of lowering the value of domestic asset portfolio and an increase of holding foreign currency asset portfolio signified nominal exchange rate variable as one of the most important variables in dollarization. Moreover, studies on twin dollarization where a firm borrows in foreign currency and sets its prices in foreign currency also found exchange rate policy to be a key consideration on a firm's dollarization decision, hence there is a significant link between exchange rate volatility and dollarization (Shi & Xu, 2010). In essence, a country should have clear exchange rate policies to boost confidence of residents (investors) in the stability of their currency to avoid holding investments in foreign currencies which sends out the message that the local currency is second-rate to foreign currencies. Consequently, researchers suggested having a monetary union as a way of curbing persistent dollarization, as it happened in Latin American and East

Asian countries during their financial crisis period (Alexander & von Furstenberg, 2000; Hallwood, Marsh, & Scheibe, 2006).

1.2 Statement of the Problem

There have been only a few studies done in Tanzania on currency substitution, and on the level of usage of the US dollar. According to Kessy (2011) in Tanzania, US dollars have the highest currency usage compared to the other East Africa countries in terms of holding wealth and being used as a medium of exchange. It is also significant that after the financial liberalization in Tanzania in 1992, the commercial banks allowed the holding of open foreign currency deposit accounts for both residents and non-residents. Kessy (2011) indicates that foreign currency deposits held by the private sector in the banking system were only Tshs.17 billion ($57,102,549.4609 dollar) but rose steadily to Tshs. 306.6 billion ($383,053,684.99) in 2000 and surged further to a staggering Tshs.2.2 trillion ($1,666,275,344.43) in 2009. Relatively this was equivalent to 7.5% of Gross Domestic Product (GDP) or two months' Tanzania imports. However by end of 2010, foreign deposits stood at a massive Tshs.2,970.5 billion ($2,043.6 million dollar) while in 2011 they reached Tshs.3,773.4 billion ($2,408.6 million) and finally settled at Tshs. 4,006.1 billion ($2,549.0 million) in 2012. Moreover, Ngowi (2011) indicated that the most common dollar payments are made for electronic equipment especially computers. He went on to indicate that the various kinds of services where payments are made in US dollars are air tickets, house rents and hotels services. In addition, there are a range of fees charged in US dollars such as school fees, consultation fees and some fees payable to Government Ministries, Departments and Agency (MDAs). So, the government fixes some fees in US dollars. An example of this is the tariff for obtaining rights to use a database at the Ministry of Energy and Mineral. You have to pay $50 for restricted

access and $100 for unrestricted access. It is clear from this that, there is a substantial level of unofficial for transaction purposes.

This has also been happening in Argentina which led to the adoption of a Currency Board in 1991 to 2001 to protect the peso currency. There are many studies which have been done on Argentina concerning different macroeconomic problems including loss of last resort by the central bank, seigniorage problem and capital flight. Ketkar and Ketkar (1989) noted that Argentina started experiencing a problem of constant capital outflows since 1979. During the 1980s, macroeconomic and political risks caused many people to hold dollars as a substitute to the domestic currency which led to capital flight. More still, Kamin and Ericsson (2003) approximated the value of the stock of flight capital at the end of 1989 to range from $30 billion to $50 billion. Molano (2000) noted that the Currency Board system was put into trial at some point in the 1995 post-tequila crisis in Mexico, and even if Argentina was not affected much but it had been exposed financially and had complexity in progress planning during that time. Caprio, Dooley, Leipziger, and Walsh (1996) estimated that $8 billion of deposits had out flowed in three months which corresponded to 16% of the total banking system deposits. This was because the financial system had experienced both a liquidity crisis and a confidence crisis. In addition, De la Torre, Yeyati, and Schmukler (2002) explained that a chain of external shocks, comprising the Brazilian crisis, the appreciation of the US dollar against the majority of the currencies, and it was the increase in the fiscal deficit that placed the economy into a cycle of increasing currency-growth-debt and the growing budget deficit of 1999. In addition, by the end of December 2001, Argentina attempted to finance its budget deficit by printing money about 2,600 millions of Argentine pesos which was about 23 percent of total pesos in circulation. In March, 2002, the situation became worse that the amount which financed the deficit was twice that of 2001. Thus, printing more pesos was not a long-term solution.

Therefore, the literature on dollarization posits that domestic financial dollarization, specifically, deposit dollarization as the ratio of onshore foreign currency bank deposits to total onshore bank deposits is usually instigated by high domestic inflation, volatile exchange rates and the credibility of the central bank (Cabral, 2010; Luca & Petrova, 2008; Nicoló et al., 2005). Neanidis and Savva (2009) noted that people use foreign currency especially dollar currency in the place where there is high proportional of inflation. These are some of the variables that this study will examine more closely.

However, despite rampant inflation and a very volatile exchange rate of the Tanzanian shilling versus the US dollar, little empirical work has been done to establish the effects of inflation, interest rates and nominal exchange rate on dollarization. While the Argentine Currency Board has done a lot of work on this and other macroeconomic problem faced by the Argentina government. Based on the literature on dollarization, the aim of this study is to explore if dollarization in Tanzania and Argentina occurred because of inflation, depreciation of the currency and the increase of nominal interest rate as well as to test the portfolio theory of Ize and Yeyati (2003) to see whether dollarization is related with exchange rate depreciation and an increase in the inflation rate.

1.3 Purpose Statement

The main purpose of this study is to establish how the effects of inflation, nominal exchange rate and nominal interest rate have contributed to dollarization. The study also aims to investigate whether there is any connection between dollarization in Tanzania and Argentina. The study draws a comparison between Tanzania in Africa and Argentina in Latin America. This is an empirical study where macro-level quarterly time series data from 2002 to 2010 are used to test the hypothesis. The hypothesis is whether there is a relationship between dollarization and the various

independent variables, which in this case have been identified as the nominal interest rate, inflation rate and nominal exchange rate.

1.4 Research questions

This study will seek to answer the following broad questions:

- What are the effects of the nominal exchange rate, the inflation rate and the interest rate on dollarization in Tanzania and Argentina?
- How is the nominal exchange rate, the inflation rate and the interest rate on dollarization in Tanzania and Argentina compared?

1.5 Significance of the study

The findings of this study will be significant to the Central Bank of Tanzania in handling the growing trend of dollarization in the economy for monetary policymakers. Previous studies show that high dollarization has the effect of collapsing domestic monetary policies, causing the loss of seigniorage revenue, loss of monetary sovereignty, diminished control over exchange rate and loss of last lender resort by central bank (Alexander & von Furstenberg, 2000; Lange & Sauer, 2005).

Furthermore, the results will also be useful to the financial field in academia as well as contribute to the existing literature on dollarization in Africa. Most existing studies on dollarization have focused on Asia and Latin America following the currency crisis and economic crisis that were experienced in these regions(De la Torre, Yeyati, & Schmukler, 2002). The only African countries that have had studies done on them concerning dollarization are Uganda in the 1980s and Zimbabwe in the 2000s (Makochekanwa, 2009). Both of which have had serious inflation problems and experienced severe depreciation of their currencies.

1.6 Organisation of the Study

Chapter 1 presented the introduction to the study in seven different sections starting with the background of the study where we discussed briefly the literature on dollarization, and then we stated the problem statement and the purpose of the study. In addition, research questions are presented that should be answered by the end of this study. The thesis carries on as follows: chapter two presents an overview of the literature focusing on Dollarization. Chapter three explains and discusses the methodology and the description of the data. Chapter four details the empirical analysis and tests carried out by following the procedures outlined in the chapter three. The results of correlation analysis are presented first, then the unit root analysis and finally the regression analysis together with the Chow-test. Lastly, chapter five presents a summary in a systematic manner the results of the empirical tests and analysis presented in details in the chapter four and provides conclusion for research questions presented in chapter one and winding up with recommendations for further study on this research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Concept of dollarization

Dollarization is the adoption of a foreign currency as a means of transaction, a store of value, medium of exchange and unit of account (Bogetic, 2000). The central bank of a country decides to operate without its monetary policy in the case of full dollarization. It can be by use of foreign currency parallel to or as an alternative to the domestic currency. In an extreme case, official (or *de jure)* dollarization refers to the case in which the foreign currency is habitually and exclusively used as legal tender by a country determined to abandon domestic currency absolutely. It loses the power over national money supply and fail to maintain a sovereign monetary policy (Salvatore, 2001). For instance, in 2001, Ecuador and El Salvador officially adopted full dollarization while Panama had dollarized since 1904 and Guatemala followed in May 2001 when these countries also started using official dollarization (Dean, 2001). In addition, Makochekanwa (2009) noted that Zimbabwe officially adopted a policy to dollarize in early 2009.

