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THE ROLE OF MONEY IN THE ZIMBABWEAN ECONOMY: POST DOLLARISATION

BY

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DEDICATION

To my mom Merita Gureia, you are the best mom in the world.

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However, the views expressed in this dissertation, errors and omissions remain the author's and should not be attributed to any of the above-mentioned people and/or organizations.

ABSTRACT

Pre-dollarisation Zimbabwe experienced a period of high inflation rate and poor economic performance despite having excess liquidity. Post-dollarisation the country has been facing economic decline, deflation and serious liquidity crises. It is against this background that the study examined the role of money in the Zimbabwean economy. This was done by investigating the relationship between money supply, prices and output. Granger causality tests and Vector Autoregression techniques were employed using the sample period from 2009/01 to 2015/03. Narrow and broad money supply measurements were considered. Volume of manufacturing index (VMI) was used to proxy output while consumer price index (CPI) was used to represent prices. The variables were not cointegrated thus the long run relationship among the variables was not found. The study found no evidence of Granger causality between broad money supply and output. Only a weak unidirectional causality running from output to narrow money supply was found. Impulse Response Functions and Variance Decompositions further suggested that these two variables do not significantly respond to each other in the short run as well as in the long run. These results support the propositions of the Real Business Cycle theory which states that money and output are independent variables. Prices were found to Granger cause narrow money supply while VMI Granger cause prices without any feedback. The policy implication arising from this study is that money does not matter for output growth and monetary policy does not play a significant role in influencing the level of economic activity in Zimbabwe post dollarisation. In short, an increase in money supply will not have an impact on output in the Zimbabwean economy. Hence any polices aimed at solving the liquidity crises will not be enough to address output growth challenges also. Prices are no longer responding to money supply movements as well in the multicurrency regime. Therefore the government has to look for other means in order to stimulate output or economic growth and to stabilize prices in Zimbabwe.

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LIST OF CRONYMS

ADF	Augmented Dickey Fuller
CZI	Confederation of Zimbabwe Industries
ARDL	Autoregressive Distributed Lag
DF	Dickey Fuller
GDP	Gross Domestic Product
GNP	Gross National Product
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IMF	International Monetary Fund
MoFED	Ministry of Finance and Economic Development
MPS	Monetary Policy Statement
RBZ	Reserve Bank of Zimbabwe
USD	United States Dollar
VAR	Vector Autoregressive
VECM	Vector Error Correction Models
ZIMSTAT	Zimbabwe National Statistics Agency
ZWD	Zimbabwean Dollar
LR	Likelihood Ratio
FPE	Final Prediction Error
AIC	Akaike Information Criterion
SC	Schwarz Information Criteria
HQ	Hannan-Quinn information criteria

CHAPTER ONE

INTRODUCTION AND BACKGROUND TO THE STUDY

1.0 INTRODUCTION

Monetary policy consists of the activities undertaken by the Central Bank to control monetary variables like money supply and interest rates (Mankiw, 2010). The desired goal or outcome of these activities is to ensure a good economic environment through price stability, stability in the financial sector, high employment, interest rate stability as well as economic growth among other goals. Money supply in general is influenced by three major groups, the Central Bank, financial intermediaries and the general public. In developing countries due to a relatively less developed financial sector, the Central Bank determines a greater percentage of money supply than the financial intermediaries and the general public (Bain & Howells, 2003).

Zimbabwe experienced a period of rising inflation from the 1990's through 2007 when the country entered into a hyperinflation period (Makochekanwa, 2007). This led the government to abandon the Zimbabwean dollar in 2009 and adopt the multicurrency system. Before 2009, the government through the Central Bank had autonomy in the conduct of the monetary policy. The Central Bank was able to effectively influence money supply in the country and it was able to provide liquidity to the economy through the banking sector. The Central Bank was able to play its lender of last resort role, provide seigniorage revenue to the government and liquidity to the economy. However this monetary independence did not significantly translate to economic growth, high levels of money supply especially after 1997 did not yield positive benefits to the country. The period from 1997 to 2008 was characterized by low and negative economic growth, high inflation and high unemployment rates. The studies done also indicate that during this period (1997 – 2008) money supply did not impact positively on economic activities, the whole decade was lost (Makochekanwa, 2007 and Nhavira, 2009).

With the introduction of the multicurrency system in Zimbabwe in 2009, the monetary authorities are now playing a limited role in money supply determination and this has affected the conduct of monetary policy and money supply levels in the country. The Central Bank no longer effectively plays its lender of last resort role or expand money supply through Open Market Operations and the Discount Window. The government has also lost seigniorage revenue. This has led to severe decline in money stock growth rate in the country. The level of broad money stock was slightly

above US$ 4.5 billion by the end of 2014 (RBZ, 2014). The Central Bank is also no longer able to effectively implement its monetary policies in this dollarization period. Owing also to this inability of the Central Bank to influence money supply, the country is experiencing serious liquidity challenges. The liquidity crunch is being experienced at the same time the country is recording declining national output growth, deflation and high formal unemployment, widespread closure of companies and bank failures as well as high lending rates. Real Gross Domestic Product (GDP) growth rate was 7.3% in 2009 and increased to 11.9% in 2011. Since then the growth rate has been decelerating with a value of 1.5 % estimated in 2015 (MPS, 2016). Inflation rate stood at -2.47% as at December 2015 and is expected to remain in the negative territory for quite some time (Monetary Policy Statement, 2015).

The role of money in an economy especially its impact on variables like prices and output is debated by various schools of thought. The Monetarists hold a view that money supply changes play an active role in changing prices and output thus causation runs from money to prices and output without any feedback. They conclude that monetary policy is effective in influencing economic activities. The Keynesians are of the direct opposite view. They argued that money does not play an active role in changing output but it is output that causes money supply changes through its impact on money demand. Hence the direction of causation runs from output to money supply without any feedback. This school of thought argues that prices are influenced by structural factors, not monetary factors. The Classical School also postulated that money supply is neutral, its changes only affect prices and not real variables like output and employment. Real Business Cycle theorists are of the view that money and output are independent variables which do not influence each other but are positively correlated because they respond to the same exogenous shocks.

To further intensify this theoretical debate, empirical literature does not give a conclusive answer as well on the role of money in the economy. Vladir and Viktorova (2006) found that output Granger causes money supply for the case of Czech Republic while Hill (2007) found that it is money supply that Granger causes output using the United States data. For the case study of Zimbabwe, Makochekanwa (2007) found that money supply positively influenced prices in the Zimbabwean dollar period using monthly data from February 1999 to December 2006. Nhavira (2009) found no Granger causality between money supply and output. Only evidence of bidirectional causality between money and prices was found. This study employed data from 1991

to 1995 when the monetary authorities were still capable of determining money supply through money printing and the lender of last resort role. These two studies (Makochekanwa, 2007 and Nhavira 2009) clearly indicated that money did not play a significant role in influencing output but only affected prices. The current study is then motivated by the need to investigate the role of money in the multicurrency system when money supply is now determined outside the realm of the Zimbabwean Central Bank and when the country is using strong currencies relative to the Zimbabwean dollar of 2000's. The study investigated whether monetary policy is effective in influencing economic activities in the multicurrency regime owing to the fact that the findings of previous mentioned studies on Zimbabwe, Nhavira (2009) and Makochekanwa (2007) suggest monetary policy ineffective in the Zimbabwean dollar period.

The study will examine whether the liquidity crunch is the one affecting output and price movements or that these variables are independent of each other. The knowledge about this will help the policy makers, academia and economic agents in general to know whether money supply improvements will lead to output growth and price changes or that the variables are independent of each other. The results will also shed light on how the inability of the monetary authorities to fully implement their monetary policy due to dollarization is affecting economic variables such as prices and output. The findings will as well indicate whether de-dollarisation will be a good move by the government. The results can help policy makers in policy formulation and the economic agents at large in forming their expectations.

1.1 BACKGROUND TO THE STUDY

This section will explore money supply, prices, output and other macroeconomic indicators trend from 1980 to 2015.

1.1.1 1980 - 1996: THE PERIOD OF RELATIVE MACROECONOMIC STABILITY

The introduction of the Zimbabwean dollar dates back to 1980 when the country attained its independence. The currency came into existence when it replaced the Rhodesian dollar at par and was worth US$1.47 (Sikwila, 2013). The Zimbabwean dollar was also stronger than the currencies of the neighboring countries. However it continued to depreciate since its introduction until it was officially abandoned in 2009.

After independence, the new government inherited a dual economy characterized by a relatively well developed urban sector and a very poor rural sector which was accommodating more than

80% of the black majority (Zhou & Zvoushe, 2012). The inherited economy was heavily embedded with inequalities. There were inequalities in income and wealth distribution, agriculture, education as well as in industry and banking sector. It was against this background that the new government embarked on policies to address these injustices.

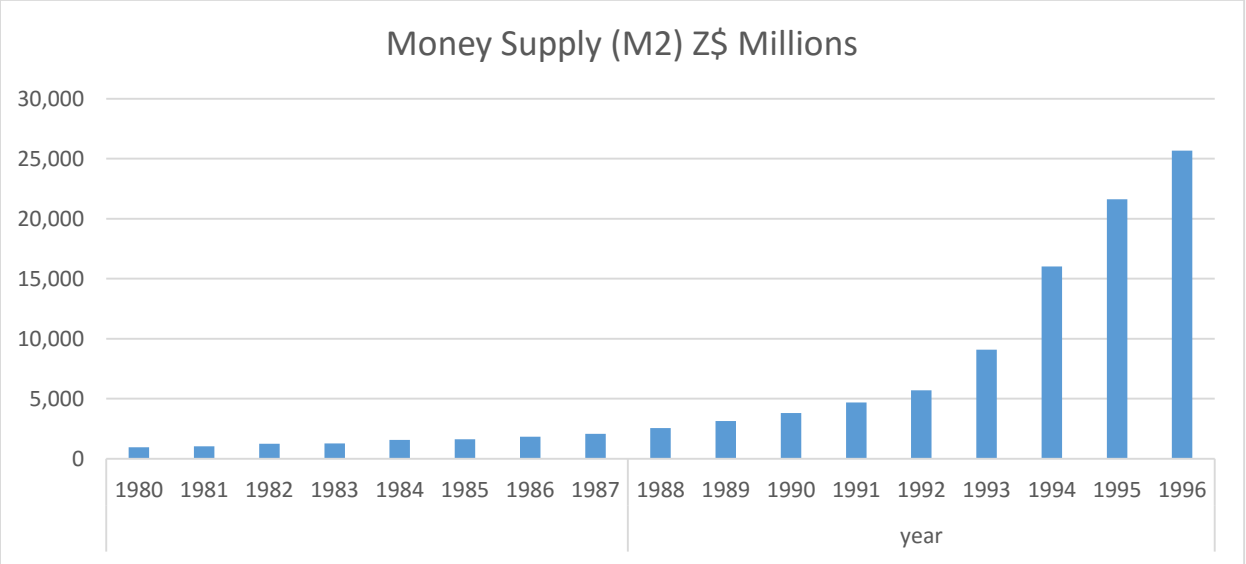
In 1980, Growth with Equity policies were implemented and government spending was channeled towards social sectors with emphasis on the expansion of rural infrastructure and land resettlement programs to settle people who had been displaced by war. Education for all policy was implemented as well with primary and secondary education being provided for free. In the health sector, "Equity in Health" policy was also implemented and the resources were shifted from the urban to the rural areas and emphasis was put on preventive care rather than curative care. As noble as these national building policies were, sustaining them became a major challenge since the country was coming out from war and did not have enough resources.

In 1991 - 1995, the government implemented a World Bank sponsored five year Economic Structural Adjustment Programme (ESAP). Policy measures under ESAP were to reduce government expenditures and budget deficits, commercializing and privatizing the state owned enterprises, withdrawing subsidies, introducing user fees on health and education sectors, trade and exchange rate liberalization, domestic market deregulation among other institutional reforms.

1.1.1.0 MONEY SUPPLY, OUTPUT AND PRICE TRENDS (1980 - 1996)

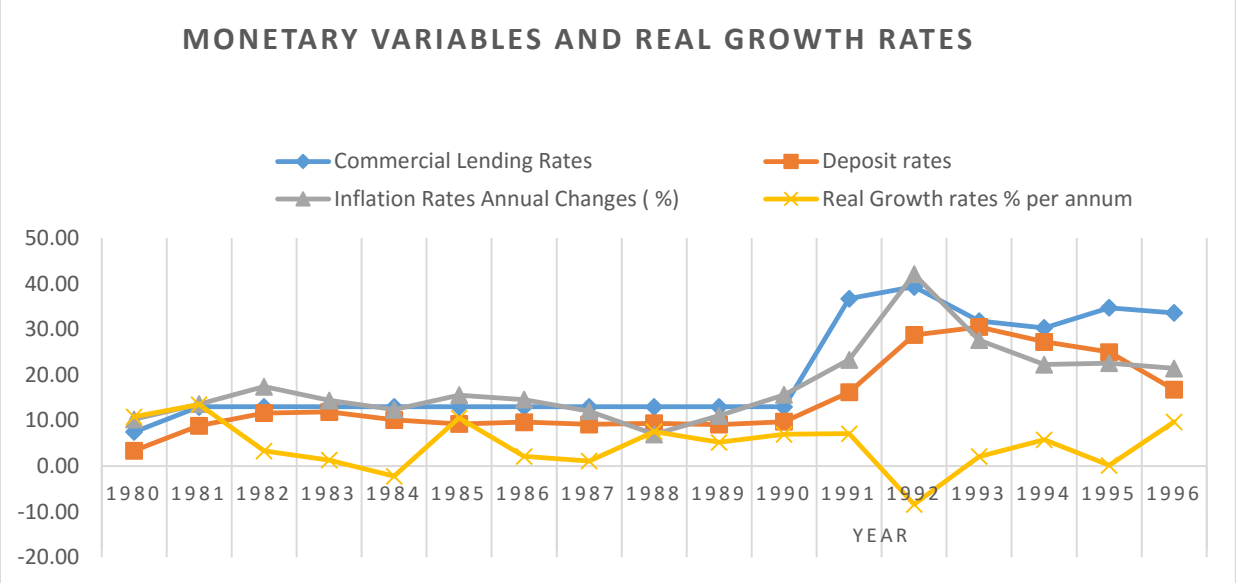
Looking at the period from independence to around the year 1990/1991 from the two figures overleaf, economic indicators are showing that the economy was performing relatively well. Although the government was implementing various programs after independence, money supply levels were very low. As shown in Figure 1, money supply levels were below Z$5 billion from 1980 to 1990.

Figure 1: Money Supply levels 1980 - 1996



Source: Zimstat

Figure 2: Comparison of selected macro - economic indicators



Source: Zimstat

Figure 2 depicts that the spread between lending rates and deposit rates were very small and inflation rate relatively stable and low. In the same figure, the real growth rates were in the positive region except for the year 1984 which had a growth rate of minus 2.2% when the country

experienced a drought, and the growth rate was at an average above 5% per annum in this decade. The statistics are showing that price stability and high economic growth were realized with money supply levels very low.

The ESAP period however started to show a different story, as can be seen from figures 1 and 2. The level of money supply rose sharply in this period such that the value of money supply was above Z$25 billion in 1996 compared to a figure of below Z$5 billion recorded from 1980 to 1991. Inflation, deposit and lending rates also rose during the ESAP period. Inflation rate reached as high as 40% in 1992. Real growth rates declined to an average of less than 3% and the country recorded a negative value of -8.4% in 1992 when the country experienced a severe drought. Hence high money supply levels in the ESAP period were not associated with high levels of output growth but fed into prices.

In a nutshell, the period 1980 - 1996 was a period of relatively low money growth rate, positive output growth, low rate of inflation and a stable macroeconomic environment generally.

1.1.2 PERIOD 1997 - 2008: THE LOST DECADE

It is argued in the literature that the period from 1997 - 2008 marked a turning point on relatively disciplinary policies of price stability, employment creation and debt servicing that the government had pursued since independence (Makochekanwa, 2007, Zvoushe & Zhou, 2012).

In 1997, War Veterans were given gratuities which amounted to Z$50 000 which was approximately equal to USD$ 3000 at that time (Zvoushe & Zhou, 2012). In that same year money supply M2 rose from Z$25667 million in 1996 to Z$37514 million which is a more than 46% increase (Zimstat, 2015). This expenditure was not budgeted for and worsened the government fiscal position. In 1997, the World Bank withdrew its financial support to the country's balance of payments thereby further straining foreign currency availability in the country (Zvoushe & Zhou, 2012). An announcement was made concerning the issue of acquiring white owned farms by the government, but there was no clear stipulation on the financing of the process since it was unbudgeted for as well. This resulted in loss of confidence in the local currency by investors and they reduced the demand for it. The Zimbabwean dollar crashed on 14 November 1997 and it lost 75% of its value against the United States dollar (Makochekanwa, 2007). This day is called the black Friday in Zimbabwean history. Around early 1998 prices rose sharply and the consumer purchasing power was eroded. Real wages fell but labour demand did not rise owing to a two day

protest in the whole country organized by the Zimbabwe Congress of Trade Unions (ZCTU) demanding wage increments. The government intervened by imposing price controls but this did not alleviate the situation as the commodities were shifted from formal markets to parallel markets where they fetched even higher prices.

