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Editorial Note

This issue of SAJMR is dedicated to the fond memory of Late Prof. Dr. A. D. Shinde a renowned Chartered Accountant and Founder of SIBER Trust. It was his vision and untiring efforts that has led to the creation of the educational empire in Southern Maharashtra. Number of students from all over the country and especially students of rural areas have been immensely benefited from the educational programs initiated by Dr. A. D. Shinde. In his memory on the first anniversary, Dr. C. Rangarajan, Chairman, Economic Advisory Council to the Prime Minister of India delivered the first memorial lecture. We are happy to publish this memorial lecture as a lead article in the current issue.

Keeping in view the interdisciplinary approach of the journal the articles ranging from the fields of economics, finance, marketing and health care services have been selected for the present issue. All these articles are comprehensive in their coverage and use latest statistical tools for analyzing both the primary and the secondary data collected. These statistical techniques include factor analysis, reliability test and techniques of hypothesis testing and others. We are sure this issue of SAJMR would provide an excellent reference material both for the researchers and students from different disciplines.

As a continuing feature of the journal we have incorporated a Case Study for the benefit of the readers. This is followed by a book review on Future of HRM. In all the present issue covers wide range of issues from management area along with a case study. It is expected that these articles will provide new insights to readers and thereby encourage them for taking up further research on these lines.

Dr. T. V. G. Sarma
Editor

Income Velocity of Money in Ethiopia

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Abstract : Velocity of money can be defined as the average number of time that the national currency is moving from ones hand to the other. It can be defined as the ratio of nominal income divided by the stock of money (NGDP/M). The effectiveness of monetary policy depends on the predictability of income velocity of money. In Ethiopia it is found to be stable and predictable. Therefore the monetary authority by using monetary aggregate as intermediate targeting variable can control the price level which is a prime objective of monetary authority.
JEL Classification:

Key words: Income Velocity, Effectiveness of Monetary Policy, Ethiopia

1. Introduction

Velocity of money can be defined as the average number of time that the national currency is moving from ones hand to the other. It can be defined as the ratio of nominal income divided by the stock of money (NGDP/M).

The effectiveness of monetary policy is depends up on the stable function of velocity of money. If the income velocity of money function is stable it helps to predict the effects of the change in money supply on income, price and employment. But the stability of velocity of money remains a controversial issue by many researchers.

The predictability of income velocity of money is very important in the Ethiopian economy to use broad monetary aggregate as intermediate target variable.

2. Literature review

The economic system is functioning like a human body, in human body it is both the blood and its circulation that matters by the same token in the economic system it is not the mere existence of stock of money but also the velocity of money that plays a role in the well functioning of the economic system (Shuibo Sun: n.d.). In the classical economists idea since the nominal income is determined by movements in the supply of money then the velocity of money (PY/M) could be treated as constant (Mishkin: 2007). But Keynes by incorporating the speculative demand for money introduces the role of interest rate that affects the demand for money. So he argues that velocity is not constant since there is a substantial fluctuation in interest rate. Whereas according to Friedman change in interest rate has little effect on the demand for money therefore interest insensitivity of demand for money implies the predictability of the velocity of money by the monetary authority.

Traditionally velocity of money was considered as an analogue of the demand for real balance and taken as a function of income and interest rate which is a proxy variable of opportunity cost of holding money(Bordo, Joung and Siklos :1993). But Barodo and Joung (1990) in addition to these traditional determinants they argued that the income velocity of money is a function of changes in financial system. These change in financial institution passed through two phases which are monetization and the financial sophistication of the economy. At the stage of monetization there is a spread of banking services and increasing deposit and notes throughout the economy. In the case of the growth of financial sophistication the substitution of bank deposits and notes by financial assets will be undertaken. The sum of

these two factors leads to a "U" shaped curve of velocity of money. The falling part of the curve is due to the monetization of the economy and reaches its minimum when monetization of the economy is completed. The rising part of the curve indicates the substitution of deposit and notes by financial assets and stable economic system. The more stable the economic environment, the more it reduces the demand for precautionary balance and increases the income velocity of money.

Arnold (1996) explained in the following way how we measure monetization and financial sophistications that gives "U" shape for income velocity of money.