Mengesha and Holmes (2011) noted that unofficial (*de facto*) dollarization is defined as the use of a foreign currency alongside the domestic currency despite the fact that foreign currency is not an official tender according to that country's financial or monetary regulation. At some point in Latin America, during the hyperinflation of the 1980s, governments adopted the US dollar. On the other hand, *de facto* dollarization can be categorised into two types, namely; (1) currency substitution and (2) asset substitution.

According to Ize and Yeyati (2003), Yeyati (2006) and Nicoló et al. (2005), currency substitution is defined as the use of the foreign currency as medium of exchange and unit of value. Kessy (2011), Ngowi (2011) noticed that most people in Tanzania use foreign currency for transaction purposes. The price of goods and services are tagged to the dollar. The most common dollar payments are for electronic equipment such as computers, televisions, phones, air tickets, including domestic flights, hotel accommodation, rent, and school fees. This proves that there is currency substitution in the Tanzanian economy. This is because residents of a country prefer using foreign currency as protection against the nominal local domestic currency. Moreover Makochekanwa (2009) noted that during the period of hyper-inflation, Zimbabwean residents held various types of cash such as the US dollar and the South African Rand, with the main motive being having currencies for transaction purposes. Since 2006 most goods and services have been valued in either the South African rand or the US dollar due to the fact that the Zimbabwean dollar (Z$) lost almost 99.9% of its value between 2007 and 2008. To prevent further damage, in January 2009 (in Zimbabwe) a law was introduced that intended to control foreign currency deposited in a domestic bank that made it hard for residents to withdraw foreign currency. Hence, domestic residents decided to hold foreign currency in cash without depositing in their domestic banks.

Feige and Dean (2002) described asset substitution as the use of foreign currency as a store of value determined by trading off between the risks and returns on assets against those held in domestic and foreign currency. A foreign currency-denominated asset gives the opportunity of insuring against macroeconomic risks such as high inflation, prolonged depressions and currency (depreciation) risk. Furthermore, Kessy (2011) and Yeyati (2006) noted that domestic residents prefer holding interest rate bearing financial assets for the purpose of protecting themselves against domestic inflation. By chosing to hold foreign currency as a part of their asset enables them to get an equivalent return.

2.2 Effects of Dollarization

2.2.1 Dollarization and financial and fiscal stability

Goldfajn, Olivares, Frankel, and Milesi-Ferretti (2001) proclaimed that when a country dollarized its economy, it loses the ability of printing money in local currency which restricts the capacity for financing fiscal deficit. Therefore, it generates more fiscal discipline that in turn enhances the credibility of policymakers and decreases interest rates. Official dollarization encourages fiscal and monetary discipline which leads to better performance in the economy as well as decreased level of inflation rate reduces exchange rate volatility and probably deepens the financial system.

Although, through dollarization countries benefit from greater financial stability, this also leads to the penetration of foreign banks into countries with weak financial institutions. A subsidiary bank of foreign-owned bank can invest in countries that have weak financial system and be authorized to have its assets and liabilities in both domestic and foreign currencies. Hence, these banks are able to provide loans in both currencies that increases credit to other domestic banks as well as to the firms and households. Kashyap and Stein (1997) claimed that some banks from Europe started lending to other countries for the purpose of broadening their market internationally. Most transitional economies (countries that have transitioned from a centrally planned to a market economy) have fragile financial systems dominated by out of control inflation. Moreover, these countries have a high degree of exchange rate volatility, which tend to weaken its domestic currency. This growth of foreign-owned banks continues to weaken domestic financial institutions. The foreign banks principally provide foreign currency loans to the other domestic banks, households, business and government conversely increases foreign liability in banking sectors due to the fact that the bank's assets didn't match with their liabilities. Therefore, dollarization leads to an increase in the ratio of liability on a bank's balance sheet.

According to Basso, Calvo-Gonzalez, and Jurgilas (2011) in emerging economies the credit (in Euro) to GDP ratio is 40% for the sample period 2000 to 2006. The credit market has been able to grow because the domestic residents have a preference for holding Euro currency because of the weakness of their domestic currency that attracted European Union Banks to penetrate which leads to inflow of foreign funds into the country. This means that the transitional economies show a remarkable growth in the credit market. Additionally, countries that adopt dollarization will be able to benefit inform of improved financial stability by offering a lower inflation rate. Fischer (1982) argued that for a country that adopt full dollarization means that the government has failed to operate by itself. Therefore, it is through dollarization that a country will now have fiscal discipline since they will not be able to print any more money whenever they want. Once a country employs better fiscal control and has a good financial system in place, then through dollarization it can lower country risk and consequently reduce the of cost of servicing foreign currency denominated debt due to fact they will be using a strong and stable currency (Borensztein & Berg, 2000). According to Nicoló et al. (2005), countries with higher inflation are associated with financial depth whereby banks allow people to have foreign currency accounts as a means of hedging themselves against the eroding effects of chronic inflation. On the other hand, this increases the bank's ability to provide more loans to domestic residents and in turn fuels the growth of the domestic market and currency. Since most developing and emerging market countries, as well as countries that have transitioned from a centrally planned to a market economy allow onshore banking as well as allowing residence to deposit foreign currency. This helps protect against the adverse effects of inflation. There is a strong positive correlation between dollarization and inflation which suggests that dollarization may have the outcome of regulating the adverse effects of inflation on financial depth. More precisely, Nicoló et al. (2005) studies show that the minimum level of yearly inflation beyond which dollarization deepens financial intermediation is within 20–30%.

2.2.2 Dollarization and Transaction Costs

Another interesting point is from a school of researchers who insist that dollarization lowers transaction cost. A country faced with high inflation may also suffer from a high depreciation of its currency which is a big macroeconomic problem for a country since it comes with more expenses for transaction purposes such as using lots of money chasing few resources, it is also expensive to import goods and services from another countries and lastly it involves high costs in paying debts. Most countries adopted dollarization to eliminate the problems arising from having a weak domestic currency and decide to use a stronger foreign currency in-order to reduce the cost of buying imported goods and services, servicing of their public debt, and increase access to external finance. Reding and Morales (2004) contended that dollarization reduces transaction costs for all users of a weaker or depreciated domestic currency. Therefore, it is through the policy of dollarization that economic agents can now be compensated for using foreign currency instead of using their domestic currency. Furthermore, Thomas (1985) maintains that the use of foreign currency reduces transaction cost for the consumption of goods and services. Guidotti and Rodriguez (1992) asserted that because of the depreciation of the peso in Argentina, Bolivia, Peru and Uruguay, dollarization was implemented to replace the peso for the purpose of solving their transaction problems. This seems to suggest that countries which are suffering from high inflation will not manage to compete with the countries with strong currency both in terms of trading and paying off their debts. Therefore, the hazard of currency devaluation would not exist since the value of the domestic currency has deteriorated. As a result, advocates for dollarization argue that the cost of foreign credit for a dollarizing country would come down and this motivates investment and economic growth. In addition, Goldfajn et al. (2001), assert that countries that adopt full dollarization manage to lower their borrowing cost by reducing currency risk. More still additional costs of exchanging currencies are incurred when domestic money is used but not incurred when foreign money is used.

The savings on these costs when compared to the costs of seigniorage transfer to the foreign country, the saving in transaction costs would be a function of the number and value of transactions carried out with foreigners and the openness of the economy. In a very open economy, transaction costs could outweigh seigniorage costs and tilt the balance toward the use of foreign currency. In 1990's, Argentina decided to adopt the Currency Board for the purpose of compensating transaction costs of high inflation level and losing its domestic currency value.