Government expenditure continued to rise through 1998 when the country was involved in the Democratic Republic of Congo war. Again this expenditure was not budgeted for and consumed a significant share of the country's GDP. In that same year, the Central Bank intervened to bail out commercial banks that were suffering from contagion effects after an indigenously owned bank, United Merchant Bank of Zimbabwe Ltd, was declared insolvent. These situations persistently weaken the confidence in the local currency and it continued to depreciate. The depreciation resulted in price inflation in the country due to rise of production cost from imported inputs.

Fast Track Land Reform set in early 2000. From that period real GDP growth rate remained negative up to year 2008 and a decline in agricultural outputs and exports earnings from this sector was observed (Zimstat). The World Bank suspended extra lending to Zimbabwe under International Bank for Reconstruction and Development (IBRD) and International Development Association (IDA) due to the failure by the country to service its debt (Zvoushe & Zhou, 2012). This led to foreign currency shortages which further causes shortages in local currency as the Central Bank could not import paper and ink to print the local currency. The local currency shortage reached its climax in 2003. The police had to be dispatched to maintain order at banks as clients were causing havoc demanding their savings. It is argued however that the cash crisis was not accidental but was a monetary policy tightening strategy by the Central Bank to control the inflation rate which was over 133% after 2002 (Zimstat, 2014). Noteworthy is that all these expenditures mentioned so far were financed domestically. It was either borrowing from the banks or deficit monetization (money printing) which resulted only in inflation not output growth (Makochekanwa, 2008).

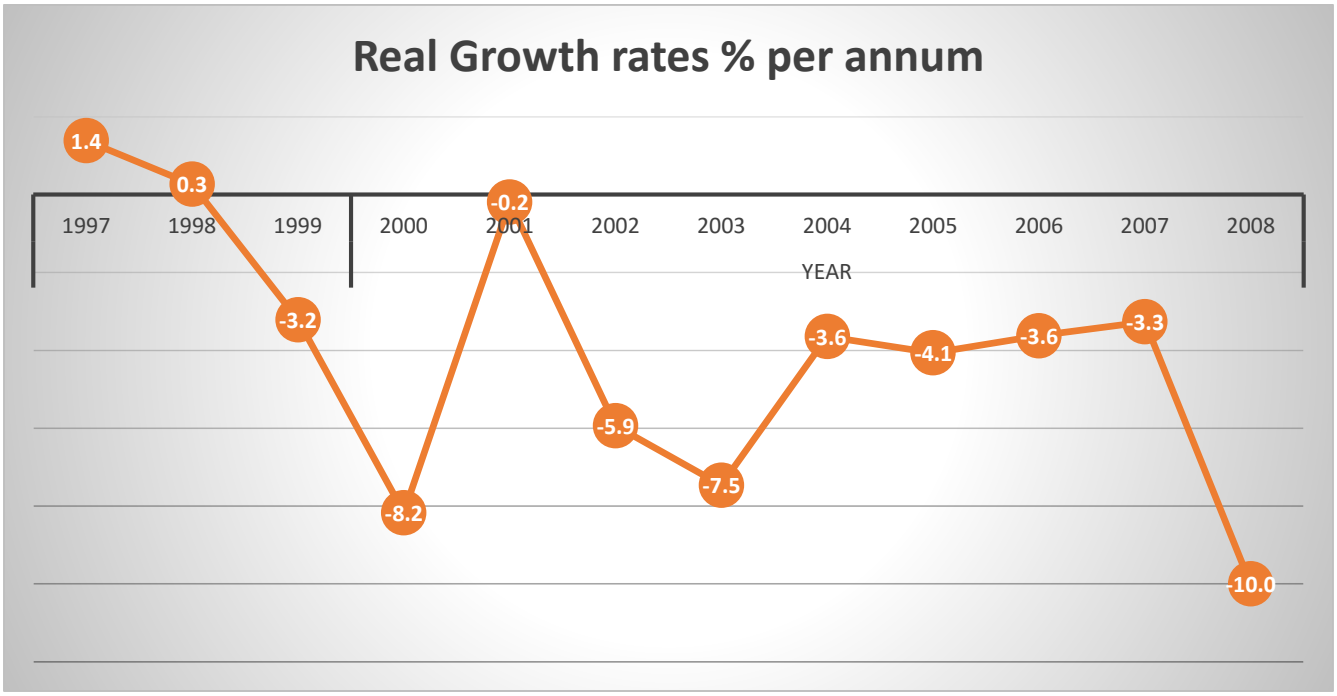
On December 1 2003, Dr. Gideon. Gono was appointed as a new Central Bank Governor. Inflation rate at the year-end was 365% and output growth was approximately negative 7.5% (Zimstat, 2014). The new Governor acknowledged the presence of inflation and declared it as the country's number one enemy in his 2004 Monetary Policy Statement. As a monetary strategy for 2004, the Governor set up a "Framework for Liquidity Management" which sought to align money supply

growth levels with inflation rates targets. By end of 2004, the inflation rate fell by 15% to a value of 350%. However this monetary tightening framework brought about serious liquidity challenges as the discount rate was raised and financial institutions failed to utilize the accommodation window. The Century Discount House collapsed and it triggered severe contagion effects on other financial institutions (MPS, 2004). The Central Bank had to intervene in the form of Troubled Bank Fund thus increasing money supply. With these events it can be noted that cash shortages did not start in the multicurrency era but were observed even in the Zimbabwean dollar time. There was a battle between providing liquidity to the nation and attempts to contain inflation.

The Central Bank embarked on the quasi – fiscal activities post 2004 and these activities were liquidity expansionary in nature. As highlighted in the 2008 Monetary Policy Statement, the funds were provided by the Central Bank for the various programs. The Central Bank channeled its funding activities to agriculture under Agriculture Sector Productivity Enhancement Sector program (ASPEF) in 2005. This facility was continued through 2007 geared towards ensuring that the impact of the Land Reform Program and other agriculture programs were fully realized. Under the ASPEF facilities, by January 2008 Z$62 214 862 000 000 had been disbursed to the farmers. The Farm Mechanization program which sought to provide farm equipment to both communal and commercial farmers was started in 2007. Tractors, harvesters, planters among other farm equipment were delivered to farmers by 2008. Operation Maguta/Inala which was launched in 2005 had received Z$3.038 trillion by 2008. The Maize Delivery Bonus Scheme had also received an amount of Z$1.013 trillion dollars as at 4 January 2008. The scheme was introduced in the 2007/08 marketing season to redirect maize delivery from the parallel market to the Grain Marketing Board and at the same time to sufficiently reward farmers. In the second quarter of 2007, the government also intervened to provide basic commodities to people through the Reserve Bank. The program was called Basic Commodities Supply Side Intervention Facilities (BACCOSSI) and aimed at delivering food to people and give financial support to farmers. In 2008 Z$4.7 trillion was disbursed to beneficiaries.

These quasi - fiscal activities resulted in a massive increase in money supply. Surprisingly, massive increase of money supply since 1997 through the quasi-fiscal activities era did not translate to output growth but only increased prices. This can be observed from figure 3.

Figure 3: Per Annum Real GDP Growth Rates



Source: Zimstat

Figure 3 illustrates real growth rate per year from 1997 - 2008. In 1997, real growth declined by 8.3% from a value of 9.7% recorded in 1996 to 1.4 %. The growth rate continued to decline up to 2003 with the exception of 2001 when the country recorded a growth rate of -0.2% compared to -8.2% achived in 2000 thus an 8% improvement. Period from 2004 to 2007 shows a stable output growth rate although it was growing in the negative region. A sharp decline in growth rate was experienced in 2008 when the country recorded minus 10% growth rate. Prices continues to rise under this period and a nine digit rate of inflation (231 150 889 %) was recorded in 2008 (Zimstat, 2015).

In summary, money expansion from 1997 to 2008 did not yield significant effects to the economy. Actually the period is referred to as the lost decade characterized by declining and negative output growth rates as well as high inflation rates.

1.1.3 MACROECONOMIC ENVIRONMENT IN THE MULTICURRENCY SYSTEM (2009 - 2015)

Before the official introduction of the multicurrency system, the first Zimbabwean dollar was replaced by new Zimbabwean dollars many times (Dhoro & Bonga, 2015). The Central Bank

officially abandoned the Zimbabwean dollar in February 2009 although de facto dollarization had already started end of 2008 when business were only transacting in foreign currencies like the South African Rand (Kairinza, 2012).

1.1.3.1 Sectoral Developments in the Multicurrency System

With the introduction of the multicurrency system many sectors were revived and responded positively to the new currency system. However this improvement did not last long as shall be discussed below. Only few main key sectors will be reviewed which are agriculture, manufacturing and the mining sector.

Figure 4: Sectoral Developments

Source: RBZ, 2014

As shown in figure 4, in 2009 all the three sectors recorded high and positive growth rates with the agriculture sector having the highest growth rate of 31.1%. Agriculture output growth rate however decelerated from the year 2010 to 2013 and increased in the year 2014 when it shot to a value of 23% and was the only sector that recorded a positive growth of the three sectors in that year. This agriculture boom was due to 2013/2014 favorable rainfall and the increased production of maize, tobacco poultry. However the 2015 growth rate was estimated to decline by 20% to 3.4% due to expected rainfall challenges.

The mining sector was similarly on a downward trend from 2011 as shown in figure 4. The sector grew at an average of above 16% per annum in the period 2009 - 2013. The year 2014 recorded a growth rate of -2.1% and the estimated 2015 growth rate is 3.1%. The factors highlighted to be undermining the mining sector include weak international mineral prices, corruption of miners, frequent power cuts, outdated equipment and funding challenges for recapitalization.

The manufacturing sector also responded positively to the introduction of the multicurrency system, as illustrated in fig 4 again. However from 2012 to 2015 this sector performed badly and even recorded growth rates of -0.6% and -4.6% in 2013 and 2014 respectively. The poor performance of the sector was demonstrated by a fall in capacity utilization. Capacity utilization had been on an upward trend from 2009 to 2011 and reached its peak in 2011 at 57.2%. From 2011 capacity utilization has been falling and was estimated to be only 36.3 % in 2014 (CZI, 2015). The low capacity utilization is said to be caused by antiquated plant and machinery, influx of cheap imports, high production costs, low foreign direct investment and the chronic liquidity crunch. Over a thousand companies had closed or are under judicial management since 2011 and over six thousand workers had been retrenched (RBZ, 2014).

1.1.3.2 The Banking Sector Developments

People's bank accounts were denominated in Zimbabwean dollars before 2009. With the introduction of the multicurrency regime, the Central Bank announced a freezing of the Zimbabwean dollar deposits accounts (MPS, 2012). This eroded the general public confidence in the financial sector since this led to many people losing their long term savings. Hence there is a strong preference by the public to hold and transact in cash rather than using the banking system. The banks are now mainly used for salary transactions. This has limited the banks' ability to transfer funds from the surplus units to the deficit units of the economy hence reducing money supply creation.

Another financial sector institutional problem of Non-Performing Loans (NPLs) emerged as early as 2009. These NPLs were mainly caused by the funding mismatches by the banks and the unsustainable lending rates which were as high as 25% in a poor performing economy and insider loans (Zimstat, 2014). Zimbabwe Asset Management Corporation (Private) Limited (ZAMCO) was given the mandate to deal with non-performing loans. However the NPLs levels although

declining, they are still high since a value of 14.52% of total loans were non-performing as at June 2015 (MPS, 2015).

The loss of confidence and the problem of NPLs in the banking sector coupled with the fact that the Central Bank cannot effectively play its lender of last resort led to the failure of a number of banks since the introduction of the multicurrency system. As at 31 December 2009, there were 27 banking institutions (MPS, 2010). There were 17 Commercial Banks, 4 Merchant Banks, 1 Discount House, 4 Building Societies and 1 Savings Bank. As at 30 June 2015, there were only 18 operating banking institutions implying 9 had failed within such a short period (MPS, June 2015). There were only 13 Commercial Banks, 3 Building Societies, 1 Merchant Bank and 1 Savings Bank. The banks that have closed shops include Interfin Bank Limited, Allied Bank, Genesis, Royal Bank, Capital Bank and Barbican Bank. The cited challenges that have affected these banks are chronic liquidity challenges, high levels of non-performing loans, persistent losses and undercapitalization. The collapse of these banking institutions is further worsening the banking sector confidence of the general public not even mentioning its contribution to unemployment.

The other phenomenon adding to the collapse of the banking system is the deposit- lending rates spread. The banks are charging very low deposit rates sometimes even negative rates and charges very high lending rates as high as above 25% (MPS, 2014). This has affected savings mobilization by the banks. Those who managed to secure loans end up defaulting because of very high interest charged in the face of the weakening economy.

With the Central Bank unable to print foreign currencies and poor performance of the banking sector, the sources of liquidity became export proceeds, diaspora remittances, external loans, income receipts and foreign investments. The major sources are export proceeds and remittances contributing 61% and 27% of market liquidity respectively (RBZ, 2014). External loans and foreign investment have been very low thereby increasing the liquidity challenges in the country.

The inability of the Central Bank to play its lender of last resort role, bank failures and lack of confidence in the banking sector contributed to low money creation by the banks which manifests through the prevailing liquidity crunch.

1.1.3.3 Money, Prices and Output trends since 2009

Table 1: Money, Output and Price Comparison

Year	Real GDP growth	CP1	Monthly % changes M3
2009	7.3	89.5	14.1
2010	11.4	92.2	1.4
2011	11.9	95.4	0.4
2012	10.6	99	1.6
2013	4.5	100.6	3.3
2014	3.2	100.4	-0.3
2015	1.5	negative	1.2

Source: RBZ, 2014

Broad money supply change has been on a downward trend since 2009 on average. This can be seen in Table 1. Money growth rates reached as low as -0.3% in 2014. Looking closely at the Table, money growth rate was declining on average from 2009 to 2011 while the real GDP growth rate had been on an upward trend in the same period. This might tempt one to conclude that economic activities are not affected by monetary developments. However looking at the latter periods and the magnitude of change between money supply and growth rate the story becomes unclear. Money growth rate declined by 12.7% between 2009 and 2010, which is from a value of 14.1% to 1.4% and real growth rate increased by 4.1% to 11.4% in 2010 from a value of 7.3 % recorded in 2009. Money growth rate was generally very low in 2010 and 2011 and real growth rate of 11.9% was achieved in 2011 which is only 0.5% improvement from 2010. Money growth rate improved in 2012 and 2013 as compared to 2010 and 2011. There was an improvement of a 2.9% money growth rate from 2011 to 2013 but real GDP falls by 7.4%, which is from a value of 11.9% in 2011 to 4.5% in 2013. In 2014, money supply growth fell to -0.3% and GDP also declined by 1.3 % to 3.2%. This shows that in 2014 decline in money growth rate was associated with decline in GDP. For 2015, money growth rate is expected to improve to a rate of 1.2% but the real growth rate is expected to fall further to only 1.5%. This then shows that money supply growth rate and output growth relationship is not clear in the multicurrency regime.

Looking at prices, consumer price levels were increasing when money growth rate was positive and declined as money growth became negative as shown in Table 1 implying a positive correlation between money and prices.

To conclude, money growth rates were low since 2009, output growth declining and prices remained low as well. This situation provokes an investigation to check if money supply challenges are causing low output growth and deflation.

1.1.4 SELECTED SOCIO - POLITICAL ISSUES IN ZIMBABWE

There are a number of socio - political issues that need to be considered when looking at the economic development of Zimbabwe. To a certain extent these issues might have contributed to the low economic activities in the country.

To begin with, the country suffers from policy reversals or lack of policy commitment. Since independence the country had implemented many policies for example, the Growth with Equity policies, ESAP and Indigenization policies. Currently the country is under the economic blue print called the Zimbabwe Agenda for Sustainable Socio-Economic Transformation (ZIMASSET) which is supposed to guide the country economic decisions up to 2018. In August 2015, the President of Zimbabwe announced a Ten Point Plan for Sustained Economic Growth. These policies are just announced but they are not fully implemented, followed and reviewed most of the time.

Another serious issue surrounds the Land Reform Programme which happened fifteen years ago in the year 2000. Many people who have acquired land through this process have not yet secured title deeds or transferable leases so that they can invest in those farms or to get funding from the banks. These are some of the challenges that are affecting the success of the land reform program and economic development. Agriculture output and export earnings from this sector keep falling yearly (Zimstat, 2015).

Indigenization and Economic Empowerment Act which was signed in 2008 is argued to have some adverse effect on the investment climate in Zimbabwe. This is because the 51% share ownership by indigenous Zimbabweans might be difficult to achieve due to financial problems hence there is a fear that shares will need to be freely transferred to indigenous Zimbabweans so that foreign investors comply with the indigenization policy.