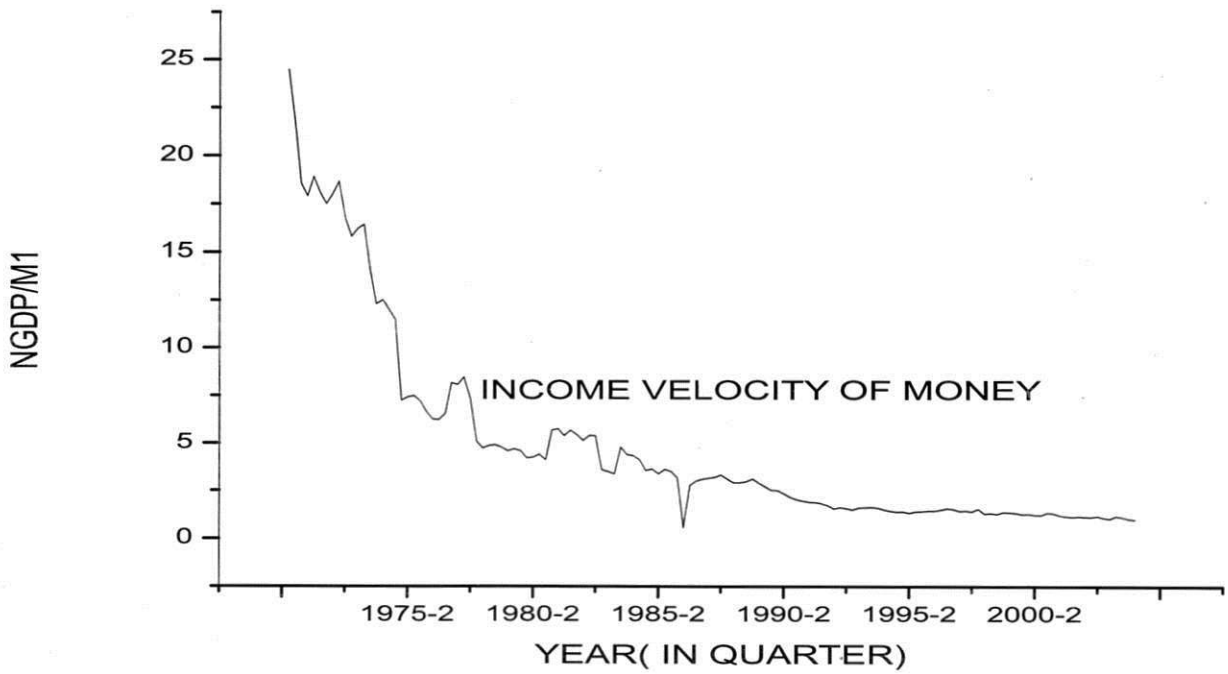
i. The process of monetization and spread of commercial banking represented by the share of agricultural lab our force in non agricultural sector and the currency money ratio.

ii. The proxy of financial sophistication is the ratio of total non bank financial asset to total financial assets.

iii. Economic stability is measured by standard deviation of the annual percentage change in per capita income of the six years moving average.

The income velocity of money (NGDP/M1) in Ethiopia is not constant rather it is continuously declining. The income velocity of money is continuously declining at an increasing rate especially during the majesty period. In this period after the National bank of Ethiopia came in to being in1964 more private banks started to flourish and commercial bank of Ethiopia (owned by the government) expands its branches. Due to this there is a sharp decline in the velocity of money in the country as it is clearly shown in figure 1. But after this period, following the communist regime, due to confiscation of private banks by the government and the limit imposed on the interest rates paid on savings the public developed fear and hoard cash rather than putting their money in the banks. As it can be seen from graph-1- below the velocity of money is declining at a slower rate after 1975 up to1991. After the current regime came to power in 1991 there is a continuous declining in the income velocity of money. The factors contributed for the declining of income velocity of money in the current

Figure-1- Income Velocity of Money



Source: National Bank of Ethiopia

i. Privatization: The economic system which was regulated by central planning for seventeen years changed in to market friendly economic system. Due to this many private enterprise flourished and injects dynamism in the social, psychological and institutional aspects of the economy