2.2.3 Dollarization and Macroeconomic stability

Dollarization is used as an instrument that promotes macroeconomic stability. Dollarization is used as a policy intervention, a solution to the credibility problem when a domestic central bank fails to pre-commit itself to minimize or lower the rate of inflation. Mutengezanwa, Mauchi, Njanike, Matanga, and Gopo (2012) noted that adaptation of dollarization in Zimbabwe helped to stabilize the macroeconomic conditions and has been successful in reducing the level of inflation from a four digit number to a single digit number. It has given a basis for continued economic growth hence restoring confidence in the Zimbabwean economy. Barro and Gordon (1983) argued that through dollarization, countries can be able to shield themselves from the cost of domestic interest rate risk and exchange rate risk. When a country has a high level of inflation and there is depreciation of its domestic currency, by adopting dollarization it would mitigate those risks. Moreover, Torre and Schmukler (2005) argue that dollarization helped investors in Argentina to mitigate the risk of systemic asset price volatility of the peso currency. Dollarization offers the investor insurance against the risk of price volatility. These authors emphasized further that dollarization decreased the number of domestic corporate bond holding by Argentina residents. In 2000, Torre and Schmukler (2005) investigation shows that the ratio of holding domestic long-term bonds is 1%, short term domestic bond 12% in pesos currency. This is lower than the ratio of holding shares of dollar contract bonds both long-term

foreign currency contract at 36% and short-term (up to five years) foreign currency contract at 51%. This implies that resident prefer holding foreign bond rather than the Argentina domestic bond. Dollar contracts are a better hedge against inflation volatility since the dollar currency is stronger compared to the peso. That provides a better method for reducing the risk of loss given the high default rate from the depreciated peso. Broday and Yeyatiz (2001) argue that when there was devaluation of peso currency, people who had deposited their currency in dollars were sheltered against exchange rate fluctuations.

2.2.4 Dollarization and monetary policy

An independent monetary policy is the method by which the monetary authority (central bank) of a country controls the supply of money by using the interest rate with the intention of achieving relatively stable prices and low unemployment which will encourage economic growth and stability. Monetary theory provides us with approaches on how to craft an optimal monetary policy. With the adoption of official dollarization, the domestic central bank would no longer have the right to use its key policy target, the monetary base. In this sense, there would simply be no sovereign monetary policy. Most countries which adopt dollarization have a weak currency and they have fixed exchange rate since they failed to adjust it because the central bank had lost its power of being the lender of last resort. Their currency is unstable so they cannot use it as a store of value, neither internationally nor domestically. It has been proven that central banks of dollarized economies are unable to use monetary policy to control output and employment fluctuation (De la Torre et al., 2002).

Yeyati (2006) conducted a test in developing countries to see if dollarization strengthens monetary, financial stability and economic performance. Unfortunately, this study found that with the existence of dollarization, it results into an increase of

foreign deposits which makes it difficult to conduct monetary policies because the country experiences decreased demand for holding domestic currency which in-turn reduces the efficiency of monetary policy as a tool in curbing the level of domestic inflation. Since people choose to protect themselves from inflation by holding foreign currency this is what creates currency mismatch in the banking system.

According to Yeyati (2006) there is also a strong relationship between occurrences of monetary shocks and inflation in dollarized economies. Likewise, there is unsteady demand for domestic currency and there is a high possibility of experiencing a banking crisis due to past depreciation of domestic currencies, low and volatility in output growth.

2.2.5 Seigniorage and Dollarization

Seigniorage is the amount of revenue a government generates from printing money and is determined by the demand for base or high-powered money. On the other hand, Stanley (1982), Melvin (1988), Bruno and Fischer (1990), and Phylaktis and Taylor (1993) argue that when a country dollarizes, this is largely because they have chosen to operate without a sound monetary policy and as a consequence they have the limitation of no longer being able to create money. As recommended in these studies, seigniorage can be a major source of tax revenue, but it also increases the level of inflation, with the result referred to as an inflation tax. Actually, the ratio of high-powered money to revenue, It is important to include seigniorage as a revenue source Stanley (1982) .

Dollarization reduces the ability of the government to finance its fiscal deficit by using seigniorage revenue (Stanley, 1982). As a country dollarizes, it abandons the use of its own currency partially or totally and adopts the foreign currency as legal tender or partially alongside the domestic currency. The country's sovereignty of

using its own currency to finance budget deficits is automatically reduced. Demand for high-powered money deteriorates as the rate of inflation rises. There is a maximum limit of financing a deficit budget by using seigniorage revenue**.** In that beyond a certain point it leads to different macroeconomic problems such as less revenue and an increased rate of inflation. Blanchard (2010) notes that seigniorage is as a result of the rate of nominal money growth and real money balances, this means that when the expected rate of inflation increases, this cause a reduction of real money balances. Therefore when there is a large deficit a country is unable to depend on seigniorage as this will lead to higher inflation.

2.2.6 Dollarization and Lender of Last resorts

Lender of last resort is the body that is associated with supply of credit to banks in the incident of an unexpected or rapid demand for liquidity, such as when a financial crisis occurs and the depositors attempt to withdraw their money from a bank because they think the bank will fail (Bordo, 1990) . The central bank is a crucial mechanism for protecting a monetary system when there is a crisis. In a situation, where the economy is dollarized, the central bank cannot provide reserves to financial institutions for the purpose of restoring confidence in bank depositors and short-term creditors that their claims on the banks will be honoured if they attempt to liquidate them. When a country is dollarized this means there is loss of lender of last resort function by the central bank. In-case of confidence crises, bank runs tend to occur which may be very devastating to the economy. Mishkin (1999) argues that, central banks of emerging economies have an extremely limited capacity to perform the role of lender of last resort even under flexible exchange regimes. Most countries in emerging market have their liabilities held in foreign currency including households, firms and banks. In addition, most of them have a history of past high inflation. Therefore, the central banks of emerging economies lending to the financial system at the time of financial crisis for the purpose of expanding domestic credit instead it

may result into increase in inflation. Expansionary monetary policy is probably going to cause expected inflation rate to rise significantly. An expected rise of the inflation causes more depreciation of the domestic currency. This tends to affect the financial system by decreasing cash flows on balance sheet and that makes it harder for emerging economies to recover from financial crises. Therefore, Mishkin (1999) postulated that, in the presence of dollarization, central banks in emerging market are unable to perform the function of lender of last resort without any international support. In the case of a hard peg, it is difficult for central banks to perform the function of last resort even in the long run. In the absence of dollarization, it is customary that the central bank can create credit quickly and at a negligible cost simply by printing more domestic currency. However, when a country adopts official dollarization the ability to print more money will vanish and the central bank can no longer act as a lender of last resort. In this respect, the cost of full or partial dollarization for the country's economy is high.

Table 2: Effects of Dollarization

POSITIVE EFFECT	NEGATIVE EFFECT
1. Country gain fiscal and financial stability by using hard currency.	1. Loss of practice monetary policy
2. Reduce transaction cost	2. Loss of seigniorage
3. Promote macroeconomic stability	3. In full dollarization central bank can't act as a lender of last resort

Source: Research Data (2013)

2.2 Causes of Dollarization

2.2.1 Inflation

Dollarization happens when a country suffers from higher inflation. The domestic currency loses its value. Residents in the dollarized economy lose confidence in their

government that makes them to think their government is unable to have reliable policies for promoting long-run economic stability. (Honig, 2009). Consequently, residents protect themselves by holding foreign currency accounts and also conduct some transaction in foreign currency. Makochekanwa (2009) maintained that Zimbabwean residents lost confidence in the Zimbabwean dollar because of the economic slump and hyper-inflationary for a long period from 1997 to 2008. This author estimated the monthly inflation by July 2008 and report that it was approximated to be 231.2 million percent, whilst the International Monetary Fund (IMF) in September 2008 released statistic that the hyperinflation rate approximated to be 489 billion.

Countries with exchange rate volatility might fail to match their assets and liabilities on their balance sheets which lead to inability of a country to hedge against exchange risk. Arteta (2005) argues that a floating exchange rate worsens bank currency mismatches in emerging economies. This paper calculated the effect of exchange rate regime on banks currency mismatch, defined as the dollar deposit per inhabitants less dollar credit given by banks to the inhabitant private sectors. Furthermore, Yeyati (2006) said that floating exchange rates in a circumstance of high and volatile inflation increase dollarization. A fixed nominal exchange rate fails to quickly adjust the real exchange rate in the incident of adverse shocks. Goldfajn et al. (2001) point out that a fixed nominal exchange rate has more drawbacks when shocks are more asymmetrical between the economies and the country itself. There are no other alternative means to smooth shocks since they fix both the domestic interest rate and exchange rate with the foreign ones. The implementation of a fixed exchange rate regime without the necessary preconditions may lead to more problems in terms of output volatility and unemployment.