Zimbabwe is also recorded as one of the most highly corrupt countries in the world. The country was ranked at 156 out of 175 highly corrupt countries in the 2014 Global Corruption Perception Index. On a scale from 100 very clean countries to zero highly corrupt Zimbabwe scooped number 21. This corruption level are not good for economic development because if there is lack of trust to those that are in power economic coordination is difficult to achieve especially from the private sector and foreign business people.

In conclusion, socio-political issues play a great role in shaping economic development of a country. Therefore these issues not just monetary factors must be considered as well when economic growth and development policies are drafted.

1.2 PROBLEM STATEMENT

In the Zimbabwean dollar era, the Central Bank was the major determinant of money supply in the country. If there was excess liquidity or shortages, the Central Bank would intervene and try to ensure that the economy have sufficient stock of money. The monetary authorities were able to fully implement their monetary policies. However with the introduction of the multicurrency system, the Central Bank cannot print these foreign currencies thereby constraining the institution to effectively implement the monetary policy and determine money supply levels. The Central Bank powers in influencing monetary variables are thus limited, it is like the monetary authorities had surrendered their monetary autonomy or powers to the Central Banks of these countries who own the currencies in circulation in Zimbabwe. This has affected the interbank market as well. Many banks have been declared insolvent so far and this is eroding the confidence in the banking sector by the public (MPS, 2015).

The lack of confidence in the banking sector and the limited ability of Central Bank to play its lender of last resort role have constrained the money creation process in the country to the extent that the country is experiencing a liquidity crunch. At the same time the country is experiencing poor economic performance and deflation. GDP growth was on a downward trend from 2012 to date when a figure of 10.6% growth rate was recorded compared to 11.9% growth rate achieved in 2011. The growth rate further declined to 4.5% and 3.2% in 2013 and 2014 respectively (RBZ, 2014). Year on year inflation rate stood at -2.22% while month on month record a figure of -0.10% as at February 2016 (Zimstat, 2016). Inflation rates are expected to stay in the negative territory for quite some time (MPS, 2015).

Since the country is currently experiencing a liquidity crunch, deflation and decline in output at the same time, this creates the need to investigate the relationship among these variables in the multicurrency system in Zimbabwe. Again liquidity challenges and poor economic performance are being experienced when the monetary authorities cannot effectively implement monetary policy due to dollarization. This issue gives the importance of investigating how this limited role being played by the Central Bank is affecting economic activities. The issue that needs to be understood is whether money supply challenges are the ones affecting prices and output or that the liquidity crunch is a result of a decline in output and deflation or that the variables are independent of each other. The study seeks also to establish whether causality is in the short run or long run if the results show a causal relationship.

In summary the study seeks to investigate whether money matters for output growth and price movements in Zimbabwe so as to challenge the introduction of the multicurrency system which is limiting money supply expansion by the Central Bank. The results will reveal the role of money in the Zimbabwean economy in the multicurrency regime since previous studies on Zimbabwe showed that money supply did not play a significant role in influencing output but only lead the country to hyperinflation period during the Zimbabwean dollar period. The study seeks to investigate whether the story has changed, that is, does money now or still matters for output growth and price movements in Zimbabwe with the introduction of stronger currencies in the economy and the removal of the Zimbabwean dollar.

1.3 RESEARCH OBJECTIVE

The overall objective of the study is to examine the role of money in the Zimbabwean economy post dollarization. The study seeks to find out whether money matters for output growth and price movements in Zimbabwe.

The specific objectives are to investigate:

- the causal relationship between money and prices.
- the causal relationship between money and output.
- the causal relationship between prices and output.
- the nature of the causal relationship if it exists, that is to determine whether it is short run or long run.
- the direction of causality, that is to find whether it is bidirectional, unidirectional or neutral.

1.4 RESEARCH QUESTIONS

- Is there a causal relationship between money supply and output in the multicurrency system in Zimbabwe?
- Is there a causal relationship between money supply and price levels in the multicurrency system in Zimbabwe?
- What is the relationship between prices and output in the multicurrency system in Zimbabwe?
- If there is causation among the variables, is it short run or long run?
- What is the direction of causality among the variables?

1.5 RESEARCH HYPOTHESES

- There is no causal relationship among all the three variables post dollarization.
- There is neither a short run nor long run relationship among these variables.

1.6 JUSTIFICATION OF THE STUDY

Studies have been done on Zimbabwe concerning the role of money in influencing output and prices. Makochekanwa (2007) and Kairinza (2012) scrutinized the causes of hyperinflation. Nhavira (2009) examined Granger causality between money, inflation and economic growth. All these studies were done when the country was using the Zimbabwean dollar. These studies found that the role of money in influencing output was weak and thus they concluded that monetary policy is not effective in Zimbabwe. These studies also showed that it was money supply expansion that led the country into hyperinflation.

The current study seeks to explore the role of money in the multicurrency system when the country is using relatively stronger currencies than the Zimbabwean dollar of late 2000's and when the monetary authorities are not able to fully implement monetary policies and influencing money supply. Liquidity crunch, deflation and economic decline proved to be current challenges in Zimbabwe hence the knowledge about whether there is causality or not between these variables is crucial to policy makers and the economic agents in general. Policy makers will know whether monetary policy or increases in money supply will effectively stimulate economic growth in the multicurrency system since it proved to be ineffective in the Zimbabwean dollar period (Makochekanwa, 2007 and Nhavira, 2009). The results will also give some explanations on

whether the country should de-dollarize or not. Moreover the study will add to the literature on the debate on the role of money in an economy from the Zimbabwean perspective.

1.7 ORGANIZATION OF THE REST OF STUDY

The next chapter presents literature review both theoretical and empirical concerning the role of money in an economy and or the relationship between money supply, prices and output. Chapter three will present the methodology adopted in this study and the findings will be outlined in chapter four. The conclusion and policy recommendations derived from findings will be presented in chapter five.

CHAPTER 2

LITERATURE REVIEW

2.0 INTRODUCTION

In this chapter, theoretical and empirical literature surrounding the issue of the role of money in an economy will be reviewed.

2.1 THEORETICAL LITERATURE REVIEW

The different views of different schools of thought regarding their explanation on the role of money particularly the relationship between money supply, prices and output will be explored in this subsection.

According to the Classical School of thought, money supply is neutral. It does not have any impact on real variables like output and employment, it only influences nominal variables such as prices and nominal interest rates. The Classical theory is based on the Say's law which argues that supply creates its own demand. This theory relies heavily on the assumption that prices and wages are fully flexible and respond to the market forces of demand and supply (Ghatak, 1995). If there is unemployment for example, the real wage will fall leading to an increase in demand for labour and a decline in the supply of labour. Consequently in the goods market, if there is a supply shortage, consumers will bid up prices. Price increases induce increase in supply and a reduction in demand. The process will continue until the equilibrium is reached. Hence according to the Classical School, money does not play any role in affecting real variables. Its sole function is to determine the general price level at which goods and services will be exchanged. Any increase in money supply will lead to inflation. They argue that output and employment are determined by labour, capital, saving behavior as well as the existing technology.

The relationship between money, prices and output in the Classical theory is summarized by the Quantity Theory of Money developed by Fisher (1911) which is expressed as follows:

MV = PQ, where M is money stock, V is money velocity, P stands for prices and Q represents real output. The equation is stating that when the stock of money is multiplied by money velocity (M x V) the results must be equal to total expenditure which is the product of prices and real output (P x Q). This school of thought argued that velocity is relatively constant and that output is fixed at full employment where the economy is always at. Hence any change in money supply will bring

about a proportionate change in prices. Thus the Classical theory rules out the role of money in influencing output growth. However, in developing countries, Zimbabwe included, prices and wages are not fully flexible and most economies are not always at full employment. Hence, the argument put forward by the Classical theory may not explain well the relationship between money, prices and output and the role of money in general in Zimbabwe.

Another school of thought that believes that money supply does not impact on output is the Keynesian school of thought. The Keynesians rejected the role of money in influencing output and unlike the conclusion reached by the Classical School, they argued that prices are also not influenced by monetary movements but are influenced by structural factors. Although the Keynesians believe that interest rate is a monetary phenomenon, they argued that investments are not very sensitive to interest rate (Snowdon & Vane, 2005). This school of thought postulates that investors are influenced by "animal spirits" regardless of the interest rate. These animal spirits were defined as the confidence about the future macroeconomic and political environment, governing institutions, expected climatic conditions and movements on expected future demand. An investor will undertake an investment if he/she feels that it is a good idea and is likely to yield positive benefits basing on these animal spirits not interest rates. Thus investment can be low even if interest rates are very low if people are pessimistic about the future. Keynes also argues about the inability of an increase in money supply to drive interest rates further down. This is the case of the liquidity trap phenomenon. The money demand curve will be horizontal at a certain interest rate and at that point, the opportunity cost of holding money will be very low. Increase in money supply or a shift of the money supply curve will not affect the interest rate. This means that expansionary monetary policy will not be effective to influence investment since interest rates will not fall further from that rate. The role of money or monetary policy to influence output is therefore highly uncertain according to this school of thought.

The Keynesians proposed that the only way to move the economy out of this liquidity trap or to increase output is expansionary fiscal policy. They believe that it is effective demand (investments demand, government spending and consumption demand) that determine the level of output in an economy not the quantity of money. Increase in investment spending as well as government expenditures and tax reductions will increase aggregate demand which will in turn lead suppliers to supply more goods and output will increase. In Zimbabwe, investments, government

expenditure and consumption demand are low and declining (MPS, 2015). The animal spirits might be the ones affecting money supply, output growth and price movements in the country.

The Monetarists attacked this conclusion of the Keynesians. They argue that as output or income increase, the transaction demand for money will also increase causing interest rates to rise if money supply is not increased. Very high interest rates will crowd out investment and this will affect the primary goal of the fiscal policy. Also high interest rate will make it very costly for the government to borrow money from the public and banks to finance its fiscal expenditures. The only way to avoid interest rate hikes after implementation of an expansionary fiscal policy, money supply must be increased. The Keynesians accepted that monetary policy can play an accommodative role that is money supply must be increased as well after implementation of the fiscal policy. Therefore money supply will have played an accommodative part. Thus changes in output will have brought about changes in money supply through its effects on money demand. This led to the conclusion by the Keynesians that causation runs from output to money supply without any feedback (Froyen, 2004).

This school of thought also argued that prices, inflation rate and wages are not monetary factors but are influenced by structural factors, for example weather, governing institutions, property rights and people's expectations, contracts between suppliers and buyers or between workers and their employees, the rules and regulations (wages and prices) and effective demand.

Another school of thought, the Monetarists also put their argument on the role of money in an economy. The Monetarist case is advocated for by a number of economists and among them is Friedman, M. They put their argument in line with the Quantity Theory of Money. Unlike the Classical School of thought, the Monetarists believe that an increase in money supply might affect output without being inflationary. They argued that, if the economy is operating at less than full employment, an increase in money supply will lead to a rise in expenditure which will in turn stimulate production hence output and employment will rise. However, the Monetarists believe that this will happen only in the short run, but after some time the economy will return to a less than full-employment situation which is caused by real factors (Ghatak, 1995).

They further argued that an increase in money supply will raise the purchasing power since prices and wages are not flexible in the short run. This will lead to an increase in aggregate expenditure. The rise in spending will induce firms to produce more output and to do so they have to hire more

labour. In addition, an increase in money supply will cause a depreciation of the domestic currency thereby reducing imports and increasing exports. Rise in exports demand coupled with a rise in domestic demand will stimulate domestic investment leading to output growth. The rise in production will increase demand for factors of production by firms which will raise the factor prices which are wages and rental prices. Since firms are believed to be profit maximizers', as wages rise they must also raise the prices of their goods for them to make profits. Rise in prices will reduce demand for the goods and the firms will need to cut production. Cutting back production implies that the firms will be terminating contracts and output will fall as unemployment rises. Hence the economy will return back to its potential output level.

This implies that money supply changes do not bring in permanent changes in output an economy. They also argue that increase in money supply when the economy is near or beyond full employment will only result in inflation. Friedman (1963) argued that inflation is always and everywhere a monetary phenomenon. The Monetarists therefore advocates for money growth rule where they state that money supply growth rate must be equal to the expected growth rate of output. This school of thought unlike the Keynesians does not believe in government intervention to fine tune the economy although they believe that in the event that the government needs to intervene, monetary policy is preferred to fiscal policy.

Following the attack of the Keynesian school of thought by many scholars especially the ones who advocate for the use of monetary policy to revive the economy, a team of scholars named the New Keynesians also put forth their argument on the impact of money on economic activities. The scholars associated with the New Keynesians models include Fisher (1977), Gray (1976) and Taylor (1980). This school of thought argues that money supply might fail to affect economic activities due to the fact that markets fail to clear. One of the widely used New Keynesian theories is the Sticky - wage Model. Under this model wage contracts are a central feature of the economy. This model argued that firms and workers enter into wage contracts to fix money wages over a long period of time. In fixing the money wage, the workers will also include the anticipated money supply changes. If money supply grows faster than what was anticipated during the time of wage contract agreement real wages will fall inducing firms to employ more workers and this will lead to a rise in output. However if money supply grows at the rate anticipated by workers, real wages will not fall and the changes in money supply will not have an impact on real variables.

Other economists argued that the relationship between money and economic variables is affected by the imperfections in the market. One of these imperfections was argued to be information asymmetry or imperfect information. This line of thinking was put forth by economists like, Lucas (1972) and Barro (1976). These economists disagreed with the fact that wages are not easily renegotiable as put forward by the New Keynesians. They believe that wages and prices are flexible just like in the Classical School. However they do not agree with the Classical School conclusion that money is neutral and does not affect real variables. They argued that monetary changes might have a real effect in the economy because economic agents have limited information about prices and wages and may misperceive aggregate and relative price changes. If money supply increases, it will raise all prices in an economy just as in the Classical fashion. However, because people have limited information about the macroeconomic prices and only know about the prices in their own sector, they will perceive the rise in prices of their goods as a rise in demand for their own goods and that all prices of other goods have not increased (The Lucas Island Model, 1972). Thus, they will increase production and supply of their goods. However, after some time, everyone will see that actually all prices have risen including the prices of their inputs. They will then cut production back to its previous level which will be the potential output given the prevailing factors. This implies that if people had perfect information in the economy money supply will not affect real variables but in the real world there is always an information gap in an economy.

Real Business Cycle theorists believe that money is neutral even in short run because prices are assumed to be flexible. Kydland and Prescott (1982), Long and Plosser (1983) were the early proponents of Real Business Cycle theories. The theory argues that, the path of the economy is determined by people's responses to exogenous changes in the economic environment. These responses are assumed to be optimal. The fluctuations are believed to have nothing to do with money supply changes. These exogenous shocks include technological changes, productivity changes, environmental changes (e.g. weather changes in agric-oriented economies), movements in world oil prices or energy prices and changes in the path of government spending or taxation. Developments in the labour markets may also affect economic activities and these developments include the change in demographic factors, rising participation of women in the labour force as well as unemployment issues. These are shocks that influence output growth in an economy not money growth according to the Real Business Cycle.

There is an example illustrated to show how an economy responds to shocks (The Robinson Crusoe Island). The assumption is that Robinson divides his time between work and leisure and produces fish and mends the nets. When the weather is good, Robinson spends much of his time fishing and mending nets so output rises. However, if a storm hits the sea, it is no longer viable for Robinson to continue fishing thus he maximizes his utility by spending all his time on leisure. He can also postpone the mending of the nets since they are not being used currently. When fishing and mending of nets activities decline output falls. When the weather is back to normal, Robinson will return back to his fishing business and output increases.

The Business Cycle Theory was heavily criticized due to the fact that money and output have a positive relationship sometimes. The Real Business Cycle theorists argued that the positive relationship is found because money is responding to real shocks which output is also responding to. That is, the two variables will be responding to same real shocks not that they are causing each other. In their explanation of how money can respond to real shocks, they divide money into two categories (inside money and outside money). Outside money (monetary base) is the one under the direct control of the policy maker. It is called outside money because its quantity is determined outside the realm of the private sector. The inside money is the quantity determined within the banking sector.

Their first explanation was that, the banking sector produces transactions which are inputs to the private sector just like capital and labour. If there is a real shock in the economy which makes it profitable for people to increase output in the near future, firms will increase the demand for transaction services to produce this output. The stock of deposits produced by the banking sector will adjust to this new transaction demand. The banks will try to source additional funding to create deposits including the reduction of their holding of excess reserves. Hence money supply will eventually increase. The second explanation hinges on the expectations about future economic activities. The Real Business Cycle theorists argued that such expectations will influence people's decisions and the information will be quickly reflected in asset prices and interest rates. As an example, higher expected output might increase demand for money and credit. This will force monetary authorities to increase money supply if they are targeting low and stable interest rates. Hence money supply is adjusting to an expected rise in output. Thus according to Real Business

Cycle models money does not cause output changes and monetary policy is completely irrelevant for smoothening output changes.