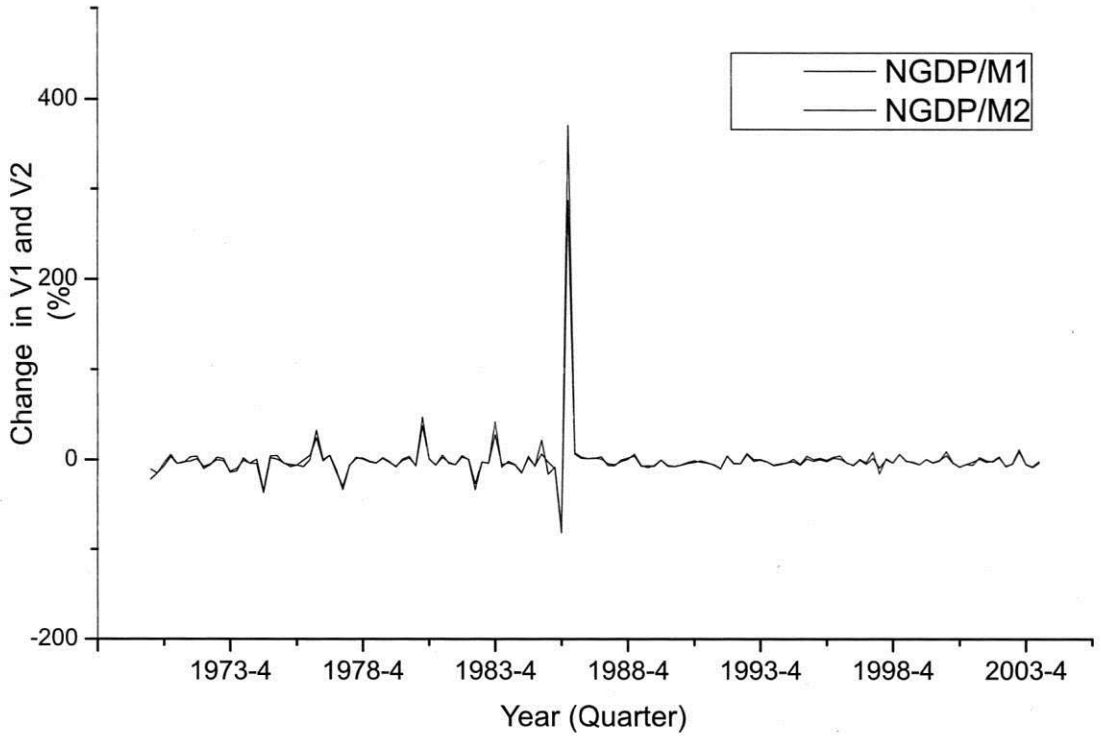
a. The financial behavior of saving, depositing, borrowing, lending are changed by the financial institutions, the private business sectors and individuals.

b. The behavior of individuals custom in competitiveness and business has changed.

ii. Liberalization of the financial sectors: one of the major reforms in the financial sector was the emergence of domestic private banks which creates competitiveness in the banking sector. In addition the expansion of saving and credit associations branches in many parts of the country's rural area which were not accessible for banking services in the preceding regimes. With the expansion of banking sectors in Ethiopia changes are occurred in service efficiency, increase in financial transactions, loan distribution techniques, channeling idle resources in to the banking system e.t.c. The establishment of Micro financial Institutions in the rural area further increases the monetization of the rural economy by providing credit and saving access. Liberalization of the lending and deposit rates by setting only the floor by the government and market determined managed floating exchange rates are part of the liberalization which creates competitiveness in the financial sectors.

But we don't have the upward portion of the income velocity of money due to the fact that the economy lacks financial sophistications. Lack of financial sophistication in the economy means the public do not have options to substitute the demand deposit, time deposit and cash in to financial assets due to the non existence of capital market and the limited role of money market in the economy. Therefore in Ethiopia there is an increasing monetization of the economy by expanding the banking sectors and Micro finance institutions. But there are no financial sophistications due to the non existence of capital market in the country.