2.2.2 Government quality

Government quality deals with administration of fiscal and monetary policy. Monetary policies are operated by the central bank while fiscal policies are operated by the government. The central bank does implement monetary policy and it should work independently. But in most of the Third World countries the central bank is interfered with by politicians and the government. Honig (2009) argues that myopic politicians in pursuant of short-term benefits might endorse inflationary policies through monetary or fiscal policies. That actually deteriorates confidence of the private sector in the domestic currency in the long-run. This author measured government quality by using several variables from the international country risk guide such as: bureaucracy quality, corruption, law and order. They were found to have a significant negative relationship. In addition, poor regulation and supervision of the financial system by the monetary regulatory authority may result into loss of control by the central bank of domestic money supply which may resort to using foreign currency (Cabral, 2010; Luca & Petrova, 2008). Woodford (1995) noted that there was a lack of accountability for fiscal policy. This in turn pressurized the monetary authorities to monetize the debt. As a consequence, this increase of money supply in the economy subsequently led to high inflation and put downward pressure on the exchange rate. Calvo and Mishkin (2003) indicated that a weak fiscal policy, frail financial systems and weak monetary institutions are the main source of high inflation and large currency depreciation in emerging market countries.

2.2.3 Risk factors

Dollarization is motivated by external factors such as a rise in the price of oil, instability of worldwide economic growth, climatic shocks, an increase in commodity prices, rising global inflation and the changing of exchange rates policy in the

developed economies, all of which are likely to affect capital flows (Roubini, 2001). In the globalized economy, most countries depend on each other. Similarly, developing economies are importing most capital goods such as machinery and other goods like clothes from developed countries and export raw materials to developed countries. When the foreign currency appreciates against domestic currency that makes importing goods more expensive and the domestic residents has to pay more. In case the domestic inflation is higher, domestic residents incurred more costs in paying for imports. Therefore, some of them will decide to hold foreign currency so as to be able to manage the situation. Clearly, these risk factors are likely to affect and lead to dollarization. Beckerman (2001) noted that the macroeconomic crisis of early 1998 in Ecuador was caused by both external and climatic shocks such as El Niño. Still, in 1998, the crude oil-export prices went down which reduced the source of revenue thereby increasing the deficit. Concurrently there was poor management of the banking system which led to a rise in the external debt. Due to that, currency depreciation tends to broaden the deficit. In the middle of 1998, there were presidential elections that political pressures increased the fiscal deficit because the government injected a lot of money into the elections. The estimated non-financial public deficit was 5.7 percent of the GDP (compared with 2.6 per cent in 1997) (Beckerman, 2001). There was a mismatch of assets and liabilities in the commercial banks since they had provided credit to oil suppliers, agriculture farmers. Notably, because of the climatic crisis and decrease in oil price, these borrowers had failed to pay back their loans. This led to the bank crisis in which people lost confidence and

started withdrawing money. This finally led to dollarization in Ecuador (Beckerman, 2001).

2.3 Interest rate, Exchange rate and Inflation

Investors in a dollarized economy seem to hedge themselves against domestic inflation as well as fluctuations in the exchange rate. For this reason, the current study is interested in examining the relationship between dollarization and exchange rate, nominal interest rate and inflation. Neanidis and Savva (2009) argued that due to the existence of inflation and exchange rate risk, domestic residents banked in dollars in order to hedge themselves. In additional, Honohan (2007) postulated that the key element of dollarization is the presence of high inflation. This paper claimed that no country can get away from dollarization if the level of inflation is too high. Honohan (2007) insisted that the nominal amount of domestic local currency base, the nominal exchange rate and the relevant interest rate are the foremost computable aspects in short term development of dollarization ratios.

Kamin and Ericsson (2003) noted that Argentina had dollarized because of a different macroeconomic problem. In the 1980s, the rates of inflation combined with the rate of exchange rate depreciation had worried policymakers and residents in Argentina. They undertook a different approach to solving the inflation problem. The first phase of the plan was called Plan Austral program which took place in middle of 1985. It comprised of wage, price and exchange rate freezes with several fiscal adjustments. Conversely, whilst the fiscal deficit subsequently declined, it was not able to get rid of inflationary pressures, which reverted back to upward trends by 1987. A second major dis-inflation program was carried out in August 1988 (Ref), Plan Primavera was designed to prevent the acceleration of public inflation, private prices and the official exchange rate fixed to 4% per month. Plan Primavera worked out at the

beginning by bringing down the inflation. However, the real exchange rate went up significantly and the fiscal situation became worse. This led to an increase in interest rates which caused a rise in the cost of servicing the government domestic debt. In February 1989, the Central Bank of Argentina announced that the exchange rate had depreciated sharply and inflation rose rapidly up to 198 percent per month by July 1989.

There is a direct relationship between nominal interest rate and inflation rate. Blanchard (2010) noted that in the medium-term period, the inflation rate is identical to money growth. This paper postulated that in the medium-term the nominal interest rate is equal to the natural real interest rate plus money growth. Therefore, in medium-term equilibrium, a change in growth rate of money supply contributes to fluctuation in inflation with an instantaneous adjustment of nominal interest rate. Additionally, Blanchard (2010) postulated that over a long-term period, the money growth has an impact on nominal interest rate and the expected inflation rate without affecting real interest rate. This relationship was first discovered by Fisher and it was named after him as the Fisher Effect or the Fisher hypothesis. It stated that increase in nominal interest rate is directly related to increase in inflation. Different researchers have tested the relationship between nominal interest rate (lending interest rate) and inflation to see whether if it holds. Berument and Jelassi (2002) used a sample of 26 countries, 12 developed countries and 14 developing countries. This paper found that, the Fisher hypothesis held in 16 out of the 26 countries. According to his findings, the Fisher hypothesis holds more in the developed countries than in developing countries. The Fisher hypothesis version holds in 9 out of 12 developed countries and 7 out of 14 developing countries. Payne and Ewing (1997) did research on less developing countries to see whether the Fisher hypothesis is correct. Being aware of possible spurious regression results, this paper used Johanses-Juselius co-integration procedure to test the Fisher effect/hypothesis. Out of the nine countries studied, the

Fisher Effect was found to hold in only three countries, namely: Malaysia, Pakistan and Sri Lanka.

2.4 The Relationship between Interest Rate, Exchange Rate, Inflation Rate and Portfolio theory

Portfolio theory aims at choosing a portfolio of assets to maximize the return for a given amount of a portfolio at a risk free rate. The purpose of this study is to investigate whether the portfolio theory holds for the Tanzanian and Argentine economies. Ize and Yeyati (2003) developed the portfolio theory using Minimum Variance Portfolio (MPV) to measure the level of dollarization of assets and liabilities in relation to macroeconomic policies. This paper found that the phenomenon of financial dollarization exists and that people do choose to hedge themselves against inflation by holding foreign currencies. Moreover, the study postulated that financial dollarization is likely to persevere higher in circumstances of higher inflation and real exchange rate volatility even if after controlling the level of inflation.

According to Yeyati (2006), the currency substitution theory anticipates that the relationship between domestic currency and foreign currency is a function of nominal interest rates of both currencies.

$$Y = f(i, i^*) \quad (1)$$

Where $i = domestic\ interest\ rate\ and\ i^*\ foreign\ interest\ rate$

Ize and Yeyati (2003) indicated that if the interest rate parity holds, there is no arbitrage. Then it equalizes the rates of return on domestic and foreign currency assets. This confirms that shifts in inflation or interest rates would not make a difference to the preference of residents holding foreign currency assets. When there

is chance of increasing expected inflation, the domestic currency continues to depreciate and provides a possibility of currency substitution.