2.2 EMPIRICAL LITERATURE REVIEW

This section reviewed studies that have been carried out for both developed and developing countries. The studies done for Zimbabwe were also reviewed.

Friedman and Schwartz published a book in 1963 with a title, "A Monetary History of the United States". The authors investigated the relationships between money and economic activities using annual time series data from 1867 – 1960. The study found that changes in money stock have been closely associated with changes in economic activities including output and price movements. Hence they prescribe that monetary authorities should control money supply in order to control variations in economic activities. Sims (1972) investigated again the causality between these variables, using postwar quarterly data from 1947 - 1969 for United States again. The study revealed that there is a unidirectional causality from money to output and prices without feedback. This was the same conclusion established by Friedman and Schwartz (1963). For the same country again, Brillembhourg and Khan (1979) reinvestigated the relationship between money, prices and income using the sample period 1870 - 1975. They wanted to examine if money has mattered historically. The study applied causality techniques to a larger sample size than the one used by Sims and comes to the same conclusion reached by earlier mentioned studies for the United States. They found a unidirectional causality running from money to income and prices although with a lag of about two years.

Recent studies also confirm that money matters in the United States economy for example Hill, (2007) and Yang & Lee, 2012. Hill (2007) found that causality runs from money to income directly or indirectly via the employment channel. The study employed VAR techniques and used monthly data from 1959 to 2002. Using a different methodology (the conditional quintile) which is argued to give a broader picture of an economy, Yang & Lee (2012) found that past money growth is useful in forecasting output growth in the United States for the study period from 1959:04 - 2001:12. The Granger causality test, however, showed that money – income causality is weak.

All these studies done for United States were based on causality test and differ mainly in sample sizes and their application of the VAR analysis. Basing from the results of these empirics, it is the observation of the researcher that money to output and prices causality is strongly supported for

the case of the United States. The studies are in support of the Monetarist proposition that money causes output and prices in a one way direction.

Sauer and Bohara (1990) carried out a "Vector Autoregressive Moving Average (VARMA) analysis of Germany Money and Income Data". Real interest rate was included as a third variable making the analysis a three variable VARMA. The study analyzed this relationship using two different data sets for the different exchange rate regimes. The data from 1960Q1-1972Q4 was under the fixed exchange rate while sample period 1973Q1 - 1988Q3 falls in the flexible exchange rate regime. The study findings showed that under the fixed exchange rate regime, real GNP was independent of real money and real interest rates. However, under the flexible exchange rate regime, real GNP was found to be influenced by these two monetary variables (money and interest rate). The study justified the results by arguing that the Central Bank has an ability to adjust domestic credit component of the money supply without having creating offsetting international flows under the flexible exchange rate regime. They also argued that real GNP independence on money supply under the fixed regime imply monetary policy ineffectiveness since it will be constrained to perform independent domestic monetary policy given its need to defend the parity. Hence from this study, the role of money is affected by the exchange rate regime. This then implies that in the countries adopting flexible exchange rate money is likely to influence economic activities.

Another study by Nouri and Samini (2011) for Iran also found a positive relationship between money supply and economic growth using the ordinary least square (OLS) technique. OLS technique however is not robust for causality tests since it only indicate whether there is a relationship or not hence it is not a suitable econometric procedure for the current study.

Vladimir and Viktorova (2006) did the study for the Czech Republic using Vector Autoregressive Analysis and Granger causality test. For the Granger causality analysis, the study used two sample periods. The first sample was from 1996Q1 to 2004Q2 while the other was from 1998Q1 to 2004Q2. The Czech Central Bank switched to inflation rate targeting at the end of year 1997 and there was an exchange rate crisis in the country in May 1997. The authors then implement two sample periods, the one including 1997 and the one excluding 1997. In contrast to the findings of so far mentioned studies, all the sample periods rejected the hypothesis that real money supply Granger causes real output. These results were also confirmed by the VAR analysis which shows

that it was money supply which responds much to changes in output. Hence they conclude that in the case of the Czech Republic, it is the increase in real output which causes increases in real money supply imply a reverse causation proposed by the Keynesians.

A similar study, a test for the direction of causality between money and income for six developed countries (Australia, Canada, Germany, Japan, United Kingdom and United States), was carried out by Dyeres *et al* in 1980. Postwar data for the different sample periods for countries ranging from 1950 - 1975 quarterly was obtained from the Central Banks of these countries. The study employed the exact procedures used by Sims (1972) and an alternative method where the researchers adjusted the econometric procedures by removing a trend, using first differenced data or using series in natural logarithms and including lags in their models. Of these six countries, only Japan and United States data revealed bidirectional causation between money and income. Results for Canada and Australia showed that causality is from money to income while for United Kingdom it is from income to money. Money and income were found to be independent of each other in Germany.

These results are different from the findings of other researchers in these countries. The bidirectional causation found in this study was rejected by Sims (1972) for United States. Barth and Bennett (1974) found bidirectional causality for the Canadian case. The results of Germany which indicates that money supply and income are independent of each other are consistent with that of Sauer and Bohara (1990) only under the fixed exchange rate regime.

The differences in findings of these studies might however be attributed to differences in sample periods and the econometric procedures. Monetary policies do change over time therefore it is possible to find conflicting evidence on money, prices and output causality for the same country if different sample periods are used and if different econometric procedures are employed. Differences in country structures and difference in the way they conduct monetary policy also attributes to difference in study findings. People expectations also differ in each country. Therefore it is not possible to get uniform results on the causality between money and output in these countries.

Results that are similar to those of the United Kingdom case found by Dyeres *et al* (1980) were confirmed by Huat and Wai in (2000) for the case of Singapore. The study investigated the relationship between money and output and employed cointegration and Granger causality

methodology. The study found bidirectional causality between M1 and GDP and unidirectional causality from GDP to money for broader measures of money supply (M2 and M3). The results indicated that bank sector development in Singapore is demand following that is it responds to economic performance but it does not influence economic activities itself.

Related studies were done for India and the results obtained were mixed. Yadav (2008) investigated the cointegration and causality between money and GNP using annual data for the period 1950/51 to 2006/07. The Granger causality test indicated that causality runs from GNP to money supply (M3). Evidence of cointegration between real and nominal values of national income and money supply was found. The trivariate VAR methodology by Rami (2010) for the study period of 1951 to 2005 yielded opposite results. Money was found to Granger cause output and prices but the results were weak. Mishra (2011) investigated the dynamic relationship of money and income using data from 1950/51 to 2008/09 and found that these variables were cointegrated. The results of this study were in consistent with the results of Yadav (2008). The VECM shows a unidirectional causality from GNP to M3 while the Granger causality show that in the long run causality runs from GNP to money M3 but in the short run causality is from money to GNP. Yadav & Lagesh (2011) using ARDL approach and monthly data from 1991 - 2007 also estimated a dynamic relationship between macroeconomic variables which are real output, money, price, interest rate and exchange rate. The study found the evidence of cointegration among these variables. However, no evidence of short run causality was found between real money and output but a unidirectional causality from prices and interest to output was found.

The above studies show different results for India. Yadav (2008) and Mishra (2011) found evidence of output causing money. Conversely Rami (2010) found a weak unidirectional causality from money to prices and output. The difference in findings of these studies is attributed to the fact that the former two studies (Yadav and Mishra) employed a bivariate VAR while the later study used a trivariate VAR. The sample size of these three studies is not much different. Since the findings of Rami (2010) are weakly supported, hence his results that money Granger causes output and prices can be discarded. The study by Yadav and Lagesh (2011) who found no causal relationship between money and output employed a shorter sample period than the other three studies. The study proxied output by the index of industrial production and employed monthly data not annual data. This therefore reduces the credibility of the results compared to the studies which

used real and actual output data and over a long sample horizon. Thus the evidence that output causes money in India is the one that can be highly supported.

Evidence of bidirectional causality between money and income was found by Hossain (2011) and Shams (2012) who produced same results for the case of Bangladesh. Hossain (2011) employed Error Correction Model and cointegration analysis when he investigated money and income causality for Bangladesh again. The study found evidence of cointegration and bidirectional causality. Similarly Shams (2012) reached the same conclusion that there is bidirectional causality between money and income. This study also observed a unidirectional causality from money to prices. The difference of this study with Hossain study is that it employed a Trivariate analysis including prices as the third variable. Again this study employed internally generated data sources for the period 1972/73 - 2009/10 while the other study sources its data from IMF for the period 1974 - 2008.

Another study that found evidence of bidirectional causality between money and income was carried out by Husain & Rashid (2009). The researchers did a study titled, "Price Hikes, Economic Reforms and Causality in Money, Income and Prices: Evidence from Pakistan". The study investigated the causal relationship between money and income, money and prices using both real and nominal annual data set from the years 1959/60 to 2003/04. The study found evidence of money playing an active role in leading price changes. When shifts in macroeconomic variables due to 1970 price hikes as well as the economic reforms of 1990 were included in the model, the results indicated a stable long run relationship between real money and real income. Real income was found to be a leading variable that affects real money in the long run. For short run these variables were found to be independent of each other. Strong long run relationship and bidirectional causality between nominal money and nominal income were found and the nominal variables show short run independence. Furthermore, another study for Pakistan was performed by Bilquees, Mukhtar and Sohail (2012), when they investigated the dynamic causal interaction of money, prices, interest rates and output. Using quarterly data over the period 1972Q1 to 2009Q2, the VAR analysis established that money Granger causes output in the short run and that there is stable long run equilibrium among the variables. The study also found a bidirectional causality pattern on money supply, price level and interest rate. The study concludes that monetary policy is very effective in affecting economic activities at least in the short run in this country. The

observation from these two Pakistanian studies is that money matters for economic activities as suggested by the Monetarists.

In Canada, Barth & Bennett (1974) investigated the role of money on the Canadian economy. Employing quarterly data from 1957 – 1972, the OLS regression results and causality test proved that money supply (M1) and GNP are related and that there was bidirectional causality. However for M2 the results indicated that there was no causality between money supply and GNP. Unidirectional causality from money to income which was confirmed by Sims (1972) is thus not supported by this study. Kichian (2012) reexamined this relationship using flexible drifting - coefficient approach and considering the time - varying – parameter models. The study using data from 1976Q1 - 2010Q1 found that money growth does not affect GDP growth in the long run in the Canadian case. Only short term impact which oscillates between positive and negative impact was found.

For the case study of China, Yan - Liang (2012) investigated the relationship between money supply, economic growth and inflation. The study employed cointegration and the Vector Error Correction Model (VECM) using monthly data from 1998 to 2007. The study findings rejected the long run relationship between money supply and economic growth while money and inflation were found to be cointegrated. The study also found that economic growth Granger cause inflation. Hence the study proposed a balanced money growth rate to combat inflation and for short term economic growth. As to stimulate long run economic growth, the study suggested that the government must look for other sources. Since China is the fastest growing economy currently and this study is showing that money supply did not contributed much to economic performance, it might imply that Zimbabwe need also to look for real factors to stimulate economic growth in the country.

Al-Fawwaz and Al-Sawi (2012) investigated the short run relationship between money, prices and the gross domestic product using annual time series data from 1976 - 2009 for Jordan. Money was found to Granger cause prices but not output growth. The results also indicated that prices do not Granger cause output and money supply.

A number of studies have been done for Nigeria. Oniyeiwu (2012) investigate the relationship between monetary policy and economic growth for the period 1981 - 2008. The regression results indicated that money supply has a positive impact on output. The results of Fasanya *et al* (2013)

indicated that monetary variables and economic growth are cointegrated from their investigation of whether the growth process is affected by monetary policy. The sample period was from 1975 - 2010. Money supply was found to be neutral from the VAR analysis. The results from these two studies differ on estimation techniques of which the VAR analysis applied in 2013 is argued to be more robust. A more recent study for the same country on "The Nexus between Monetary Policy and Economic Growth in Nigeria: A Causality Test" by Sulaiman & Migiro (2014) found that money is neutral which is the same conclusion reached by the 2013 study. These two last studies differ mainly on sample periods since the latest study period was from 1981 - 2012.

Suliman and Ahmed (2011) investigated the long run relationship between money supply, prices and real GDP for Sudan. The sample period from 1960 - 2005 was used. The study employed cointegration and VAR analysis. Money supply, prices and real GDP were found to be cointegrated. The results showed that Real GDP and money supply Granger cause prices without any feedback while no causal relationship was found between real GDP and money supply.

The VAR approach was employed by Chipote and Makheta - Kosi (2014) on the investigation of the impact of monetary policy on economic growth in South Africa. The study employed quarterly data from 2000 to 2010. All the monetary variables (exchange rate, money supply and the interest rate) except inflation proved to be insignificant on economic growth. These results are similar with that of Barth & Bennet (1974) for the case of Canada. The study recommended that the monetary authorities must focus on creating a conducive environment for domestic and foreign direct investment.

A number of studies have been done also on Zimbabwe to explore the relationship between money supply and economic variables. Makochekanwa (2007) inquired on the dynamic causes of hyperinflation in Zimbabwe using Error Correction Models and Granger causality test. The study employed monthly time series data from February 1999 to December 2006. The study found bidirectional causality between money supply (M2) and inflation from Granger causality test and that money supply has a significant and positive impact on inflation from the Error Correction model estimation. The results imply that monetary authorities must reduce money supply in order to ease inflation.

Nhavira (2009) did a study with the title "Does Money - Growth Still Granger Cause Inflation and Economic Growth in Zimbabwe 1991 - 2005?" The study employed VAR analysis and found a

bidirectional relationship between money and prices. The results revealed that money supply doES not Granger cause output for the study period indicated while a bidirectional causality between prices and money supply was found. Although Nhavira used M3 to measure money supply he still reached the same conclusion as Makochekanwa who measured money supply by M2 that there is a feedback relationship between money and inflation.

Kairinza (2012) published a discussion paper titled "Unbundling Zimbabwe's journey to hyperinflation and official dollarization". In this paper it was clearly highlighted that liquidity expansion especially in the Quasi - fiscal activities period post 2004 played a major role in leading the economy to hyperinflation period. Thus the study established that money supply increases had an impact on prices but not output. These results are similar to the findings of Suliman & Ahmed (2011) and Chipote & Makheta-Kosi (2014) for Sudan and South Africa respectively. These results imply that even when the country had the ability to print money it did not help much for output growth. This shows monetary policy ineffectiveness in the country.

2.3 CONCLUSION

The theoretical literature shows that the role of money in the economy is ambiguous. The empirical findings on the relationship between money, prices and output is mixed as well. In some countries money growth impacted positively on economic growth and prices for example Hill (2007) and Lee & Yang (2012) for Unites States. Money was found to be neutral in countries like South Africa (Chipote & Makheta-Kosi, 2014) and Zimbabwe (Nhavira, 2009). In some countries, money growth actually responds to output growth (Huat & Wai, 2000) for Singapore and for United Kingdom (Dryers *et al*, 1980). Many studies reached the conclusion that money and prices are positively related. Hence the role of money in an economy is country specific and varies with the sample period and econometric techniques employed. This therefore gives a justification to do a research for the Zimbabwean post dollarization case.

The main analytical tools employed by many studies in the reviewed literature are causality techniques. Most studies employed VAR, VECM, and Granger causality test. Few studies employed ARDL and OLS. Thus the current study follows the methodological procedures followed by most studies in the reviewed empirical literature to investigate the role of money in the economy. Thus VAR and Granger causality tests were considered in this study.

CHAPTER THREE

METHODOLOGY

3.0 INTRODUCTION

This chapter outlines the methods used to investigate the role of money in the Zimbabwean economy. Econometric procedures, data sources, explanation and justification of variables will be presented in this chapter. Eviews 7 software package was used for estimation.

3.1 THE VECTOR AUTOREGRESSIVE MODEL (VAR)

The study employed Vector Autoregressive (VAR) modeling. Sims (1980) argued that macroeconomic variables are interrelated in many ways hence identification is difficult to fulfill and assumptions required to be fulfilled for one to be able to apply the OLS technique are difficult to attain. He therefore argued that all variables must be treated as endogenous variables and that there is no need for any prior distinction between these variables. VAR methodology is a simultaneous equation modeling which considers several endogenous variables but each endogenous variable is explained by its lagged or past values and the lagged values of all other endogenous variables in the model. Many studies for both developed and developing countries have employed this technique, for example Sims (1972), Rami (2010) and Bilquees, Mukhtar & Sohail (2012).

VAR models have a number of advantages. These models can be used to study the effects of policy through impulse response analysis and they also eliminates the identification problem by treating all variables as endogenous. It was further argued by Litterman (1986) that VAR modeling does a better job of forecasting than structural multiple equations models. This model takes into account the dynamic feedback causality between variables in the short run as well as in the long run (Greene, 2002). Besides these advantages, the VAR methodology is criticized for being a-theoretical. VAR models emphasize more on forecasting hence they are less suitable for policy analysis. Another challenge is that they have too many parameters which make it difficult to interpret these models. Besides these shortfalls, VAR modeling still produces unbiased and reliable results.