Figure -2- Rate of change in Velocity from quarter to Quarter



During the Derge regime (1974-1991) the growth rates of income velocity of money (NGDP/M1) was exhibited large swings of up and down as shown in figure 2. This was due to the substantial economic volatility following the socialist government which the period was characterized by command economy, drought and war. Even though during the present regime the income velocity of money is moderate, there is a difference in the growth rate of income velocity of money from quarter to quarter. For example if you are taking the year 2003 of quarter two to quarter three it was 12.12% and -4.7878% is from quarter three to the fourth quarter of the same year. The difference between the two consecutive periods reveals that the nominal GDP was lower by 16.91% than it would have been if velocity had been constant or growing at rate of the year 2003 quarter three to four. If you take the same comparison of income velocity of money (broad money which is M2 in Ethiopian case) had velocity of M2 was constant for the same period the percentage change in NGDP/M2 from 2003 quarter two to quarter three was 10.289% and -4.79% for quarter three to four of the same year. This implies that had income velocity of broad money was constant the nominal GDP was lower than 15.08% than it would have been. After 1991 income velocity of broad money (NGDP/M2) remained more stable than income velocity of narrow money (NGDP/M1). The quarterly rate of change of income velocity of narrow money is 6.5% which is much higher than the rate of growth of (NGDP/M2) broad money by more than 2.1%. This is the right measure to use broad money aggregate as intermediate target variable of monetary policy.

3. Data and Model Specification

Short (1973) used Velocity as a function of interest rate, number of banks as a proxy measure of financial institutions development, real income (RGDP) to estimate the income velocity of money in Singapore and Malaysia for the period 1951-1966. He found that income velocity of money is negatively related with GDP and positively related with number of banks and interest rate turns out to be insignificant. And Akhtaruzzaman (2008) used C/D, DD/TD, real income, interest rate paid on deposit and consumer's price index was used in estimation of velocity of income in Bangladesh. Again here the financial development was measured using proxy variables. Also Owoye (1997) to estimate the variability of income velocity of money for 30 developing countries using the conventional equation of exchange and arrived at mixed results. To estimate the income velocity of money in Ethiopia we use the following specification.

$$M_2 V = PY \quad \text{.....1}$$

Where:

M2	=	Broad money which a simple sum of currency plus demand deposit
V2	=	Income velocity of money defined as a ratio of nominal gross domestic product to broad money (NGDP/M2).
P	=	Inflation rate proxies by consumer's price index (CPI)
Y	=	Real Gross Domestic Product (RGDP)

The superiority of this specification over the other specifications is that it does not use proxy variables to measure financial developments where in a country financial asset and financial market developments are limited. In addition to this the model used by Sort (1973) and Akhtaruzzaman(2008) had the following short comings to use in Ethiopian:

i. The number of bank branches shows only the rate of transaction under taken by the economy,
ii. Currency to deposit ratio and demand deposit to time deposit ratio are determined by the growth of income , the higher the income the lower the currency to deposit ratio and demand deposit to time deposit ratio and vice versa.
iii. The deposit rate of interest available in Ethiopia was not market determined therefore it does not show the opportunity cost of holding money.

By transforming equation number 1 in to logarithmic form and by rearranging we can estimate the following model.

$$LnV = \alpha LnY + \beta_1 LnP - \beta_2 LnM + \varepsilon_t \text{ ----------2}$$

3.1 Expected sign and magnitude of the parameters

i. The sign of real income is expected to be negative because as it is shown in figure 2 the velocity of money is at a declining stage which shows that as real income increases velocity of money declines. In addition the country is not in financial sophistication stage. Had the country been in financial sophistication stage the sign of real income would have been expected to be positive.

ii. The sign of the inflation rate is expected to be positive or negative. Here inflation rate is the most appropriate measure of opportunity cost of holding money than nominal interest rate because rate of interest is not market determined in Ethiopia. Due to this reason we use inflation as a proxy of opportunity cost of holding money. If the expected sign of inflation is

a. Negative and significant: It shows as inflation increases the value of money declines and the public wants to hedge themselves by substituting money for real assets..

b. Positive and significant: The implication will be the public holding of money increase as inflation is raising or as inflation increase the public increase their expenditure which in turn increases their demand for money for transaction purpose and finally that will increase the velocity of money.

iii. And the sign of monetary aggregate is expected to be negative for the simple reason that as the amount of broad money increases the turnover of money from hand to hand will come down and vice versa.

4. Empirical Results

4.1 Data: The data in this study covers from the second quarter of 1972 up to the second quarter of 2004. The variables used to estimate income velocity of money are tested for stationary using PP test. Income velocity of money and broad money are stationary in levels where as real income and consumer's price index appeared to be non stationary in levels. But they are stationary in the first difference as it can be seen from table 1.