Furthermore, Ize and Yeyati (2003) noted that the existence of multicurrency between domestic currency (Peso currency) and foreign currency (US Dollar) in circulation, there is a risk involved. The return of holding an asset in terms of domestic currency (r_D^H) is affected by change in the inflation rate while the return of the other currency in terms of foreign currency (r_D^F) is influenced by fluctuation in the real exchange rate. Whereas $\varepsilon_\pi, \varepsilon_S, \varepsilon_C$ are disturbances related to inflation, the real foreign-exchange rate and country risk.

$$
\begin{aligned}
r_D^H &= \mathrm{E}(r_D^H) - \varepsilon_\pi + \varepsilon_C \\
r_D^F &= \mathrm{E}(r_D^F) + \varepsilon_S + \varepsilon_C \\
r_D^H &= \mathrm{E}(r) + \varepsilon_S
\end{aligned}
\qquad [2]
$$

In addition, Ize and Yeyati (2003) asserted that dollarization is determined by λ^* Minimum Variance Portfolio (MVP). This is established when the portfolio composition operates on both two sides of a bank's balance sheet to hedge against inflation and risk of foreign currency fluctuation. Hence, depositors of foreign currency and creditors of foreign currency united together by tradable fund market which causes financial equilibrium that spin around interest rate parity and minimum variance portfolio. It is the dollar share of MVP. It is as the result of the relative volatilities of inflation (Π) and the rate of real depreciation (S):

$$
\lambda^* = \frac{S_\pi + S_{\pi S}}{S_\pi + Sss + 2S_{\pi s}} \qquad [3]
$$

Then, in the absence of the real interest rate differentials across currencies, domestic residents (borrowers) can choose the currency composition of domestic currency and

foreign currency so as to minimize the variance of portfolio returns, which clearly depend on the volatility of inflation and the real depreciation rates. If this is the case, it can be argued that the dollarization ratio is directly proportional to the coefficient of the exchange rate. If capital flow is forbidden for-example, when the domestic economy is closed, then all domestic bank deposits must correspond to domestic bank loans. In this condition, depositors' and borrowers' portfolios should be the same. As a result of this scenario, I have assumed that the uncovered interest rate holds, the MVP is the only possible financial equilibrium that applies here. Thus, divergences from MVP can only happen if the supply and demand of loanable funds mismatch.

CHAPTER THREE: METHODOLOGY

3.0 The Research Design

The empirical methods that guided this study are grounded in the portfolio approach by Ize and Yeyati (2003). This approach is useful where risk aversion of depositors and borrowers both select currency denominations of their holdings in a bi-currency economy where several factors are either actively priced or deliberately considered in their decision regarding of the level of foreign currency held in their portfolios. Clearly, to address/explore each of the two major hypotheses of the effects the inflation rate and the nominal exchange rate have on the level of dollarization in Tanzania and Argentina as well as to performance, a comparison analysis (exploratory) methodology of the two countries is the best fit for this study.

According to Fraenkel, Wallen, and Hyun (1993), explanatory studies examine the relationship to identify possible cause-effect relationships between the variables of interest. This explains why some authors simply call explanatory research design as causal research design which are specially relevant/useful for theory testing and construction (De Vaus, 2001). According to De Vaus (2001) explanatory studies focuses on the *why* questions whose answer involves developing causal explanations that argue that one phenomenon affects the other whether directly or indirectly. To perfectly explain causation, one may have to do a chain of causal tests such as correlation, prediction and regression analysis. In this study, the researcher seeks to explain whether the inflation rate, interest rate and the nominal exchange rate are a cause of dollarization.

3.1 Model Specification

The current paper followed the empirical and theoretical model as discussed in the previous sections and specifically on the following baseline model for estimation of association between dollarization, interest rates, exchange rate and monetary regime. To be able to compare dollarization in Tanzania and Argentina, a parameter stability methodology called the Chow-test, formulated by Chow (1960) to test for the equality of coefficients in two separate samples was adopted. Basically, Chow-test entails running a regression model in two samples separately and pooling the samples and then running a pooled regression. Specifically, the model (4) below was run on Tanzanian data and then the same model using Argentine data was used. Then the data was combined before running the model again. Therefore, the working model is:

$$y_{it} = \rho y_{it-1} + \varphi int_{it} + \omega fx_{it} + \gamma' Controls_{it} + \varepsilon_{it} \qquad (4)$$

Where, i is the country subscript, t is the time subscript while y denotes the ratio of foreign deposits to total deposits in the banking sector hence y_{it-1} is it's lagged value, int is the interest rate, fx is the exchange rate between the domestic currency and the US dollar, $Controls$ is a vector of control variables that affects the level of dollarization, and ε_{it} is the white noise disturbance term. In addition, φ, ω and γ are coefficients of respective variables but γ is a vector of such coefficients.

The selection of the members as control variables was informed by the previous theoretical and empirical studies that suggested significant relationship with dollarization. These variables included interest rate differential with the US (Basso, Calvo-Gonzalez, & Jurgilas, 2007; Neanidis & Savva, 2009), change in rate of inflation (Rennhack & Nozaki, 2006) and financial depth (Basso. et al., 2011).

To eliminate the unit root that is popular in most financial and economic data series, the equation (4) was transformed into its first difference form. In essence, all variables are then stated in their difference and not level form. It was estimated that:

$$\Delta y_{it} = \rho \Delta y_{it-1} + \varphi \Delta int_{it} + \omega \Delta fx_{it} + \gamma' \Delta Controls_{it} + \in_{it} \quad (5)$$

Most likely, the coefficients- φ, ω and γ – will be different from one data set to the other. Intuitively, this means that effect of each explanatory variable would be different for each country and for the whole population (joined samples). Chow (1960) derived a mathematical formula that can be used to explain whether the coefficient of a certain variable in one data set is significantly different from the coefficient of the same variable in another data set. This is an F-test that utilises the sum of square residual (SSR) from all the three equations and degree of freedom to compute F-statistics that can then be compared with critic F-statistics to determine the level of significance difference. To compute the F-statistics the formula was used:

$$F = \frac{(SSR_N - (SSR_{n_1} + SSR_{n_2}))/k}{(SSR_{n_1} + SSR_{n_2})/(n_1 + n_2 - 2k)} \quad (6)$$

Where k is the number of parameters in the equation to be estimated in each stage, SSR_{n_1} is the sum of squared residual when the equation is estimated using Tanzanian data set and SSR_{n_2} is the sum of squared residual when the equation is estimated using Argentine data. In the same way SSR_N is the sum of squared residual for the combined samples. The value of F-statistics computed above is then compared to critical F-statistics with $n_1 + n_2 - 2k$ degrees of freedom. In the case of the F-statistical being greater than the critical F, we would be able to reject the null hypothesis and accept that the models in the two countries are significantly different. Hence, the coefficients are unique for each country. The size of the coefficient will also indicate where the impact of each variable is likely to be stronger.

3.2 Data Sources and Descriptive Statistics

3.2.1 Sources of Data

As discussed in the previous sub-section, the main variables of interest were: dollarization; inflation rate; interest rate and the nominal exchange rate. The control variables were: the GDP growth rate; lending interest rate differential and deposit interest rate differential. All of the data on each of the variables was collected in quarterly time intervals from third quarter of 2002 to the second quarter of 2010, in either percentages for the exchange rate and interest rates or in the domestic country currency for foreign deposits. To compute the level of dollarization, the approach of Ize and Yeyati (2003)was followed and the ration of foreign currency denominated deposits to total deposits was obtained. On the other hand, two interest rate differentials were computed and included as a control variable. These were computed as the difference between the domestic currency lending/deposits interest rate and foreign currency lending/deposits interest rate.

In the case of Tanzania, the current paper obtained a complete set of data on foreign currency deposits, total deposits, the nominal exchange rate and the lending interest rate for domestic as well as foreign currency deposits from the Bank of Tanzania's statistical bulletin.

In the case of Argentina, the data for the same variables were obtained from the CEIC Global Database, maintained by CEIC Data Company ltd. that has built its reputation in providing the financial information service industry with accurate and comprehensive data. However, data on the quarterly gross domestic product (GDP) growth rate series was only available from the trading economies database that is reputed for providing accurate historical data on more than 300 000 economic indicators, after checking for inconsistencies. Finally, data on the inflation rates for

both countries was obtained from IMF's international monetary fund's international financial statistics (IFS).

3.2.2 Descriptive and the Level of Dollarization for Tanzania

On average, the total deposit for the period covered stood at about Tshs. 4.867 trillion per quarter with a median of about Tshs. 4.424 trillion, out of which Tshs. 1.361 trillion were foreign currency denominated deposits which accounted for 28% of total deposits on average. The distribution of the foreign currency deposit ratio, which formed the dependent variable, can be described as being very close to a normal distribution since the mean and media were both at 28%, while the skewness was very close to zero at 0.37 and kurtosis was closer to three at 2.5. On the other hand, Table 3.1 shows that the average level of the exchange rate was Tshs. 1255.35 per dollar and the interest rate stood at a mean value of 15.13% per annum whereas inflation rate averaged at 7.39% per annum.