3.2 MODEL SPECIFICATION

3.2.1 THEORETICAL FRAMEWORK

The study seeks to determine the influence of money supply on prices and output. From the theoretical literature, the relationship between money supply, prices and output was summarized by the Quantity Theory of Money developed by Fisher (1911). The relationship was presented as follows:

MV = PQ……..1

M represents money supply while V is money velocity which was argued to be constant. P represents prices and Q output. Applying natural logs at both sides to get equation 2:

LN(MV) = LN(PQ)…….....2

Clearing brackets to get equation 3:

LNM + LNV = LNP + LNQ……3

Since V is assumed to be constant LNV can be represented by $\boldsymbol{\alpha}$, then equation 3 can be written as follows to represent an econometric equation:

$LNM = \alpha + \beta LNP + \gamma LNQ + w_t$……4

Equation 4 represents the relationship between money, prices and output from the theoretical perspective. W_t is the error term while α is a constant term and $\beta \ and \ \gamma$ are coefficients.

3.2.2 THE EMPIRICAL MODEL

A multivariate VAR model can be represented by separate equations (Gujarati, 2002). In VAR modeling each endogenous variable is explained by its lagged or past values and the lagged values of all other endogenous variables in the model. The study proxied output (Q) by volume of manufacturing index (VMI) and money supply was denoted by (MS) while consumer price index (CPI) represents prices (P). Equation 4 was extended to suit multivariate VAR representation formula. Thus following from equation 4 and the empirical literature (Rami, 2010, Yang - Liang, 2012 and Suliman & Ahmed, 2011), the estimated model was expressed as follows under VAR format:

$$LNVMI_t = \propto + \beta_1 LNVMI_{t-1} + \cdots + \beta_n LNVMI_{t-n} + \delta_1 LNMS_{t-1} + \cdots + \delta_n LNMS_{t-n} + \varphi_1 LNCPI_{t-1} + \cdots + \varphi_n LNCPI_{t-n} + \varepsilon_t \ldots\ldots 5$$

$$LNMS_t = \emptyset + \partial_1 LNVMI_{t-1} + \cdots + \partial_n LNVMI_{t-n} + \gamma_1 LNMS_{t-1} + \cdots + \gamma_n LNMS_{t-n} + \theta_1 LNCPI_{t-1} + \cdots + \theta_n LNCPI_{t-n} + \omega_t \ldots\ldots 6$$

$$LNCPI_t = \alpha + \vartheta_1 LNVMI_{t-1} + \cdots + \vartheta_n LNVMI_{t-n} + \rho_1 LNMS_{t-1} + \cdots + \rho_n LNMS_{t-n} + \tau_1 LNCPI_{t-1} + \cdots + \tau_n LNCPI_{t-n} + \mu_t \ldots\ldots 7$$

The above model (equations 5 - 7) can be generalized as follows:

$$LNVMI_t = \propto + \sum_{i=1}^{n} \beta_i LNVMI_{t-i} + \sum_{t-1}^{n} \delta_i LNMS_{t-i} + \sum_{i=1}^{n} \varphi_i LNCPI_{t-i} + \varepsilon_t \ldots\ldots 8$$

$$LNMS_{jt} = \emptyset + \sum_{i=1}^{n} \partial_i LNVMI_{t-i} + \sum_{t-i}^{n} \gamma_i LNMS_{t-i} + \sum_{i=1}^{n} \theta_i LNCPI_{t-i} + \omega_t \ldots\ldots 9$$

$$LNCPI_t = \alpha + \sum_{i=1}^{n} \vartheta_i LNVMI_{t-i} + \sum_{t-i}^{n} \rho_i LNMS_{t-i} + \sum_{i=1}^{n} \tau_i LNCPI_{t-i} + \mu_t \ldots\ldots 10$$

Thus the estimated model for the study was specified by the equations 8 - 10. $LNMS_{jt}$ represents money supply in natural logarithm where j = 1, 2 and 3 representing monetary aggregates (M1, M2 and M3). $LNCPI_t$ in the consumer price index in natural logarithm and it represent the prices. $LNVMI_t$ is the volume of manufacturing index in natural logarithm representing output while $\boldsymbol{\beta_i}$, $\boldsymbol{\delta_i}$, $\boldsymbol{\gamma_i}$, $\boldsymbol{\rho_i}$, $\boldsymbol{\vartheta_i}$, $\boldsymbol{\tau_i}$ $\boldsymbol{and}$ $\boldsymbol{\partial_i}$ are coefficients while $\propto$, $\emptyset$ and α are constants. ε_t, μ_t and ω_t are stochastic error terms which are called impulses or innovations in the VAR language (Gujarati, 2002).

3.3 STATIONARITY TESTS

Estimating a VAR model requires data to be stationary. A stationary time series is one whose statistical properties; mean, covariance, and variance are time invariant, they must be constant over time. The use of non-stationary data will yield misleading results. The t-ratio, F-statistic, R-squared and the Dubin-Watson test become useless for asymptotic analysis since they will not follow standard distribution. The t - static will not follow a t-distribution and the F- statistic will not follow an F-distribution. It is possible to regress two unrelated non - stationary series and obtain the conventional t and F test statistics suggesting a statistical relationship when in fact there is none. This is called spurious or nonsensical regression (Greene, 2002). Non - stationary series

analysis also conveys only a significant message for the period under investigation therefore the results cannot be used for forecasting. Stationary series can be made stationary by differencing and detrending (Granger, 1986).

Unit root test is used to test for stationary. When a series has a unit root it means it is not stationary. There are many ways to test for stationarity or unit roots. Augmented Dickey-Fuller test (ADF), the Phillip Perron (PP) and the Kwiatkowski–Phillips–Schmidt–Shin (KPSS) are some of the techniques that can be employed. Since all these different ways mostly lead to the same conclusion of whether a series is stationary or not, the current study considered the ADF test.

3.4 OPTIMAL LAG LENGTH SELECTION

For the estimation of a VAR model there is a need to establish optimal lag length. Braun and Mittnik (1993) showed the importance of using the proper lag length in estimating VAR models. They proved that estimates of a VAR model with an inaccurate lag length are inconsistent. The variance decomposition and impulse response function derived from that model will be misleading. It was also indicated by Lutkepohl (1993) that including many lags results in over-fitting the model which will cause mean square forecast errors to increase while under - fitting the lag length often generates autocorrelated errors. The study employed the Final Prediction Error (FPE), Akaike Information Criteria (AIC), Schwarz Information Criteria (SC) and the Hannan-Quinn Information Criteria (HQ) to choose the lag length. The lag length chosen by most of these methods will be the optimal lag length considered (Rami, 2010).

3.5 COINTEGRATION

When variables are said to be cointegrated, this means that there is a long run equilibrium relationship between them (Engle & Granger, 1987). In the short run these variables may drift apart but in the long run they will be drifting together at roughly the same rate. For cointegration to exist, variables must be integrated of the same order and not stationary in levels and their linear combination must be integrated of order zero.

To test for the presence of cointegration, unit root test of Ordinary Least Square residuals can be conducted using the DF or ADF test as proposed by Engle and Granger in 1987. This test is to assess whether the estimates of the equilibrium errors appear to be stationary (Greene, 2002). However this method has some limitations, the residual based test is not that strong since it does

not exploit all the available information about the dynamic interactions of the variables and that one needs to test the relationship one by one among other issues.

Another method is to employ the Johansen procedure as proposed by Johansen (1988). It uses the maximum likelihood estimation and it can test the presence of multiple cointegration vectors. This can be done by using either the trace test or the maximum Eigen value test. If the variables are cointegrated, the study will consider a Vector Error Correction Model (VECM) instead of an unrestricted VAR.

3.6 GRANGER CAUSALITY TEST

To see the direction of causality between the variables the study considered Granger causality test advocated for by Granger (1980). Causality in the VAR modeling refers to the ability of past values of a variable to predict the future values of another variable. That is the ability of variable Y to forecast variable X. There are three possible results from any Granger causality test. There might be a unidirectional causality implying that causality runs one way from one variable to the other without feedback. The results might show a bidirectional causality which means that there is feedback causality while neutral or independent relationship implies lack of causality between the variables.

3.7 IMPULSE RESPONSE FUNCTION

Estimated parameters of the VAR models do not have significant meaning (Hamilton, 1994 and Enders, 2004). Hence to analyze the data Impulse Response Functions (IRF) and the Variance Decomposition figures were computed.

The IRF traces out the responsiveness of a dependent variable in the system to a shock in the error terms such as $\omega_t \; and \; \varepsilon_t$ in the equations in the Model Specification section. If there is a unit change in ω_t, it will have an impact on money supply in the current period as well as the future periods. Since money supply appears as well in the volume of manufacturing index equation, the shock in w_t will have an impact also on the volume of manufacturing index. The shock on ε_t will have an impact on money supply in the same way. Interpretations of Impulse Response Functions emphasize more on the sign of the responsiveness of a variable to the shocks on other variables. That is whether the response is positive, negative or no response at all.

3.8. VARIANCE DECOMPOSITION

Variance decomposition is a technique used to decompose the total variation of a time series into percentages attributed to each structural shock. It determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables. After estimating the VAR, the study computed the IRF and variance decompositions.

3.9 DEFINITION AND JUSTIFICATION OF VARIABLES

3.9.1 MONEY SUPPLY

Money is defined in economics as anything generally accepted for the payment of goods and services or payment of debt (Mishkin, 2007). Money consists of notes and coins as well as demand and time deposits. Money supply is the amount of money stock in the economy at a given point in time. Money supply can be measured or categorized as narrow or broad money where narrow money is highly liquid. It can be turned to cash easily and at relatively low cost. Narrow money definition consists of M0 and M1 where M0 refers to notes and coins held by the non - bank public whereas for M1 definition we add demand deposits to M0. Broad money is less liquid compared to narrow money. M2 and M3 fall into the category of broad money. M2 equals M1 plus short term and small denomination deposits, savings deposits and money market deposits funds. Long time deposits, money market mutual funds and M2 constitute M3. This category is less liquid and relatively expensive to convert these financial assets into cash.

The study considered both narrow and broad money (M1, M2 and M3) since money growth relationship seems to differ for each measure of money supply (Huat & Wai, 2000). The Reserve Bank of Zimbabwe, which is the Central Bank, only publishes data for M1 to M3, data on M0 is not available. Estimations were done using each of the three definitions of money (M1, M2 and M3) since in the multicurrency regime, the Central Bank cannot target any specific monetary aggregate; all the money categories respond to same shocks outside the control of the Central Bank. All monetary aggregates are expected to be independent of output and prices.

3.9.2 PRICES, CONSUMER PRICE INDEX (CPI)

The monetary rate at which goods and services are exchanged for is called a price (Mankiw, 2010). Consumer price index (CPI) is a commonly used measure of the price level in the world. It is the price of a basket of goods purchased by a typical consumer per month relative to the price of that

same basket to some base year. CPI is used to proxy prices in this study. An independent relationship between prices, money and output is expected.

3.9.3 VOLUME OF MANUFACTURING INDEX (VMI)

Gross National Product (GDP) is a measure of national output produced within a country regardless of who owns the factors of production over a period of time usually one year (ibid, 2010). It is a measure of economic activity in a country. Increase in GDP implies that the economy is performing well while a decline indicates poor performance.

Volume of manufacturing index which is an indicator used to measure changes in the volume of production was used to proxy national output (GDP) since data is available monthly whilst data on GDP in Zimbabwe is mainly on an annual basis. From empirical evidence, GDP was proxied by the manufacturing index for example, Kadenge (1998), Yadav & Lagesh (2011), Yan-Liang (2012), and Yang & Lee (2012). No causal relationship is expected between VMI and money supply.

3.10 DATA SOURCES

Data on money supply aggregates was sourced from RBZ while VMI and CPI data was obtained from ZIMSTAT. The sample period is from 2009/01 to 2015/03.

3.11 CONCLUSION

This chapter outlined the econometric techniques that the study employed to investigate the role of money in the Zimbabwean economy- to investigate the relationship between money, prices and output. Chapter four is going to present the results and their interpretation.

CHAPTER FOUR

ESTIMATION, PRESENTATION AND INTERPRETATION OF RESULTS

4.0 INTRODUCTION

This chapter follows the procedures explained in the methodology chapter. Empirical results and their interpretations will be presented in this chapter.

4.1 DATA DESCRIPTION

Table 2: DESCRIPTIVE STATISTICS

	LNCPI	LNM1	LNM2	LNM3	LNVMI
Mean	4.580377	7.264080	7.701434	7.825118	4.046933
Median	4.594773	7.543819	7.975513	8.124912	3.906005
Maximum	4.617360	7.703518	8.197026	8.402290	4.690430
Minimum	4.498302	5.376851	5.695616	5.695851	3.387953
Std. Dev.	0.033441	0.563834	0.607362	0.664908	0.397803
Skewness	-0.939577	-1.873341	-1.671192	-1.561405	0.288375
Kurtosis	2.673455	5.786571	5.009755	4.644432	1.586393
Jarque-Bera	11.36829	68.13315	47.53327	38.92532	7.284144
Probability	0.003399	0.000000	0.000000	0.000000	0.026198
Sum	343.5283	544.8060	577.6076	586.8838	303.5200
Sum Sq. Dev.	0.082753	23.52528	27.29780	32.71564	11.71027
Observations	75	75	75	75	75

The mean and median values of each variable are very close to each other as shown in Table 2 above. This implies that the variables follow a normal distribution. There is also variability in observation since the standard deviation is not equal to zero. Therefore the assumptions of variability and normality required by the regressions analysis are fulfilled.

4.2 STATIONARITY TESTS

Table 3: UNIT ROOT TESTS

Variable	ADFTest statistics	1%Critical Value	5%Critical Value	10%Critical Value	P-value	Decision
LNCPI	-2.106333	-4.088713	-3.472558	-3.163450	0.5335	Not stationary
DLNCPI	-6.545756	-4.088713	-3.472558	-3.163450	0.0000***	Stationary(1)
LNM1	-5.242817	-4.088713	-3.472558	-3.163450	0.0003***	Stationary(0)
LNM2	-6.145194	-4.088713	-3.472558	-3.163450	0.0000***	Stationary(0)
LNM3	-6.951702	-4.088713	-3.472558	-3.163450	0.0000***	Stationary(0)
LNVMI	-3.516030	-4.086877	-3.471693	-3.162948	0.0450**	Stationary(0)

where *****,**,*** means stationary at 1%, 5% and 10% level of significant respectively and stationary (1) implies stationary at first difference while stationary (0) implies stationary in levels.

Table 3 presents unit root tests from the ADF test. The value of ADF test statistic (-2.106333) for the null hypothesis that natural log of prices are not stationary is less than the modulus values of the corresponding critical values at 1%, 2% and 10% as shown by row two. This implies that prices are not stationary at levels, they however became stationary after first differencing at 1% level of significance. All the natural logs of money supply categories were stationary in levels and at 1% level of significance since the modulus values of the ADF test statistics are greater than the modulus values of the critical values at all levels of significance. Natural logs of volume of manufacturing index were also stationary in levels at 5% level of significance. All the variables that are stationary at levels entered into the regression equations as they are but lagged prices which are stationary instead of prices in levels were used. Thus the variables used for analysis were LNVMI, LNM1, LNM2, LNM3 and DLNCPI where D stands for first difference.

4.3 MULTICOLLINEARITY TESTS

The other test that needs to be done before running regressions is to ensure that the variables are not collinearly related. Presence of perfect multicollinearity or near perfect collinearity will result in regression coefficients being estimated inaccurately or indeterminate. The standard errors will be indeterminate.

Table 4: Multicollinearity Tests

	DLNCPI	LNM1	LNM2	LNM3	LNVMI
DLNCPI	1.000000				
LNM1	0.390636	1.000000			
LNM2	0.337110	0.991689	1.000000		
LNM3	0.319502	0.987179	0.998437	1.000000	
LNVMI	0.006603	0.676588	0.715448	0.738112	1.000000

As can be seen from Table 4, there is no problem of multicollinearity between money supply aggregates and prices, money supply aggregates and volume of manufacturing index as well as between prices and volume of manufacturing index since the coefficient of correlation is less than 0.8 (Gujarati, 2002). Only monetary aggregates are collinearly related as they have the correlation coefficient of more than 0.99 which is the definition of very high collinearity. However the monetary variables did not enter into one equation. They were used to represent money supply in different models.

4.4 LAG LENGTH CRITERIA

As explained in chapter 3 that an optimal lag length needs to be chosen to avoid over fitting or under fitting the model, five criteria were employed to choose the lag length. The methods are LR, FPE, AIC, SC and HQ. The results are shown in Appendix II. When M1 was money supply measurement, the first three criteria (LR, FPE and AIC) chose an optimal lag of two while the last two methods (SC and HQ) chose an optimal lag of one. The optimal lags therefore become two which is the lag length supported by many methods. When M2 and M3 were used to define money supply, all the five methods chose an optimal lag length of one. Hence the first equation with M1 representing money supply the lag length was found to be two, while the other two equations with M2 and M3 representing money supply the optimal lag found was one.