Table -1- Unit Root Test (Phillips -Perron)

Variables	Levels	First difference
LnV	-2.7*	
Ln RGDP	6.3	-3.4*
Ln CPI	2.9	-8.4
Ln M2	-6.3*	

4.2 Co integration

Had all the variables been non stationary we would have been using co integration analysis but since fifty percent of the variables are stationary in levels we cannot apply co-integration analysis rather we use Granger causality test and innovation accounting analysis. This implies that there is no long run relationship between income velocity of money and its determinants in Ethiopia for the study periods. To put it differently, no long run causality exists between income velocity of money and its determinants this challenge the monetarist view. By using Impulse response function and variance decomposition analysis we will get the dynamic effects of the variability of the independent variables on the dependent variable in the short run. Therefore, it is not advisable to estimate equation number 5.2. using VECM method to get the long run and short run relationship between variables. Only the short run relationship can be obtained by applying VAR, finding lag length and undertake the Granger causality test and accounting innovations analysis.

1.3 Granger causality test

The relationship between the dependent variable which is the income velocity of money and its determinant variables such as real income, consumer's price index and broad money is tested using Granger causality and the results are presented in table-4. Due to this first we take the first differences of these variables to make them stationary and then we can apply Granger causality test. Before proceeding further we have to determine the lag length which is important in finding Granger causality test. On the basis of Akaike Information Criterion the maximum number of the lag length is four and the VAR model is stable means no roots lies outside of the unit circle.

Table 2- Granger Causality Test

Null Hypothesis	F-Statistic	Probability
LnV2 does not Granger Cause LnM2	2.19175*	0.07378
LnM2 does not Granger Cause LnV2	1.84794	0.12393
LnRGDP does not Granger Cause LnV2	2.85051**	0.02666
LnV2 does not Granger Cause LnRGDP	2.37837*	0.05544
LnCPI does not Granger Cause LnV2	2.80676**	0.02854
LnV2 does not Granger Cause lnCPI	2.38337*	0.05501
LnRGDP does not Granger Cause LnM2	3.45709***	0.01029
LnM2 does not Granger Cause LnRGDP	3.04515**	0.01966
LnRGDP does not Granger Cause LnCPI	1.22568	0.30343
LnCPI does not Granger Cause LnRGDP	1.44624	0.22281
LnCPI does not Granger Cause LnM2	1.64360	0.16756
LnM2 does not Granger Cause LnCPI	1.68162	0.15849

Note: D means first difference in the variable and *, ** and*** means significant at 10%, 5% and 1% level respectively.

The Granger causality test reveals that there is a uni- directional causality relationship between income velocity of money and broad money supply that is running from income velocity to broad money which is significant at 10% level.

The policy implication of the non existence of Granger causality from broad money supply to income velocity shows that the money supply has low volatility effect on the income velocity of money which confirms that broad money aggregate is a useful monetary policy tool. Or the behavior of income velocity of money is predictable by monetary authority which helped them in achieving their goal of price stability. Therefore, any discretionary or rule based monetary measure cannot induced any considerable shocks to nominal income which would bring fluctuations in the general price. From this we can bring out two conclusions

- Since there is a stable income velocity of money then a change in money supply will have a change in the general price, then the monetary authority by gradual reduction in the money supply can reduce the problem of inflationary pressure.
- Given this stable or non variability of income velocity of money with a change in money supply the aggregate economic activity can be regulated by the monetary authority.

There is also a bi-directional causation between income velocities of money to real income and income velocity of money and consumer's price index. In the interaction of other variables only the broad money supply and real income are granger cause with each others. The Granger causality test that we failed to reject the alternative hypothesis imply the past values of the variables appear in the right hand (independent variables) side of the equations explain the dependent variables. Or simply means that the dynamics of the relationship between these variables are mainly contemporaneous. Granger causality test is a test of the null hypothesis that the lagged values of the other variable does not contain important information in the prediction of the dependent variables. Since it is a statistical analysis it does not explain how the external or internal shocks affect the other variable in the model. For this purpose we use impulse response function and variance decomposition analysis. In this analysis we used VAR analysis to describe and characterize the dynamic behavior of the variables and it is possible to explain these dynamic relationships of a VAR system through impulse response function and variance

decomposition analysis (Brandt and Williams: 2007).