Table 3.1: Dollarization in Tanzania and other Descriptive Statistics

	Total Deposit (millions)	Foreign Curr. Deposit (millions)	Foreign Curr. Ratio	Nominal Exch. Rate (Tshs./USD)	Inflation Rate (%age)	Nominal Interest rate (%age)
Mean	4,867,605	1,361,406	0.28	1,255.35	7.39	15.13
Median	4,424,098	1,426,343	0.28	1,202.36	6.61	15.04
Maximum	9,801,355	2,513,806	0.33	2,489.70	13.85	16.73
Minimum	1,931,048	478,067	0.24	969.45	3.80	13.80
Std. Dev.	2,393,802	606,306	0.02	316.95	2.68	0.66
Skewness	0.51	0.11	0.37	2.88	0.86	0.33
Kurtosis	2.01	1.68	2.50	11.14	2.78	2.90
Observations	32	32	32.00	32.00	32.00	32.00

Source: Research Data (2013)

3.2.3 Descriptive and the Level of Dollarization for Argentina

Surprisingly, the current level of dollarization in Argentina was relatively low at an average of 4% of the total deposits that stood at an average of 143 peso billion of which only 5.9 peso billion were foreign currency deposits. A closer look at the distribution of foreign currency ratio – which is the dependent variable of the basic model – suggests that the distribution that can be estimated by a standard normal distribution, the mean was 0.04, median was also 0.04 while the coefficient of skewness was barely higher than zero at a meager 0.01 whereas the coefficient of kurtosis almost hit the benchmark of three but only made it to 2.69. The dispersion, commonly measured by the standard deviation SD, was relatively small compared to the mean at 0.01 which suggests clustering near the centre of the distribution. Other variables such as the nominal exchange rate, inflation rate and nominal interest rate are reported in Table 3.2 below.

Table 3.2: Dollarization in Argentina and other Descriptive Statistics

	Total Deposit (millions)	Foreign Curr. Deposit (millions)	Foreign Curr. Ratio	Nominal Exch. Rate (Tshs./USD)	Inflation Rate (%age)	Nominal Interest rate (%age)
Mean	143,417	5,927	0.04	3.21	10.93	15.66
Median	136,050	5,174	0.04	3.08	8.80	10.61
Maximum	248,941	15,692	0.06	3.93	40.31	90.61
Minimum	69,199	721	0.01	2.81	2.43	5.48
Std. Dev.	53,329	3,887	0.01	0.34	9.03	15.93
Skewness	0.21	0.66	-0.19	0.98	2.40	3.53
Kurtosis	1.75	2.65	2.69	2.48	7.67	16.66
Observations	32	32	32	32	32	32

Source: Research Data (2013)

CHAPTER FOUR

PRESENTATION AND DISCUSSION OF THE RESULTS

4.0 Introduction

This chapter presents the results of the empirical analysis and tests carried out by following the procedures outlined in the previous chapter. The results of correlation analysis are presented first, then the unit root analysis and finally the regression analysis together with the Chow-test.

4.1 Tests for Association

As a preliminary test, I was interested in finding out the nature of the movement of each variable in relation to each of the other variables. The aims of such tests is to identify the tendency of changes in one variable to be in tandem with changes in another variable and are easily achieved via the Pearson correlation test. Normally, the results of a Pearson test lies between -1 and +1, where -1 indicates a perfect negative correlation that implies one variable increasing whereas the other decreases at the same rate. On the other hand, a correlation coefficient of +1 suggests a perfect (causal) and equal change in the same direction. Table 4.1 below, reports the results correlation analysis among the key variables in Tanzania at various levels of significance. Foreign currency ratio was only significantly negatively correlated to inflation rate at 5% level of significance while deposit interest differential was positively related to nominal exchange rate at 5%. But, none of other variables exhibited any significant correlation at any level of significance.

Table 4.1: Correlation for Tanzania

	FXR	INF	EXR	INT	GDPGR	DID	LID
FXR	1						
INF	-.371(*)	1					
	.037						
EXR	.143	.234	1				
	.436	.197					
INT	.334	.186	.250	1			
	.062	.308	.168				
GDPGR	-.023	-.124	.070	.092	1		
	.901	.499	.703	.615			
DID	.129	.314	.484(**)	.199	-.079	1	
	.482	.080	.005	.276	.666		
LID	.043	-.174	-.297	-.139	-.090	-.349	1
	.815	.340	.099	.449	.625	.050	

Source: Research Data (2013) FXR is Dollarization; INF is Inflation; EXR is Exchange rate; INT is Interest Rate; GDPGR is Growth Domestic Product Growth Rate; DID is Deposit Interest Rate Differential; LID is Lending Interest Rate Differential, * Correlation is significant at the 0.05 level (2-tailed) and ** Correlation is significant at the 0.01 level (2-tailed).

The correlation of in Argentina revealed very different results. At the 5% level of significance, the inflation rate and foreign currency ratio as well as foreign currency ratio and interest rate seem to be strongly negatively correlated whereas nominal exchange rate and foreign currency ratio as well as inflation and nominal exchange rate are strongly positively correlated. Finally, the deposit rate differential was also found to move in a positive direction relative to lending rate differential at 5% level of significance.

Table 4.2: Correlation for Argentina

	FXR	INF	EXR	INT	GDPGR	DID	LID
FXR	1						
INF	-.607(**)	1					
	.000						
EXR	.508(**)	.157	1				
	.003	.392					
INT	-.454(**)	.745(**)	.329	1			
	.009	.000	.066				
GDPGR	-.274	-.013	-.430(*)	-.413(*)	1		
	.129	.944	.014	.019			
DID	-.329	-.070	-.136	.118	.172	1	
	.066	.705	.459	.521	.347		
LID	-.171	-.072	.135	.089	-.049	.509(**)	1
	.349	.695	.460	.630	.790	.003	

Source: Research Data (2013) FXR is Dollarization; INF is Inflation; EXR is Exchange rate; INT is Interest Rate; GDPGR is Growth Domestic Product Growth Rate; DID is Deposit Interest Rate Differential; LID is Lending Interest Rate Differential, * Correlation is significant at the 0.05 level (2-tailed) and ** Correlation is significant at the 0.01 level (2-tailed).

4.2 Tests for Unit Root

According to econometrics theory, variables that exhibit non-stationarity are not considered to be tenable for any meaningful macroeconomic analysis. Instead, it is only when such variables are stated in a form where such non-stationarity is eliminated that meaningful inferences can be derived from an analysis involving such variables (Koops, 2006). Most financial time series are non-stationary because these have a varying underlying growth rate in which the mean and/or variance are continually rising. These make generalization of results based on study of a single time span unrealistic. The most common test for nonstationarity is the Dickey-Fuller (DF) test by Dickey and Fuller (1979) and augmented Dickey-Fuller (ADF). Here, I checked whether ρ is equal to zero or not in the model below, hence I tested for a null hypothesis of $H_0: \rho = 0$ against the alternative test of $H_1: \rho < 0$. When the null hypothesis is accepted then unit root or simple nonstationarity exists and otherwise

for stationarity. More specifically, I ran either of the following models for each variable:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \rho Y_{t-1} + u_t \quad (5)$$

$$\Delta Y_t = \alpha_0 + \rho Y_{t-1} + u_t \quad (6)$$

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \rho Y_{t-1} + u_t \quad (7)$$

Before testing for unit root, the data was transformed according to the regression model (2) and unit root was performed on the transformed variables that were simply approximated percentage change in the variable. An approximation of the percentage change was achieved by first linearizing the variables by using logarithms and getting the change in logarithms. This is a standard way used data transformation or '*cleaning'* procedure. The results of unit root test for each country are presented below in Table 4.3. It became evident that none of the transformed variable exhibited explosiveness i.e., nonstationarity, therefore, the variables for Tanzania were ready and considered to be tenable for regression analysis. The decision to reject or accept the null hypothesis was performed at 10% level of significance.

Table 4.3: Unit Root Test for Tanzania

Name of Variable	t-Statistic	Prob.*	Test critical values		
			1% level	5% level	10% level
%age change foreign currency Dep. Ratio	-4.489	0.001	-3.670	-2.964	-2.621
%age change Exchange rate	-6.067	0.000	-3.679	-2.968	-2.623
%age change rate of inflation	-2.521	0.014	-2.650	-1.953	-1.610
%age change in Interest rate	-8.063	0.000	-3.670	-2.964	-2.621
%age change in Deposit interest differential	-7.013	0.000	-2.644	-1.952	-1.610
%age change in GDP	-3.876	0.007	-3.738	-2.992	-2.636
%age change lending interest differential	-8.254	0.000	-2.644	-1.952	-1.610

Source: Research Data (2013) *MacKinnon (1996) one-sided p-values.