4.5 COINTEGRATION

Since only prices were not stationary at levels while all money measurements and VMI were stationary at levels, this then implies that there is no possibility of cointegration among the

variables. Hence the long run relationship is thus disqualified implying that if there is a relationship among the variables it will be short run not long run.

4.6 GRANGER CAUSALITY

Table 5 presents the results of Granger causality tests. Three equations were run with M1, M2 and M3 representing money supply measurement at each of the equation.

Table 5: Results of Granger Causality Test

Null hypothesis	obs	F-statistics	P.Value
M1 AS MONEY DEFINITION			
LNM1 does not Granger Cause DLNCPI	72	0.76764	0.4681
DLNCPI does not Granger Cause LNM1		**3.68691****	**0.0303**
LNVMI does not Granger Cause DLNCPI	72	**4.64879****	**0.0129**
DLNCPI does not Granger Cause LNVMI		0.41992	0.6588
LNVMI does not Granger Cause LNM1	73	**2.86451***	**0.0639**
LNM1 does not Granger Cause LNVMI		1.91994	0.1545
M2 AS MONEY DEFINITION			
DLNCPI does not Granger Cause LNM2	73	0.03015	0.8626
LNM2 does not Granger Cause DLNCPI		0.01741	0.8954
LNVMI does not Granger Cause LNM2	74	0.07292	0.7879
LNM2 does not Granger Cause LNVMI		1.40138	0.2404
LNVMI does not Granger Cause DLNCPI	73	1.01710	0.3167
DLNCPI does not Granger Cause LNVMI		0.23226	0.6314
M3 AS MONEY DEFINITION			
DLNCPI does not Granger Cause LNM3	73	0.00067	0.9794
LNM3 does not Granger Cause DLNCPI		0.00054	0.9815

LNVMI does not Granger Cause LNM3	74	0.00034	0.9854
LNM3 does not Granger Cause LNVMI		1.62931	0.2060
LNVMI does not Granger Cause DLNCPI	73	1.01710	0.3167
DLNCPI does not Granger Cause LNVMI		0.23226	0.6314

where ** and * implies rejecting the null hypothesis at 5% and 10% level of significant respectively.

4.6.1 GRANGER CAUSALITY BETWEEN MONEY SUPPLY AND OUTPUT

The probability that LNVMI does not Granger cause LNM1 was found to be approximately equal to 6% implying that the probability that output Granger causes narrow money stood at 94%. Thus the null hypothesis which states that output does not Granger cause narrow money is rejected in favor of the alternative hypothesis. The probability that narrow money supply does not Granger cause output was found to be approximately equal to 15% which is a large probability thus the study failed to reject this null hypothesis. The study concludes that there is a weak unidirectional causality from output to narrow money supply. These results are similar to the findings of Vladimir &Viktorova (2006) who found that output influences money supply if there is an unexpected and temporary shock on output in the Czech Republic. The results are also in support of the Keynesian hypothesis of output causing money supply changes. Output might influence narrow money in Zimbabwe due to the fact that the country is dollarized. Export receipts from output increase the liquidity in the country.

The probability that output does not Granger cause broad money is high. The probability that output does not Granger cause M2 stood at 78% while the probability that output does not Granger cause M3 was found to be 98%. The study failed to reject these hypotheses, the conclusion is that there is no causal relationship from output to broad money supply. On the other hand the probability that M2 does not Granger cause output was found to be 24% while the probability that M3 does not Granger cause output was around 21%. Again the study failed to reject these propositions. The conclusion derived from these results is that broad money supply and output are independent variables. A neutral relationship was observed. The results support the findings of Nhavira (2009) that broad money supply is independent of output for the Zimbabwean case. Barth & Bennett (1974), Kichian (2012) and Fasanya, Onakoya & Agboluaje (2013) also found that broad money supply and output are independent variables. This result also confirms the

propositions of the Real Business Cycle and Classical theory that there is no causal relationship between money and output. However, the results differ from the findings of the popular study by Friedman & Schwartz (1963) who found that money matters for output growth.

4.6.2 GRANGER CAUSALITY BETWEEN MONEY SUPPLY AND PRICES

The probability that narrow money supply does not Granger cause prices was approximately equal to 47% while the probability that M2 and M3 do not Granger cause prices was roughly 90% and 98% respectively. These findings imply that a unidirectional causality from money supply to prices is ruled out. The probability that prices do not Granger cause narrow money was found to be 3% which is a very low probability requiring the rejection of the null hypothesis. Hence there is a unidirectional causality form prices to narrow money supply. These results reject the Monetarists proposition that inflation is always and everywhere a monetary phenomenon. Structural factors as suggested by the Keynesians might be the ones affecting prices.

No Granger causality was found between broad money and prices. The probability that prices do not Granger cause M2 was found to be 86% while it was 98% for M3. An independent relationship between broad money and prices found in this study opposes the findings of earlier studies done on Zimbabwe. Nhavira (2009) found bidirectional causality between money and prices. Makochekanwa (2007) found that money supply positively influenced prices to the extent that the country experienced hyperinflation in 2007 - 2008. These two studies employed data collected when the country was using the Zimbabwean Dollar and the Central Bank able to print money. This then shows that prices were a monetary phenomenon in the Zimbabwean dollar era but might now be affected by structural factors in the multicurrency system not money supply.

4.6.3 GRANGER CAUSALITY BETWEEN OUTPUT AND PRICES

The probability that output does not Granger cause prices was found to be 1% when narrow money represents money supply whilst the probability that prices do not Granger cause output was found to be approximately 67%. This implies that there is a unidirectional causality from output to prices. These findings can be justified by the fact that there is low demand of goods and services in Zimbabwe which has resulted in many firms closing or downsizing. Therefore for firms to increase demand or to clear stock they have to reduce prices. Thus prices will be responding to output shocks. When broad money supply was considered, no causal relationship was found between prices and output. The probabilities were approximately equal to 32% for the null hypothesis that

output does not Granger cause prices. All the equations show that prices do not Granger causes output. The probabilities found were 67% when M1 represents money and 63% when M2 and M3 represent money supply.

4.7 ESTIMATED VAR RESULTS

Three separate VAR equations were run with different money supply measurement in each of the equations. The estimated results are presented in Appendix IV. The coefficients of variables in trying to explain the other variables are not statistically significant. For a variable to be statistically significant in a model according to the rule of thumb, the modulus of the 't-statistic' must be at least equal to two (Gujarati, 2002). The estimated results showed that only own lagged variables of each variable best explains that variable.

4.8 VARIANCE DECOMPOSITION

As been highlighted in chapter 3, the VAR coefficients are difficult to interpret. Variance decomposition and impulse response functions were found to be a better way of interpreting VAR models (Hamilton, 1994). Variance decomposition explains variation in a variable that is attributed to each of the endogenous variables. In this study the forecast horizon is 10 months and is shown in the first column of the variance decomposition Tables. The second columns indicate the Standard Errors of forecast for the indicated period. These errors were relatively constant in all periods and for all variables reflecting that the level of uncertainty involved in forecasting the variables is low. The third, fourth and fifth columns represent the variation of the indicated variable attributed to variations in the variable mentioned in that column.

4.8.1 VARIANCE DECOMPOSITION WHEN M1 REPRESENTS MONEY SUPPLY

4.8.1.1 VARIANCE DECOMPOSITION OF MONEY SUPPLY (M1)

Table 6: **Variance Decomposition of LNM1**

Period	S.E.	LNM1	DLNCPI	LNVMI
1	0.058039	100.0000	0.000000	0.000000
2	0.068105	94.67839	4.292607	1.029003
3	0.077550	95.33770	3.710745	0.951553
4	0.083485	94.88009	4.298496	0.821418
5	0.088423	94.97458	4.270708	0.754711

6	0.092138	94.78680	4.378333	0.834869
7	0.095219	94.60910	4.376538	1.014359
8	0.097729	94.30531	4.383667	1.311020
9	0.099851	93.94874	4.363978	1.687282
10	0.101654	93.52733	4.340738	2.131928

As shown in Table 6, variations in money supply are caused by its own shocks. In the first period 100% variation in money supply is due to shocks in money supply. Even in the tenth month, money supply shocks contributed to a maximum of 93,5% variations to its own shocks. Prices have also contributed, although to a small percentage to variations in money supply. Up to 4% variation in money growth is due to innovations in prices from period two to period ten. These results are similar to Granger causality results where the study found a unidirectional causality from prices to money supply. Output does not contribute significantly to money supply growth. Only a maximum of 2% variations in money supply is due to shocks in VMI in the tenth period. The results are also in agreement with the Granger causality tests presented above that there is a weak causation from output to money.

4.8.1.2 VARIANCE DECOMPOSITION OF PRICES

Greater variation in prices is due to its own shocks. This is shown in Table 7 below, in the first month 95% variations in prices are attributed to price shocks and up to 84% variation in the tenth month is due to prices own innovations. Volume of manufacturing index contributes a quite significant variation in prices. In the tenth month, about 10% variations in prices are due to output shocks. The same results that output influences prices were found under Granger causality test. Money supply shocks also proved to be contributing to variations in prices although the contribution is relatively very low. An average of 5% variation in each period is recorded.

Table 7: Variance Decomposition of DLNCPI

Period	S.E	LNM1	DLNCPI	LNVMI
1	0.004853	4.918045	95.08196	0.000000
2	0.004983	5.399813	90.78072	3.819463
3	0.005056	5.292895	89.20746	5.499641

4	0.005080	5.372240	88.35965	6.268106
5	0.005111	5.307787	87.31726	7.374953
6	0.005136	5.280874	86.44131	8.277812
7	0.005159	5.243515	85.67748	9.079007
8	0.005178	5.225494	85.04795	9.726555
9	0.005195	5.210641	84.51519	10.27417
10	0.005208	5.205261	84.06952	10.72522

4.8.1.3 VARIANCE DECOMPOSITION OF VOLUME OF MANUFACTURING INDEX

Table 8: Variance Decomposition of LNVMI

Period	S.E.	LNM1	DLNCPI	LNVMI
1	0.121560	0.849030	0.917204	98.23377
2	0.153648	2.315443	0.574604	97.10995
3	0.175563	2.742765	0.451349	96.80589
4	0.193008	3.211485	0.376959	96.41156
5	0.206624	3.626657	0.329379	96.04396
6	0.217681	4.016208	0.296829	95.68696
7	0.226803	4.379601	0.273516	95.34688
8	0.234419	4.721417	0.256405	95.02218
9	0.240845	5.040738	0.243691	94.71557
10	0.246308	5.339005	0.234161	94.42683

Major variations in the volume of manufacturing index are due to its own shocks. Table 8 is showing that above 94% variation in VMI is due to its own shocks from period one to period ten. Variations of VMI due to money supply shocks are quite small with only 5% variations attributed to money supply shocks in the tenth period. Contribution of prices to volume of manufacturing index variations is less than 1% in each period.

4.8.2 VARIANCE DECOMPOSITION WHEN M2 REPRESENTS MONEY SUPPLY

4.8.2.1 VARIANCE DECOMPOSITION OF LNM2

Table 9: Variance Decomposition of LNM2

Period	S.E.	LNM2	DLNCPI	LNVMI
1	0.043896	100.0000	0.000000	0.000000
2	0.059924	99.96649	0.000132	0.033375
3	0.070914	99.89898	0.000144	0.100873
4	0.079192	99.80605	0.000117	0.193832
5	0.085702	99.69467	0.000113	0.305216
6	0.090951	99.57062	0.000154	0.429223
7	0.095249	99.43868	0.000243	0.561076
8	0.098809	99.30275	0.000373	0.696882
9	0.101779	99.16596	0.000536	0.833504
10	0.104271	99.03082	0.000724	0.968459

Table 9 is showing that almost 100% variation in broad money supply M2 in every period is due to M2 shocks. Prices and output shows an insignificant role in influencing M2 growth, they are contributing less than a percent to variations in money supply in each month. The same conclusion was reached under the Granger causality test that M2, prices and output are independent of each other.

4.8.2.2 VARIANCE DECOMPOSITION OF PRICES

Table 10 is showing that a greater percentage of variation in prices is due to shocks of prices themselves. Money supply and volume of manufacturing index are contributing very small percentages. In period 10, above 92% variation in prices is due to its own shocks.

Table 10: **Variance Decomposition of DLNCPI**

Period	S.E.	LNM2	DLNCPI	LNVMI
1	0.005649	2.316202	97.68380	0.000000
2	0.005978	2.341440	96.90085	0.757715

3	0.006046	2.328283	95.84783	1.823888
4	0.006082	2.306739	94.88343	2.809832
5	0.006108	2.287361	94.09876	3.613881
6	0.006128	2.272420	93.48464	4.242941
7	0.006144	2.261868	93.00983	4.728301
8	0.006156	2.255140	92.64382	5.101036
9	0.006165	2.251596	92.36163	5.386776
10	0.006173	2.250634	92.14376	5.605605

4.8.2.3 VARIANCE DECOMPOSITION OF VOLUME OF MANUFACTURING

Table 11 below is also showing that since period one, above 90% variations in the volume of manufacturing index had been due to innovations in the manufacturing index itself. Money supply and prices contributions are very low and negligible.

Table 11: **Variance Decomposition of LNVMI**

Period	S.E.	LNM2	DLNCPI	LNVMI
1	0.119705	3.104328	0.288528	96.60714
2	0.158552	3.528754	0.177895	96.29335
3	0.182969	4.020739	0.182891	95.79637
4	0.199898	4.553586	0.200916	95.24550
5	0.212170	5.108233	0.215464	94.67630
6	0.221301	5.670546	0.225471	94.10398
7	0.228214	6.229625	0.232086	93.53829
8	0.233516	6.776886	0.236390	92.98672
9	0.237625	7.305594	0.239138	92.45527
10	0.240838	7.810580	0.240830	91.94859

4.8.3 VARIANCE DECOMPOSITION WHEN M3 REPRESENTS MONEY SUPPLY

4.8.3.1 VARIANCE DECOMPOSITION OF M3

Table 12: **Variance Decomposition of LNM3**

Period	S.E.	LNM3	DLNCPI	LNVMI
1	0.033360	100.0000	0.000000	0.000000
2	0.038979	99.26020	0.520357	0.219447
3	0.044721	99.17496	0.643481	0.181561
4	0.048732	99.01428	0.832739	0.152981
5	0.052059	98.91282	0.936103	0.151075
6	0.054768	98.79113	1.019023	0.189851
7	0.057034	98.65722	1.076372	0.266405
8	0.058948	98.50281	1.119196	0.377992
9	0.060580	98.33186	1.150888	0.517252
10	0.061981	98.14722	1.174780	0.677995

Table 12 is showing that 100% variation in money supply in the first period is due to own shocks. In the tenth period still money supply shocks are contributing much to variations in money supply as shown by a figure of 98.14722%. Prices and volume of manufacturing index play a negligible role in influencing M3 growth.

4.8.3.2 VARIANCE DECOMPOSITION OF PRICES

Table 13: Variance Decomposition of DLNCPI

Period	S.E.	LNM3	DLNCPI	LNVMI
1	0.004881	2.150167	97.84983	0.000000
2	0.005007	3.134945	93.46186	3.403199
3	0.005083	3.087203	92.15444	4.758353
4	0.005095	3.125784	91.80691	5.067310
5	0.005117	3.110826	91.03677	5.852405
6	0.005132	3.092387	90.48372	6.423892
7	0.005147	3.081638	89.98128	6.937085

8	0.005158	3.073077	89.57873	7.348192
9	0.005168	3.068403	89.25016	7.681440
10	0.005175	3.065961	88.98477	7.949270

Variations in prices are mainly due to own shocks again. However price shocks contribute to about 89% of variation while manufacturing index growth contributes nearly 8%. Money supply contribution is small and negligible.

4.8.3.3 VARIANCE DECOMPOSITION OF VOLUME OF MANUFACTURING INDEX

Table 14: Variance Decomposition of LNVMI

Period	S.E.	LNM3	DLNCPI	LNVMI
1	0.121234	1.570609	0.381672	98.04772
2	0.152541	1.135768	0.256743	98.60749
3	0.173932	1.165869	0.203552	98.63058
4	0.189675	1.211391	0.171313	98.61730
5	0.201370	1.293252	0.151994	98.55475
6	0.210418	1.392928	0.139397	98.46767
7	0.217475	1.500046	0.130803	98.36915
8	0.223062	1.612154	0.124799	98.26305
9	0.227520	1.725343	0.120549	98.15411
10	0.231106	1.837875	0.117536	98.04459

Table 14 is showing that since period 1, volume of manufacturing index own shocks contributed over 98% of total variation. M3 and prices are not significantly contributing to variations in output.

4.9 IMPULSE RESPONSE FUNCTIONS

Another way of interpreting the VAR is to use the Impulse Response Functions. The impulse response traces out the responsiveness of a variable to shocks on other variables. Graphs of impulse responses are presented in Appendix V.