4.4 Variance decomposition and impulse response analysis

To explain further the short run dynamic properties of the relationship between income velocity of money and its determinants we employ the variance decomposition and generalized impulse response analysis.

4.5 Forecast Error Variance Decomposition

By definition the forecast variance decomposition shows the proportion of forecast error variance for each variable that is attributed to its own innovation and to innovation in the other exogenous variables. This method provides complementary information on the dynamic behaviors of the variables used in the study. In this analysis it is possible to decompose the forecast error in each variable in to the contributions by each of the different shocks. Brandt and Williams (2007) the forecast error decomposition is based on how much the fitted model is differs from the actual values of the vector of endogenous variables. And the variance of these errors is decomposed and the percentage of forecast variance due to each endogenous variable is determined. If the variables are exogenous the innovation in one variable does not explain the variation in other variable. If they are contemporaneously correlated the variables in one variable can begin to explain the other with a lag. The results of variance decomposition which complement the Granger causality test are presented cn the following table.

Table -3- Forecast Error Variance Decomposition

Panel - A Variance Decomposition of D(LNV2)					
Period	S.E.	D(LNV2)	D(LNM2)	D(LNCPI)	D(LNRGDP)
1	0.179140	100.0000	0.000000	0.000000	0.000000
2	0.195656	97.12043	1.081376	0.093209	1.704988
3	0.197797	95.07992	1.297091	0.111008	3.511977
4	0.198066	95.05384	1.302403	0.117599	3.526154
5	0.198182	95.04686	1.302205	0.120998	3.529940
6	0.198200	95.03340	1.303923	0.121933	3.540746
7	0.198202	95.03218	1.305060	0.121972	3.540784
8	0.198203	95.03207	1.305118	0.121972	3.540839
9	0.198203	95.03182	1.305130	0.121991	3.541058
10	0.198203	95.03180	1.305 136	0.122000	3.541068

Panel - B Variance Decomposition of D(LNM2)					
Period	S.E.	D(LNV2)	D(LNM2)	D(LNCPI)	D(LNRGDP)
1	0.177435	96.80879	3.191205	0.000000	0.000000
2	0.195807	94.91815	3.546863	0.043911	1.491077
3	0.197446	93.38118	3.5882 25	0.118964	2.911633
4	0.197770	93.39661	3.579977	0.120525	2.902891
5	0.197899	93.37372	3.575392	0.124127	2.926764
6	0.197910	93.36581	3.577340	0.124472	2.932382
7	0.197912	93.36452	3.578607	0.124520	2.932351
8	0.197913	93 .36449	3.578616	0.124541	2.932354
9	0.197913	93.36438	3.578669	0.124549	2.932403
10	0.197913	93.36437	3.578671	0.124551	2.932404

Panel - C Variance Decomposition of D(LNCPI)					
Period	S.E.	D(LNV2)	D(LNM2)	D(LNCPI)	D(LNRGDP)
1	0.039974	0.157488	5.293018	94.54949	0.000000
2	0.041299	0.533198	6.572585	92.50619	0.388022
3	0.042775	0.872423	10.07513	86.35529	2.697159
4	0.043205	1.032565	9.957561	84.64801	4.361864
5	0.043313	1.031604	9.923044	84.34147	4.703881
6	0.043357	1.056734	9.903595	84.21602	4.823647
7	0.043373	1.056097	9.904919	84.15987	4.879119
8	0.043377	1.056059	9.905592	84.14532	4.893035
9	0.043379	1.056003	9.905068	84.14101	4.897916
10	0.043379	1.055985	9.904849	84.139 08	4.900091

Panel - D Variance Decomposition of D(LNRGDP)					
Period	S.E.	D(LNV2)	D(LNM2)	D(LNCPI)	D(LNRGDP)
1	0.029820	0.016729	38.59122	13.61851	47.77354
2	0.032256	4.610347	33.13343	11.69846	50.55776
3	0.032266	4.608073	33.11290	11.70693	50.57210
4	0.032332	4.660536	33.06326	11.79279	50.48342
5	0.032340	4.674316	33.04663	11.79338	50.48567
6	0.032342	4.673856	33.04974	11.79603	50.48038
7	0.032342	4.675390	33.04903	11.79657	50.47901
8	0.032342	4.675376	33.04922	11.79656	50.47884
9	0.032342	4.675402	33.04923	11.79658	50.47879
10	0.032342	4.675402	33.04924	11.79657	50.47878
Note: Cholesky Ordering: D(LNV2) D(LNM2) D(LNCPI) D(LNRGDP)					

How one standard deviation shock to innovation in each variable is transmitted in to the other variables are presented in the above table -3- of four panels (Panel A, B, C and D) which the ordering is given as velocity , broad money supply, consumers price index and real gross domestic product explained as follows.