Similarly, the transformed variables for Argentina were all stationary when tested for unit root using augmented Dickey-Fuller either with intercept, with deterministic trend or with none. The best results showed rejections of a null of presence of unit root are shown below in Table 4.4 when the decision was performed at 10% level of significance.

Table 4.4: Unit Root Test for Argentina

Name of Variable	t-Statistic	Prob.*	Test critical values		
			1% level	5% level	10% level
%age change foreign currency Dep. Ratio	-2.806	0.007	-2.644	-1.952	-1.610
%age change Exchange rate	-3.262	0.002	-2.644	-1.952	-1.610
%age change rate of inflation	-3.457	0.018	-3.724	-2.986	-2.633
%age change in Interest rate	-4.244	0.002	-3.670	-2.964	-2.621
%age change in Deposit interest differential	-4.561	0.000	-2.647	-1.953	-1.610
%age change in GDP	-3.159	0.032	-3.662	-2.960	-2.619
%age change lending interest differential	-5.677	0.000	-3.670	-2.964	-2.621

Source: Research Data (2013) *MacKinnon (1996) one-sided p-values.

4.3 Regression Analysis

It is common for a regression analysis to be performed to determine the nature of the relationship between variable and as an additional test for association. A regression analysis helps to reveal the magnitude and direction of change in the dependent variable for a given single unit change in the each of the independent variables. For this reason, and others discussed in the previous sections, I performed a regression test using the transformed variables, variables without unit root, to avoid performing a spurious regression.

Following the procedure as outlined in Chapter Three, the first regression was set to test the effects of changes in the nominal exchange rate, nominal interest rate, and inflation rate, on the level of dollarization in each country. This first part helped to

answer the first hypothesis which sought to establish the effect of each of the three variables on dollarization in each country. Table 4.5 presents the result of regression analysis of dollarization in Tanzania. In this regression, I used the Ordinary Least Square Regression (OLSR) approach and ran a relationship where the dependent variable is the percentage change in dollarization (CLFXR) while the independent variables are lagged percentage change in dollarization (CCLFXR), percentage change in the nominal exchange rate (CLEXR), percentage change in the nominal interest rates (CLPINT), percentage change in inflation rate (CLPINF) and the three control variable, namely: GDP growth rate (CGDP), percentage change in deposit interest differentials (CLPDID), and percentage change in lending differentials (CLPLID). Despite the underlying portfolio theory put forward by Ize and Yeyati (2003), none of the variable appeared to have had a significant effect on the dollarization at the 95% level of confidence but only lending interest rate differential had an impact at 90% confidence level or simply put, at 10% significance level.

This finding is corroborated by the R-squared which was very low; it managed to reach 0.239 whereas adjusted R-squared was -0.003. A – according to Gujarati (2003), a negatively adjusted R-squared should be interpreted as zero R-squared. In addition, the F-statistic was very low and insignificant at either 5% or 10% levels of significance which mean that the variables in the model do not have significant relationship or effect on the dependent variable. So other authors suggest that such low explanatory power simply mean that predicting changes in the dependent variable using the explanatory variable will not be better than using guesswork. Clearly, the regression analysis indicates that the explanatory variables used in this model do not have a significant effect on dollarization in Tanzania.

Table 4.5: OLS Regression results for Tanzania

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.004271	0.008639	0.494441	0.6259
C(8)	0.308365	0.195505	1.577277	0.1290
C(2)	0.005752	0.045381	0.126751	0.9003
C(3)	0.115432	0.188027	0.613911	0.5456
C(4)	-0.025050	0.033670	-0.743986	0.4648
C(5)	-0.205897	0.200821	-1.025275	0.3164
C(6)	0.025475	0.041790	0.609598	0.5484
C(7)	0.123582	0.066152	1.868145	0.0751

R-squared	0.239130	Mean dependent var	-0.000946
Adjusted R-squared	-0.002965	S.D. dependent var	0.041364
S.E. of regression	0.041426	Akaike info criterion	-3.306652
Sum squared resid	0.037754	Schwarz criterion	-2.932999
Log likelihood	57.59978	Hannan-Quinn criter.	-3.187117
F-statistic	0.987755	Durbin-Watson stat	1.754275
Prob (F-statistic)	0.465209		

Source: Research Data (2013) C(1) is constant; C(2) is partial coefficient change in lagged in the dollarization; C(3) is partial coefficient change in lagged in the nominal interest rates; C(4) is partial coefficient change in lagged in the inflation rate; C(5) is partial coefficient change in lagged in the Growth Domestic Product; C(6) is partial coefficient change in lagged in the deposit interest differentials; C(7) is partial coefficient in change in lagged lending interest differentials; and C(8) is partial coefficient changed in the lagged in dollarization.

Obviously, this seems to be a contradiction to the theory and a likely contradiction of the classical linear regression assumptions. However, multi-collinearity does not seem to prevail since R-squared is very low although none of the variables is significant. According to Asteriou and Hall (2011), a good way of identifying multi-collinearity is a high R-squared score without many significant explanatory variables. This does not seem to happen in this model. Secondly, autocorrelation or serial correlation seems to be very low since Durbin-Watson statistics was not so close to 2.0 as it stood at 1.7542. However, because of the presence of lagged dependent variable in the model, the Durbin-Watson test is no longer valid; instead I compute h-statistics using the formula:

$$h = \left(1 - \frac{d}{2}\right)\sqrt{\frac{n}{1-n\delta_{\hat{Y}}^2}} \quad (8)$$

Where n the number of observations is, d is the Durbin-Watson statistic in the estimated model using OLS and $\delta_{\hat{Y}}^2$ is the variance of the coefficient of the lagged dependent variable. The application of above equation gives $h = 1.757$ which indicates lack of serial correlation at 5% significance level as h −statistics always follows a normal distribution in large sample. Alternatively, we use LM test of serial correlation and obtain the results below in Table 4. This also confirms lack of serial correlation.

Table 4.6: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.467562	Prob. F(1,21)	0.5016
Obs*R-squared	0.653398	Prob. Chi-Square(1)	0.4189

Source: Research Data (2013)

To test whether heteroscedasticity prevailed, I started by plotting the residual; these showed a healthy distribution of squared residuals and later applied a formal test called the Breusch-Pagan-Godfrey LM test which produced the following results that indicated lack of heteroscedasticity, LM-statistics was only 4.517 compared to chi-square critical of 14.06714 at 95% confidence level and 7 degrees of freedom.

Table 4.7: The Breusch-Pagan-Godfrey Heteroscedasticity Test

F-statistic	0.557172	Prob. F(7,22)	0.7820
Obs*R-squared	4.517578	Prob. Chi-Square(7)	0.7186
Scaled explained SS	1.374518	Prob. Chi-Square(7)	0.9863

Source: Research Data (2013)

The same regression procedure was performed on the variables related to Argentina with the same type of variable by using OLS. Once again, the results contradicted the theory; none of the variables appears to have a significant effect on the dollarization at 95% level of confidence as well as at 90% confidence level. This finding is validated by a very small and insignificant R-squared of 0.235 and an adjusted R squared of -0.008 or simply zero. Moreover, the insignificance of the F-statistic indicated that the model or theory, for that matter, does not hold in Argentina and dollarization is explained by other variables that are not covered by this theory or model.

Table 4.8: Regression Argentina

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.073785	0.062740	1.176044	0.2521
C(8)	0.267632	0.240278	1.113843	0.2774
C(2)	-0.159839	0.744797	-0.214608	0.8321
C(3)	-0.114476	0.100769	-1.136028	0.2682
C(4)	0.020732	0.092394	0.224389	0.8245
C(5)	-2.009401	2.862438	-0.701989	0.4900
C(6)	0.012065	0.042666	0.282772	0.7800
C(7)	-0.010209	0.016280	-0.627104	0.5370

R-squared	0.235148	Mean dependent var	0.056228
Adjusted R-squared	-0.008213	S.D. dependent var	0.100954
S.E. of regression	0.101367	Akaike info criterion	-1.516952
Sum squared resid	0.226058	Schwarz criterion	-1.143300
Log likelihood	30.75429	Hannan-Quinn criter.	-1.397418
F-statistic	0.966250	Durbin-Watson stat	1.772482
Prob(F-statistic)	0.479146		

Source: Research Data (2013)

Similar to the Tanzanian case, multi-collinearity can be ruled out based on the low value of R-squared despite having no significant explanatory variables. Next, autocorrelation or serial correlation was checked by computing h-statistics using the formula (7). The application of above equation gives $h = 0.728265$ which indicates

lack of serial correlation at 5% and 10% significance levels critical values from a normal distribution table. A formal test was also done using Breusch-Godfrey LM test of serial correlation, the results in Table 4.9 accepted the null hypothesis of nonexistence of serial correlation.