4.9.1 IMPULSE RESPONSES OF PRICES

As shown by the impulse response graphs in the Appendices, responsiveness of prices to money supply (M1, M2 or M3) is zero from the third period to the last period. There is however a weak positive response of prices to shocks in money supply (M2 and M3) in the first two months. Thus the conclusion is that prices do not respond significantly to money supply shocks.

Prices respond positively to own shocks from the first period to around the third period. From the fourth period to the last period, the results show that prices do not respond to their own shocks as well. There is a positive response of prices to shocks in volume of manufacturing index between the first and the third period. After the fourth period prices have a constant and negative responds to shocks in output (VMI).Thus the study concluded that output influences prices in the short run and not in the long run.

4.9.2 IMPULSE RESPONSE OF MONEY SUPPLY (M1, M2 AND M3)

Money supply responds positively to its own shocks from period one through the tenth period. The responsiveness of M1 and M3 to prices is negative through the whole ten month period although response is high between the first and the third period. From the fourth period to the tenth period there is a constant and very small respond to prices. Thus the study concluded that money response to prices in the short run. M2 shows no respond to prices throughout the whole period.

M2 and M3 respond negatively to VMI but the respond is very small and negligible. Only M1 shows a significant respond to VMI which is negative in the first three periods and positive from the fourth period to the tenth period. Therefore the results suggest that M1 responds to output growth (VMI) which is the propositions of the Keynesian theorists.

4.9.3 IMPULSE RESPONSE OF VOLUME OF MANUFACTURING INDEX (VMI)

The impulse response graphs show that VMI does not respond to price shocks the whole period. The graphs also show that there is a very high respond of VMI to its own innovations through the whole ten month period. Although positive, the response of VMI to money supply is very close to zero throughout the whole period and it is thus negligible. These results suggest that output does not respond to innovations or shocks to money supply and prices.

4.10 EXPLANATIONS OF THE RESULTS

The study included three categories of money supply and employed Granger causality tests and the VAR methodology which has variance decompositions and impulse response functions as. Therefore it makes it a little difficult to give possible explanations of the findings under these many headings. The author decided to give sections of the possible explanations and justifications of the results. The explanations are given from the subheadings below.

4.10.1 MONEY AND OUTPUT

The study found that there is a weak unidirectional causality from output to narrow money supply. The possible explanation is that notes and coins as well as demand deposits may increase with the increases of output due to export earnings as well as revenue from domestic sales. The willingness of people to hold cash in Zimbabwe is high thus cash balances can be affected by output growth via income since people are no longer depositing their income as long term deposits with the banks.

The study also found that there is no causal relationship between broad money supply and output. This implies that changes in broad money supply do not influence output growth and broad money is also not influenced by output growth. The results can be explained by the fact that firms are not fully using financial intermediaries to borrow money as well as depositing the proceeds from their business. To avoid declaring their incomes and banking it with the financial institutions, businesses avoid borrowing from these banks. This is due to low confidence in the banking sector as well as high interest rates being charged by banks. The banks are like excluded from the economic activities, businesses are bypassing financial intermediaries. Whether broad money supply decrease or increase, this will not translate to output changes. Again, under -statement of export proceeds, low domestic savings mobilization from economic activities in the country makes it possible for money supply and output changes to be independent of each other. In a nutshell the weak relationship between financial intermediaries and productive sectors explain the neutrality of money in Zimbabwe. The growth in the informal sector makes it also impossible to track the relationship between money supply and output.

Another explanation of why money and output are independent variables is the interests' insensitivity of investments. One of the monetary transmission mechanisms is the interest rate channel. Under this channel increase in money will influence interest rate and interest sensitive component of aggregate demand like investment and consumption. Thus money supply affects

investment through its effect on interest rates. Increases in investment will lead to increases in output. As explored in the literature review, the Keynesians explained that it is not the level of money supply or the rate of interest which influences one's investment decisions. They argued that 'animal spirits' are the ones that guide investors in their investment decisions. These animal spirits were defined as future macroeconomic and political environment or its current stability, governing institutions, expected climatic conditions and movements on expected future demand just to mention few. In Zimbabwe investors and people in general are pessimistic about the future and investments are low. The government policies are also not credible due to lack of policy commitment, policy reversal and uncertainties that centers government decisions making process. The property rights are not well defined and this affects the acquisition of assets by people and investments in those assets. These might be the issues affecting output growth in Zimbabwe.

The neutrality results found in this study can also be supported by looking at the quasi – fiscal activities programs that took place in Zimbabwe. Money was directly injected in the agricultural sector from 2004 to 2008. This is the sector which is supposed to influence Zimbabwe economic activities since the country is agro-based and that agriculture has many sectoral inter-linkages. It has been highlighted in the background section in Fig 3 that money supply expansion during this period did not move the growth rate from the negative region to the positive territory, output growth remained negative. This money supply expansion activity only led to the currency depreciation and hyperinflation (Makochekanwa, 2007). Nhavira 2009 also did a study and found out that money supply does not granger causes output. Thus monetary policy was found to be ineffective even when the country was using the Zimbabwean dollar. This shows that the current study findings are not unique for the case study of Zimbabwe.

4.10.2 MONEY AND PRICES

The introduction of the multicurrency regime makes international trade so easy in the country; it has opened the economy for international competition. This is because people have access to the foreign currency. The possible explanation why it is price influencing narrow money supply (M1) is the fact that if local business charges competitive prices, they will gain the customers but if they overcharge they will lose the business to their international competitors and their cash balances will be affected. The study also found that there is no relationship between broad money and prices. The Keynesians explained that prices are not affected by monetary factors but by structural factors

like aggregate demand, competition, trade openness, contracts and price controls in a country. The economy of Zimbabwe is open to international competition. Hence price might be responding to a competitive environment. Again the price charged on goods sold in Zimbabwe might not be influenced by Zimbabwe's money supply since many products are not produced domestically. The prices charged reflect to the price they were purchased in those countries, tax rates and transportation costs incurred, not to movements in money supply in Zimbabwe. A downward pressure on prices being experienced in the country might also be due to heavy external competition and low demand in the country.

4.10.3 PRICES AND OUTPUT

The study found a unidirectional causality from output to prices. Many companies have closed and others are downsizing. Prices are sometimes being reduced to clear stock and to liquidate companies. Hence the reduction in production is directly or indirectly affecting prices.

4.11 CONCLUSION

This chapter presented the results from the estimated equation on the investigation of the relationship between money, prices and output. The chapter also gives possible explanations for the study findings. The next chapter concludes the study.

CHAPTER FIVE

CONCLUSIONS AND POLICY RECOMMENDATIONS

5.0 INTRODCTION

This chapter provides conclusions, summary of findings, policy recommendations and areas for further research. Limitations of the study will also be presented in this chapter.

5.1 CONCLUSIONS AND SUMMARY OF THE STUDY FINDINGS

The study investigated the role of money in the Zimbabwean economy. It sought to investigate the relationship between money, prices and output in Zimbabwe. Narrow and broad money were considered to represent money supply while CPI and VMI were used to proxy prices and output respectively. The study used monthly data from the period 2009/01 to 2015/03 and employed Granger causality test and VAR estimation techniques.

The study found no evidence of Granger causality between broad money supply and output. M2 and M3 were found to be independent of VMI. These results support the proposition of the Real Business Cycle theory which states that money and output does not affect each other but instead respond to same exogenous shocks. Thus the proposition of the Monetarists popularized by the study for the United States that money matters for output growth was not found for the Zimbabwean case. The study confirms the findings of Barth & Bennet (1974) for Canada, Nhavira (2009) for Zimbabwe case, Fasanya et al (2013) for the case of Nigeria, Suliman & Ahmed (2011) for the case study of Sudan and Chipote & Makheta-Kosi (2014) for the South African economy.

A weak unidirectional causality running from VMI to M1 was found implying that narrow money supply responds to output as argued by the Keynesians theorists. Variance decompositions and impulse responses also showed that narrow money supply and output do respond to shocks from each other.

Output was found to Granger cause prices. The impulse response functions and variance decomposition showed that prices do respond to variations in output but only in the short run and the causality is weak. These findings confirm the findings of Yan-Liang (2012) who found that output growth influences prices. M1 was also found to respond to price variations in the short run. No Granger causality was found between broad money supply and prices. Hence prices changes are not a monetary phenomenon. The study results do not support Milton Friedman's statement

that inflation is always and everywhere a monetary phenomenon (Friedman, 1963). The findings are in agreement with the Keynesians hypothesis which states that prices are not influenced by money supply changes.

In a nutshell, the study concluded that there is no evidence of both short run and long run relationship between broad money and output in Zimbabwe. Price changes are also a non-monetary phenomenon. Therefore liquidity crunch and poor economic performance as well as deflation are independent variables, they are not affecting each other in the multicurrency regime. Money does not matter for output or economic growth and price movements in Zimbabwe post dollarization.

5.2 POLICY IMPLICATIONS AND RECOMMENDATIONS

The study found no evidence of casual relationship between broad money supply and output although a weak unidirectional causality from narrow money supply M1 was found. Again the study shows that price changes are a non-monetary phenomenon in the multicurrency regime. The policy implications arising from this analysis indicate that money supply does not play a significant role in influencing economic activities in Zimbabwe. In the Zimbabwean dollar period money supply used to inflate prices and in the multicurrency regime the results show that money supply no longer influences the prices. Hence increase or decrease in money supply will not have an effect on output in Zimbabwe. Consequently the government cannot use monetary policy to influence the economic activities. The government has to make policies that enhance production so as to increase the supply of narrow money in the economy.

The results also imply that the inability or limited ability of the Central Bank to fully implement monetary policy in Zimbabwe due to dollarization has no effect on the level of economic activities. Therefore the issue of whether the government should consider de-dollarization to be able to provide the much needed liquidity can be discarded according to the findings of this study and earlier researches. The results indicate that increase in money supply will not lead to an increase in output and price changes. Thus dollarization and liquidity crunch must not be blamed for poor economic performance. This means that any policy aimed at increasing liquidity if it is not supported with or implemented with other growth policies will not be able to stimulate production and output growth at the end.

The researcher basing on the findings of this study and the suggestions of the reviewed literature urges the government to look for other sources so as to promote output growth and price stability.

Real Business Cycle theory argues that money and output do not cause each other but respond to same exogenous shocks. Hence to improve liquidity conditions and output growth simultaneously, the government has to look for these exogenous shocks that might be influencing output and money supply. The government can employ fiscal policy which is the alternative of monetary policy. It can increase government spending towards productive sectors. The government must implement favourable policies that are conducive for both domestic and foreign investment also and to look at structural factors that might hinder development of a country. Government needs to consider policy consistency as well so as to infuse confidence in the domestic economy by investors. There is also a need to make the banking sector operations trustworthy and user friendly to both the bank owners and the depositors so as to mobilise money and to encourage people to use the financial intermediaries.

5.3 LIMITATIONS OF THE STUDY AND SUGGESTIONS OF AREAS FOR FURTHER RESEARCH

This study employed a there variable VAR. Another research can be done by including other variables like interests rates into the equations. This study used monthly data due to data constrains, another study can still be done using yearly data when at least 25 yearly observations of money supply, prices and GDP data in the multicurrency system can be found. A study including the Zimbabwean dollar era data and data from the post dollarization period can also be done and other econometric technique such as the ARDL models among other sophisticated econometric techniques employed. The study found out that money growth rate does not influence prices and output changes. Studies can be done to find out what are the factors then that are affecting price developments, money supply and output growth post dollarization.

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APPENDICES

APPENDIX I: DATA USED

MONTH	VMI	M1(US$M)	M2(US$M)	M3(US$M)	CPI
Jan-09	29.6053	255.59	298	297.63	97.7
Feb-09	40.32194	216.34	383	383.19	94.6
Mar-09	35.0257	241.59	397	399.84	91.7
Apr-09	36.05719	359.53	492	495.41	90.7
May-09	32.62304	407.84	536	544.91	89.9
Jun-09	31.6603	459.52	696	711.30	90.4
Jul-09	32.25443	478.76	773	784.88	91.3
Aug-09	32.66483	524.06	847	862.03	91.7
Sep-09	36.85926	743.31	954	969.50	91.2
Oct-09	35.61634	744.53	970	991.70	92.0
Nov-09	42.78195	964.12	1174	1210.20	91.9
Dec-09	41.612	1032.51	1295	1381.25	92.3
Jan-10	36.6	1059.82	1353	1407.82	93.0
Feb-10	45.2	1101.21	1489	1546.05	93.9
Mar-10	40.1	1159.65	1591	1689.30	95.0
Apr-10	39.8	1124.16	1607	1752.27	95.1
May-10	47.1	1184.14	1670	1832.43	95.3
Jun-10	45.9	1053.48	1677	1850.58	95.2
Jul-10	36	1173.62	1746	1917.67	95.1
Aug-10	37.6	1239.95	1910	2040.17	95.0
Sep-10	48.9	1372.97	2115	2289.51	95.1
Oct-10	44.7	1164.49	1923	2151.52	95.3
Nov-10	44.8	1341.53	2031	2296.30	95.7
Dec-10	43.9	1372.04	2126	2327.61	95.3
Jan-11	44.9	1426.90	2138	2361.94	96.3
Feb-11	49.2	1395.15	2219	2458.12	96.8

Mar-11	40.9	1489.59	2320	2578.18	97.5
Apr-11	49.8	1514.19	2263	2610.42	97.6
May-11	48.4	1578.45	2463	2733.65	97.7
Jun-11	51.4	1701.76	2618	2899.72	97.9
Jul-11	53.6	1696.03	2678	2907.00	98.2
Aug-11	50	1806.99	2693	2952.44	98.3
Sep-11	51.2	1816.42	2680	3029.29	99.2
Oct-11	52.2	1798.00	2764	3053.21	99.3
Nov-11	53	1701.09	2757	3088.58	99.8
Dec-11	47.3	1845.03	2798	3100.40	100.0
Jan-12	44.9	1871.72	2887	3145.02	97.6
Feb-12	49.9	2012.82	3082	3377.57	98.1
Mar-12	45.8	1925.79	2909	3438.62	98.5
Apr-12	41.7	1922.67	2981	3453.76	98.7
May-12	44.6	1889.03	3057	3580.19	98.8
Jun-12	57.3	1952.04	3202	3590.27	99.0
Jul-12	45.3	1986.01	3128	3697.56	99.2
Aug-12	49.7	1933.79	3144	3589.30	99.0
Sep-12	47.5	1971.69	3169	3728.18	99.5
Oct-12	50	2017.38	3331	3813.96	99.7
Nov-12	49.7	1909.60	3154	3824.66	99.9
Dec-12	48.2	2089.39	3324	3886.67	100.0
Jan-13	83.9	2031.53	3224	3808.40	100.1
Feb-13	105.7	1978.34	3247	3813.62	101.0
Mar-13	96.2	1965.02	3272	3798.52	101.2
Apr-13	95.3	2086.62	3440	3966.74	101.2
May-13	95.7	2045.22	3343	4018.14	100.9
Jun-13	94.1	1989.20	3273	3838.21	100.8
Jul-13	93.6	2038.30	3363	3854.92	100.4
Aug-13	96.5	2011.31	3264	3796.24	100.3

Sep-13	97.5	2063.25	3369	3910.66	100.3
Oct-13	98	2084.45	3341	3951.68	100.3
Nov-13	99.1	1944.00	3191	3807.11	100.4
Dec-13	88.1	1959.98	3210	3932.33	100.3
Jan-14	78.8	2076.82	3254	3888.65	100.5
Feb-14	90.2	2022.12	3265	4021.78	100.5
Mar-14	83.7	2074.82	3407	4093.94	100.3
Apr-14	86.6	2187.48	3533	4230.46	100.9
May-14	84.4	2216.13	3630	4325.73	100.8
Jun-14	91.5	2162.98	3597	4323.57	100.7
Jul-14	95	2053.95	3332	4224.07	100.7
Aug-14	91.9	2120.48	3475	4322.08	100.4
Sep-14	101.4	2130.80	3536	4388.50	100.4
Oct-14	105.9	2202.57	3594	4457.26	100.3
Nov-14	98.4	2164.48	3516	4415.47	99.6
Dec-14	93	2158.49	3562	4403.12	99.5
Jan-15	92.1	2008.12	3401	4340.13	99.2
Feb-15	108.9	2008.12	3401	4340.00	99.1
Mar-15	96.9	2121.53	3482	4370.32	99.1

APPENDIX II: LAG LENGTH CRITERIA

VAR Lag Order Selection Criteria

Endogenous variables: DLNCPI LNM1 LNVMI

Exogenous variables: C

Date: 12/12/15 Time: 22:05

Sample: 2009M01 2015M03

Included observations: 68

Lag	LogL	LR	FPE	AIC	SC	HQ
0	247.8339	NA	1.50e-07	-7.200998	-7.103079	-7.162200

1	413.6556	312.1350	1.49e-09	-11.81340	-11.42172*	-11.65821*
2	425.5233	21.29189*	1.37e-09*	-11.89774*	-11.21231	-11.62615
3	430.1471	7.887796	1.56e-09	-11.76903	-10.78984	-11.38105
4	433.6153	5.610204	1.85e-09	-11.60633	-10.33338	-11.10195
5	439.2468	8.612923	2.07e-09	-11.50726	-9.940547	-10.88648
6	445.8289	9.485957	2.27e-09	-11.43614	-9.575674	-10.69897

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

VAR Lag Order Selection Criteria

Endogenous variables: DLNCPI LNM2 LNVMI

Exogenous variables: C

Date: 12/12/15 Time: 22:06

Sample: 2009M01 2015M03

Included observations: 68

Lag	LogL	LR	FPE	AIC	SC	HQ
0	238.6639	NA	1.96e-07	-6.931291	-6.833372	-6.892492
1	445.2834	388.9308*	5.86e-10*	-12.74363*	-12.35195*	-12.58843*
2	453.3917	14.54720	6.03e-10	-12.71740	-12.03197	-12.44581
3	459.4437	10.32405	6.61e-10	-12.63070	-11.65150	-12.24271
4	462.0240	4.173948	8.04e-10	-12.44188	-11.16893	-11.93750
5	468.2691	9.551335	8.83e-10	-12.36085	-10.79414	-11.74008
6	475.6679	10.66301	9.43e-10	-12.31376	-10.45329	-11.57659

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

VAR Lag Order Selection Criteria

Endogenous variables: DLNCPI LNM3 LNVMI

Exogenous variables: C

Date: 12/12/15 Time: 22:29

Sample: 2009M01 2015M03

Included observations: 68

Lag	LogL	LR	FPE	AIC	SC	HQ
0	232.6889	NA	2.34e-07	-6.755556	-6.657637	-6.716758
1	458.3953	424.8591*	3.99e-10*	-13.12927*	-12.73760*	-12.97408*
2	465.2879	12.36609	4.25e-10	-13.06729	-12.38185	-12.79570
3	472.6375	12.53751	4.48e-10	-13.01875	-12.03955	-12.63076
4	474.9758	3.782554	5.49e-10	-12.82282	-11.54986	-12.31843
5	480.6118	8.619778	6.14e-10	-12.72388	-11.15716	-12.10310
6	489.3231	12.55451	6.31e-10	-12.71538	-10.85491	-11.97821

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

APPENDIX III: GRANGER CAUSALITY

Pairwise Granger Causality Tests

Date: 12/12/15 Time: 22:41

Sample: 2009M01 2015M03

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.

LNM1 does not Granger Cause DLNCPI	72	0.76764	0.4681
DLNCPI does not Granger Cause LNM1		3.68691	0.0303
LNVMI does not Granger Cause DLNCPI	72	4.64879	0.0129
DLNCPI does not Granger Cause LNVMI		0.41992	0.6588
LNVMI does not Granger Cause LNM1	73	2.86451	0.0639
LNM1 does not Granger Cause LNVMI		1.91994	0.1545

Pairwise Granger Causality Tests

Date: 12/12/15 Time: 22:42

Sample: 2009M01 2015M03

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DLNCPI does not Granger Cause LNM2	73	0.03015	0.8626
LNM2 does not Granger Cause DLNCPI		0.01741	0.8954
LNVMI does not Granger Cause LNM2	74	0.07292	0.7879
LNM2 does not Granger Cause LNVMI		1.40138	0.2404
LNVMI does not Granger Cause DLNCPI	73	1.01710	0.3167
DLNCPI does not Granger Cause LNVMI		0.23226	0.6314

Pairwise Granger Causality Tests

Date: 12/12/15 Time: 22:44

Sample: 2009M01 2015M03

Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
DLNCPI does not Granger Cause LNM3	73	0.00067	0.9794
LNM3 does not Granger Cause DLNCPI		0.00054	0.9815
LNVMI does not Granger Cause LNM3	74	0.00034	0.9854
LNM3 does not Granger Cause LNVMI		1.62931	0.2060
LNVMI does not Granger Cause DLNCPI	73	1.01710	0.3167
DLNCPI does not Granger Cause LNVMI		0.23226	0.6314

APPENDIX IV: ESTIMATED VAR RESULTS

Vector Autoregression Estimates
Date: 12/12/15 Time: 22:46
Sample (adjusted): 2009M04 2015M03
Included observations: 72 after adjustments
Standard errors in ( ) and t-statistics in [ ]

	LNM1	DLNCPI	LNVMI
LNM1(-1)	0.509447	-0.007784	0.170644
	(0.10674)	(0.00893)	(0.22355)
	[4.77293]	[-0.87203]	[0.76332]
LNM1(-2)	0.346251	0.008246	-0.091501
	(0.09881)	(0.00826)	(0.20695)
	[3.50426]	[0.99792]	[-0.44214]
DLNCPI(-1)	-2.840472	0.061365	-1.944321

	(1.25459)	(0.10491)	(2.62768)
	[-2.26406]	[0.58491]	[-0.73994]
DLNCPI(-2)	0.536312	0.110250	0.779771
	(1.15608)	(0.09668)	(2.42135)
	[0.46391]	[1.14041]	[0.32204]
LNVMI(-1)	-0.057341	0.008084	0.761135
	(0.05915)	(0.00495)	(0.12388)
	[-0.96948]	[1.63439]	[6.14421]
LNVMI(-2)	0.070238	-0.012706	0.136252
	(0.05900)	(0.00493)	(0.12358)
	[1.19042]	[-2.57529]	[1.10257]
C	1.045968	0.016451	-0.148206
	(0.12875)	(0.01077)	(0.26966)
	[8.12393]	[1.52793]	[-0.54960]
R-squared	0.983713	0.213765	0.911729
Adj. R-squared	0.982210	0.141190	0.903581
Sum sq. resids	0.218956	0.001531	0.960499
S.E. equation	0.058039	0.004853	0.121560
F-statistic	654.3208	2.945422	111.8954
Log likelihood	106.4762	285.1389	53.24728
Akaike AIC	-2.763228	-7.726080	-1.284647
Schwarz SC	-2.541885	-7.504738	-1.063304
Mean dependent	7.338865	0.001072	4.067764
S.D. dependent	0.435141	0.005237	0.391482
Determinant resid covariance (dof adj.)		1.10E-09	

Determinant resid covariance	8.06E-10
Log likelihood	447.3194
Akaike information criterion	-11.84221
Schwarz criterion	-11.17818

Vector Autoregression Estimates

Date: 12/12/15 Time: 22:54

Sample (adjusted): 2009M03 2015M03

Included observations: 73 after adjustments

Standard errors in ( ) and t-statistics in [ ]

	LNM2	DLNCPI	LNVMI
LNM2(-1)	0.933459	0.002621	0.089314
	(0.01483)	(0.00191)	(0.04044)
	[62.9404]	[1.37308]	[2.20834]
DLNCPI(-1)	-0.001595	0.338413	-1.325622
	(0.79028)	(0.10170)	(2.15510)
	[-0.00202]	[3.32760]	[-0.61511]
LNVMI(-1)	-0.009305	-0.004423	0.865252
	(0.02019)	(0.00260)	(0.05506)
	[-0.46080]	[-1.70218]	[15.7136]

C	0.581778	-0.001763	-0.131899
	(0.07535)	(0.00970)	(0.20548)
	[7.72084]	[-0.18178]	[-0.64189]
R-squared	0.993355	0.252656	0.911242
Adj. R-squared	0.993066	0.220163	0.907383
Sum sq. resids	0.132955	0.002202	0.988721
S.E. equation	0.043896	0.005649	0.119705
F-statistic	3438.258	7.775655	236.1322
Log likelihood	126.6670	276.3444	53.43328
Akaike AIC	-3.360740	-7.461490	-1.354337
Schwarz SC	-3.235236	-7.335986	-1.228832
Mean dependent	7.752923	0.000636	4.060755
S.D. dependent	0.527155	0.006397	0.393339

Determinant resid covariance (dof adj.)	8.31E-10
Determinant resid covariance	7.02E-10
Log likelihood	458.5599
Akaike information criterion	-12.23452
Schwarz criterion	-11.85801

Vector Autoregression Estimates

Date: 12/12/15 Time: 23:01

Sample (adjusted): 2009M04 2015M03

Included observations: 72 after adjustments

Standard errors in ( ) and t-statistics in [ ]

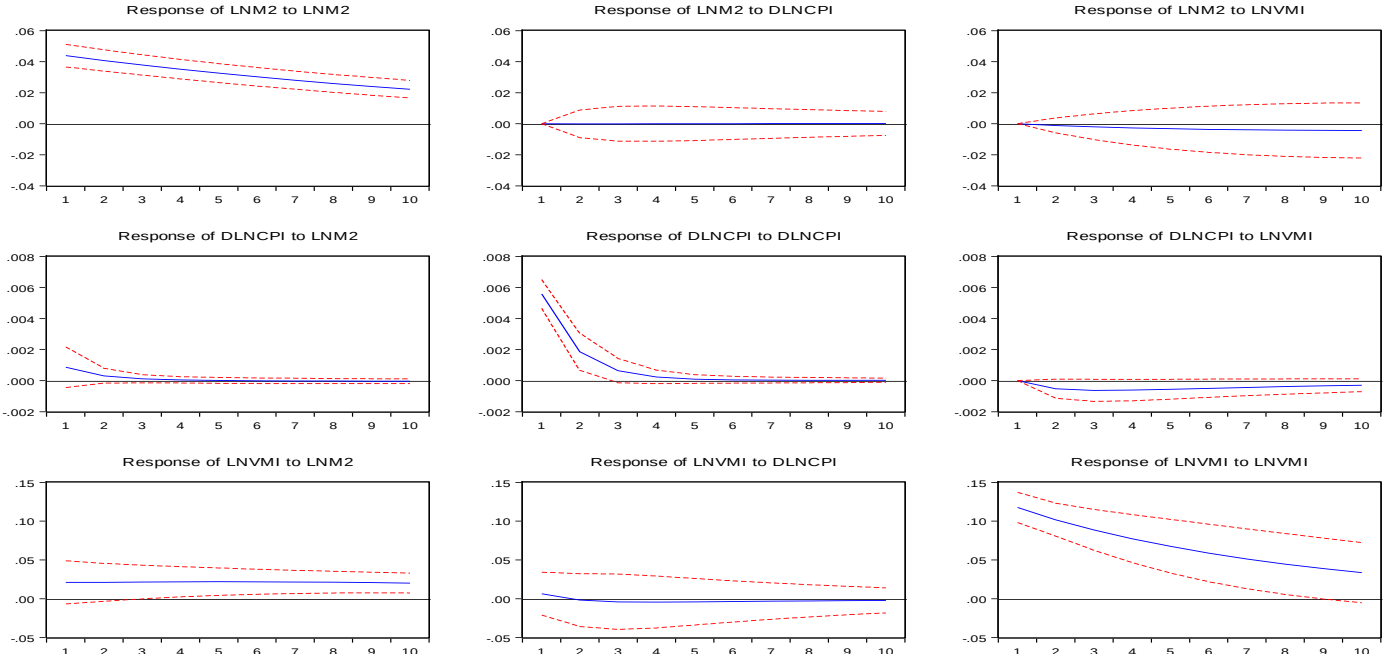
	LNM3	DLNCPI	LNVMI
LNM3(-1)	0.614893	0.010900	-0.143054
	(0.10997)	(0.01609)	(0.39964)
	[5.59153]	[0.67739]	[-0.35796]
LNM3(-2)	0.291204	-0.010069	0.199243
	(0.10283)	(0.01505)	(0.37371)
	[2.83181]	[-0.66920]	[0.53315]
DLNCPI(-1)	-0.558742	0.059580	-1.589062
	(0.73422)	(0.10743)	(2.66827)
	[-0.76100]	[0.55458]	[-0.59554]
DLNCPI(-2)	-0.101676	0.150122	0.445595
	(0.65134)	(0.09531)	(2.36706)
	[-0.15610]	[1.57517]	[0.18825]
LNVMI(-1)	-0.015211	0.007695	0.769550
	(0.03437)	(0.00503)	(0.12489)
	[-0.44262]	[1.53028]	[6.16188]
LNVMI(-2)	0.020819	-0.011324	0.109481
	(0.03415)	(0.00500)	(0.12410)
	[0.60963]	[-2.26625]	[0.88217]
C	0.760267	0.008678	0.071280

	(0.08031)	(0.01175)	(0.29186)
	[9.46664]	[0.73852]	[0.24423]
R-squared	0.996526	0.204742	0.912203
Adj. R-squared	0.996205	0.131333	0.904099
Sum sq. resids	0.072336	0.001549	0.955342
S.E. equation	0.033360	0.004881	0.121234
F-statistic	3107.676	2.789078	112.5579
Log likelihood	146.3479	284.7281	53.44109
Akaike AIC	-3.870776	-7.714669	-1.290030
Schwarz SC	-3.649433	-7.493326	-1.068688
Mean dependent	7.906228	0.001072	4.067764
S.D. dependent	0.541553	0.005237	0.391482

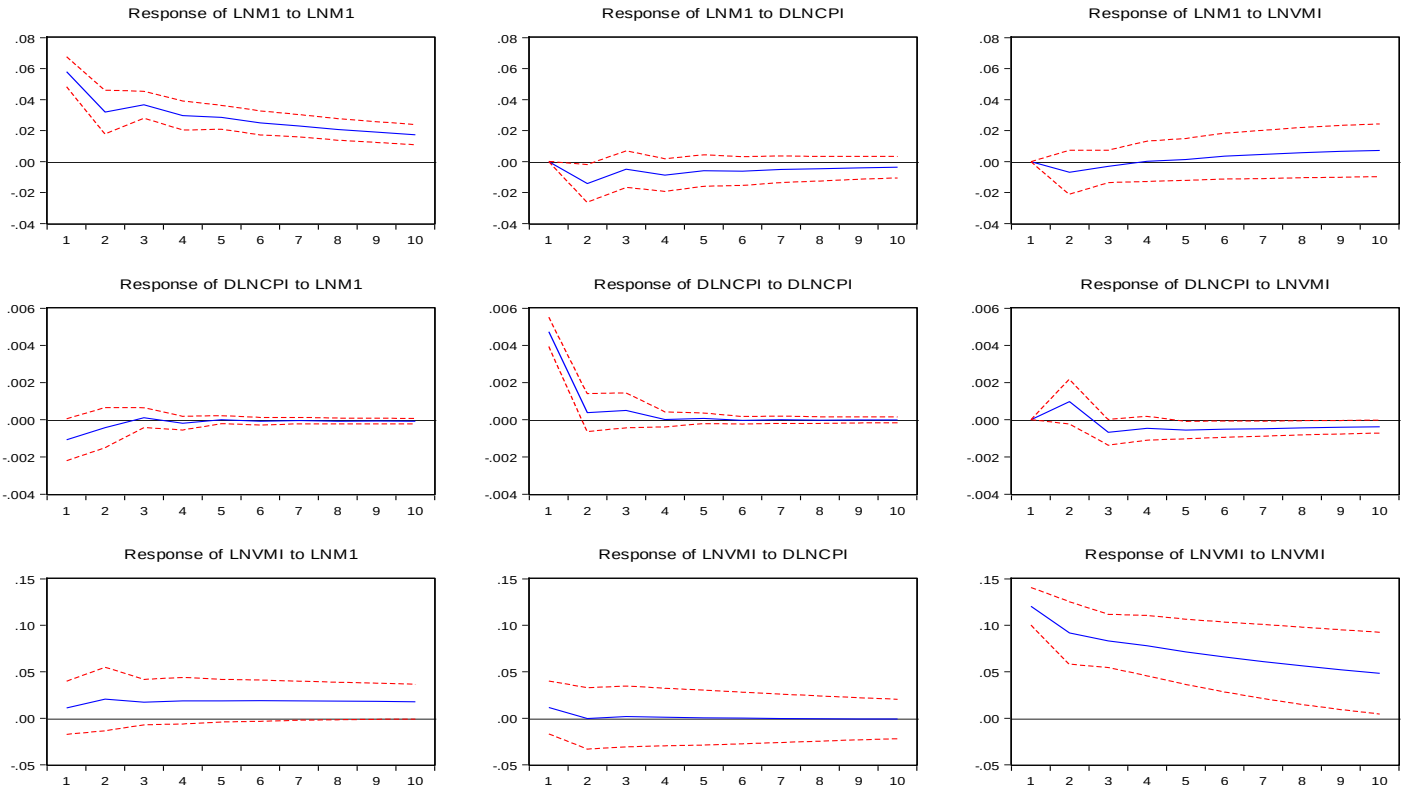
Determinant resid covariance (dof adj.)	3.74E-10
Determinant resid covariance	2.75E-10
Log likelihood	486.0094
Akaike information criterion	-12.91693
Schwarz criterion	-12.25290

APPENDIX V: IMPULSE RESPONSE FUNCTIONS

Response to Cholesky One S.D. Innovations ± 2 S.E.



Response to Cholesky One S.D. Innovations ± 2 S.E.



Response to Cholesky One S.D. Innovations ± 2 S.E.