Table 4.9: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.142513	Prob. F(1,21)	0.7096
Obs*R-squared	0.202218	Prob. Chi-Square(1)	0.6529

Source: Research Data (2013)

A further Breusch-Pagan-Godfrey LM test for heteroscedasticity was conducted. The results are presented in Table 4.10 which indicate the absence of heteroscedasticity as, LM-statistics was 12.210 against the chi-square critical of 14.067 at 95% confidence level and 7 degrees of freedom.

Table 4.10: The Breusch-Pagan-Godfrey Heteroscedasticity Test

F-statistic	2.157160	Prob. F(7,22)	0.0796
Obs*R-squared	12.21030	Prob. Chi-Square(7)	0.0939
Scaled explained SS	10.26387	Prob. Chi-Square(7)	0.1741

Source: Research Data (2013)

4.4 The Chow coefficient Stability test

To test whether the effect of the explanatory variables on dollarization were different in Tanzania from Argentina, I followed the procedures of the popular Chow's test for equality of coefficients in two separate regressions as out lined by equation (3), the results are shown in Table 4.11. The computed F-statistics according to the formula of Chow was 0.655 compared to the critical F-statistics with 8 parameters including the constant and 44 degrees of freedom is 60.48. Since, the computed F-statistics is

less than the critical F-statistics, we can accept the null hypothesis that there is no significant difference between the effect of the explanatory variables on dollarization in Tanzania and in Argentina.

Table 4.11: Chow Breakpoint Test

Null Hypothesis: No breaks at specified breakpoints

F-statistic	0.655467	Prob. F(8,44)	0.7270
Log likelihood ratio	6.755555	Prob. Chi-Square(8)	0.5632
Wald Statistic	5.243738	Prob. Chi-Square(8)	0.7312

Source: Research Data (2013)

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents a summary in a systematic manner the results of the empirical tests and analysis presented in details in the previous chapter. In addition, we derive at the following conclusions necessary to answer the research questions sought at the beginning of the study based on the results of the test in conjunction with the existing literature. Then recommendations for areas of further study are made.

5.1 Summary of the findings

From the outset, the study was focused on fulfilling two major objectives which were moulded into the research question: the effects of the inflation rate and, nominal interest rate and the nominal exchange rate on dollarization between Tanzania and Argentina; and how does the effect of the inflation rate and, nominal interest rate and the nominal exchange rate on dollarization differ between Tanzania and Argentina? According to the portfolio theory by Ize and Yeyati (2003) postulate that the exchange rate, inflation rate and interest rate have a significant impact on the level of dollarization in a country.

To fulfil this research objective/question, Pearson correlation analysis was used and showed that apart from level of inflation, dollarization - measured as the ratio of foreign currency denominated deposits to total deposit – this has an insignificant correlation with neither the nominal exchange rate nor the nominal interest rate in Tanzania, at either 5% or 10% significance levels. Surprisingly, dollarization in Argentina exhibited a significant association at 95% confidence level to the three variables. However, the size of correlation was neither strong nor

weak but simply fell in between the two values. For instance, correlation with the exchange rate was 0.508 only while correlation with interest rate was -0.454 only. Therefore, it can be argued that dollarization seems to be more closely associated to the three variables in Argentina than in Tanzania but the level of association is still not especially high.

The regression analysis performed sought to unravel the nature, the magnitude and direction of the relationship in relation to the dependent variable – dollarization. This in part also helped to respond to the requirement of the first hypothesis which sought to establish the effect of each of the three variables on dollarization in each country. In the case of Tanzania, none of the variables had a significant influence on the dependent variable, therefore, the portfolio theory put forth by Ize and Yeyati (2003) does not hold in Tanzania at the 10% level of significance. In addition, the R-squared score was very low, and only managed to reach 0.239 whereas the adjusted R squared was -0.003 indicating an almost complete lack of impact on the dependent variable from the three variables.

Almost similar results were reported for the same regression model performed on variables related to Argentina. The R-squared was found to be very low and insignificant at a paltry 0.235 leading to an adjusted R squared of -0.008 or simply zero. Furthermore, the insignificance the F-statistic indicated the inappropriateness of the model or theory to Argentina as well. All of the other tests to check whether the method of estimation had been wrong and the cause of insignificancy in the overall equation showed that neither multicollinearity, autocorrelation nor heteroscedasticity existed, hence, OLS was appropriate technique.

Finally, this study sought to establish whether the relationship exists between dollarization in Tanzania differed significantly from the relationship of dollarization in Argentina with the key variables. A Chow-test was carried out and revealed that the two data sets were not significantly different from each other and

can be assumed to have been drawn from the same population. The computed F-statistics according to the formula of Chow was 0.655 whereas the critical F-statistics was 60.48 which exceeded the computed F-statistics hence the conclusion that similarities superseded – after all none of the variables was significant in either of the countries.

5.2 Conclusion

The following conclusions can be drawn from the data. The first research question sought to establish the effect of inflation, exchange rate and interest rate in Tanzania and Argentina. The fundamental assumptions that underlie the research question are clearly set by Ize and Yeyati (2003) where currency choice of borrowers and depositors is a hedging decision which follows a minimum variance portfolio allocation as a benchmark to estimate the level of financial dollarization of assets and liabilities as a function macroeconomic uncertainties shaped by volatilities in exchange rates, inflation rate and interest rates. This assumptions are also supported by other writers who have struggled to establish/identify the kind of relationship between dollarization and the three macroeconomic variables such as identified by Levy-Yeyati and Sturzenegger (2005), Basso. et al. (2011), Neanidis and Savva (2009) and Vieira, Holland, and Resende (2012).

The findings from the correlation analysis and regression analysis in both countries dispute the assumptions and showed that exchange rate, inflation rate and interest rates do not have a significant effect on the level of dollarization. This is not a unique finding, a study by Honig (2009) on the effects of exchange rate regimes and government quality on dollarization found that exchange rate regime has a far less of an impact than what literature claims. Other studies such as by Bacha, Holland, and Gonçalves (2009) casted doubts on the effect of interest rates in a study that focused on Brazil. Based on the country analysis which showed absence of any significant linear relationship, it is of little consequence to perform

a comparison between Argentina and Tanzania, such comparison is analogous to comparing nothing to nothing which explains the reason for insignificant Chow's F-statistics.

Therefore, I can confidently conclude that exchange rate, inflation rate and the interest rates do not have a significant linear/causal relationship or have an effect on the level of dollarization countries in Africa and Latin-America.
In essence, the portfolio theory of financial dollarization is not supported in these regions and there is a need to either modify it or search for a new theory. Alternatively, a different type of tools/variables of analysis such as using real exchange rate, real interest rates may be undertaken, although it may be done to justify the use of real rather than the observed nominal rates that are more available to common borrowers and lenders.

5.3 Recommendations

Although I set-out to investigate the effects of exchange rate, inflation rate and interest rate on dollarization and in part to test the existing theory on financial dollarization. The results and the findings revealed that key macroeconomic variables sought in the study do not have a significant effect on the dollarization in Tanzania and in Argentina. The impotence of this popular theory to hold water in these two significant emerging economies suggests two sources of inadequacy: either the nature of the relationship is not linear hence a new research design can be developed or simply that the theory is wrong.

Based on these two scenarios, I would recommend that further research be pursued using the same variables as in this study but uses different forms, such as using real as opposed to using nominal values, using non-linear forms instead of using a linear estimation method. Otherwise, the significant explanatory variable of dollarization could be elsewhere and such variables could only be included in a process that calls for new theory formulation to replace the current theory.

Since 2001, calls for the revision of the current theory to include variables such as government quality and monetary policy agility (Honig, 2009), individual heterogeneity (Castillo & Winkelried, 2005), domestic debt and default risk (Vieira et al., 2012) and institutional quality and financial integration (Neanidis & Savva, 2009) among other variables. Notably, most of the suggested variables like institutional quality and government quality are generally regarded as qualitative by nature. The likely derivation from this trend is that dollarization may be a behavioural variable and not a quantitative variable. Therefore, a recommendation is that future studies to look at the behavioural aspect/variables of dollarization and the likely addictiveness of such behaviours.

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