Panel A: A shock arising from income velocity of money.

A standard deviation initial shock to the income velocity of money is absorbed 100% by the velocity of money itself. This means the other variables do not have any effect on the income velocity of money immediately. But after the second quarter the other variables such as broad money supply, consumer's price index and real income have effect on velocity of money which accounts 1.08%, 0.09%, 1.75% respectively. For the entire ten quarter or two and half years the effects of money supply, consumer's price index and real income on velocity of money following the shock arising from velocity of money innovation is negligible never exceeding more than 5% of their sum. The variation in income velocity is highly affected by its own shock than the other variables. It shows that the variation arising from income velocity accounts more than 95% of its own shock and the next is coming from the real income. The impact of money supply on velocity of money is very small and constant over the periods. This implies the velocity of money is not affected by money supply and the velocity of money is predictable by monetary authority.

Panel B : Variance decomposition arising from money supply

In table -3- panel B we can see the effects of one standard deviation shock that arises from the broad money supply. The innovation shock from money supply causes an immediate change in the income velocity of money and the resulting change in velocity of money has

96.8% effect on broad money supply. But the remaining variables do not have immediate effect on money supply in the first quarter. The shock arising in broad money supply (which is one standard deviation) is absorbed by velocity of money than the money supply itself. It means whenever there is a shock in money supply it is absorbed by the income velocity of money and immediately affects the money supply. This is confirmed by the Granger causality that runs from velocity of money to money supply, which is explained in table 2.

From this shock the effects of consumers price index and real income on broad money supply accounts only 3% over the ten quarters and the lion share of 93% is coming from the velocity of money and the remaining is absorbed by the broad money supply itself. Generally we can say that innovation in broad money supply have large impact in predicting the forecast variation of income velocity of money. Therefore, the fluctuation in the broad money supply does not bring volatility in the income velocity of money.

Panel C : A shock started from consumer's price index.

From this panel we can trace the variation in consumer's price index and other variables such as income velocity, money supply and real income due to an initial shock of one standard deviation to consumer's price index. This shock has an immediate effect on consumer's price index, broad money supply and velocity of money but it does not have effect on real income. In the first quarter 94.5% of the shock absorbed by inflation itself and the remaining 5.2% and 0.15% are accounted by broad money supply and income velocity respectively. The first quarter change in inflation has impact on money supply, income velocity and in turn these variables have an effect on inflation in quarter two. In quarter two for the variation in inflation broad money supply accounts 6.6%, income velocity 0.53% real income 0.39% and inflation itself contributes 92.5%. The influence of money supply changes from quarter two to quarter three by 53.3% and the change remains constant after the fourth period. The influence of other variables due to a unit standard deviation shock arising from inflation increases from time to time. By the end of two and half years the total variation of inflation accounted by money supply is 9.9%, real income 4.9% and income velocity 1.05%. Inflation also accounts by 84%.of its own variation of that time. This reveals that in Ethiopia money supply does not affect inflation.

Panel D : Variance decompositions running from real income to the other variables.

Own shock of real income ranged from 47.7% to 50.5% over the ten quarters and also broad money supply accounts the forecast error variance of real income ranged from 33% to 38.5%. The persistent of past shocks of real income after two and half years of the shock explains about 50.5% of the variation in its own shock and while money supply, inflation and income velocity accounts 33.1%, 11.8% and 4.67% respectively. This is supported by the Granger causality test presented on table number 2.

The salient features of variance decompositions applied on the income velocity of money (panel A) reveals that the predominant source of fluctuations in the income velocity of money is largely due to variations in its own shocks and by real income but the contribution of money supply is insignificant which 1.3% over the ten quarters is. In conclusion we can say that the forecast error variance decomposition of money supply is a better predictor of income velocity of money because the variation in income velocity is not affected by money supply.

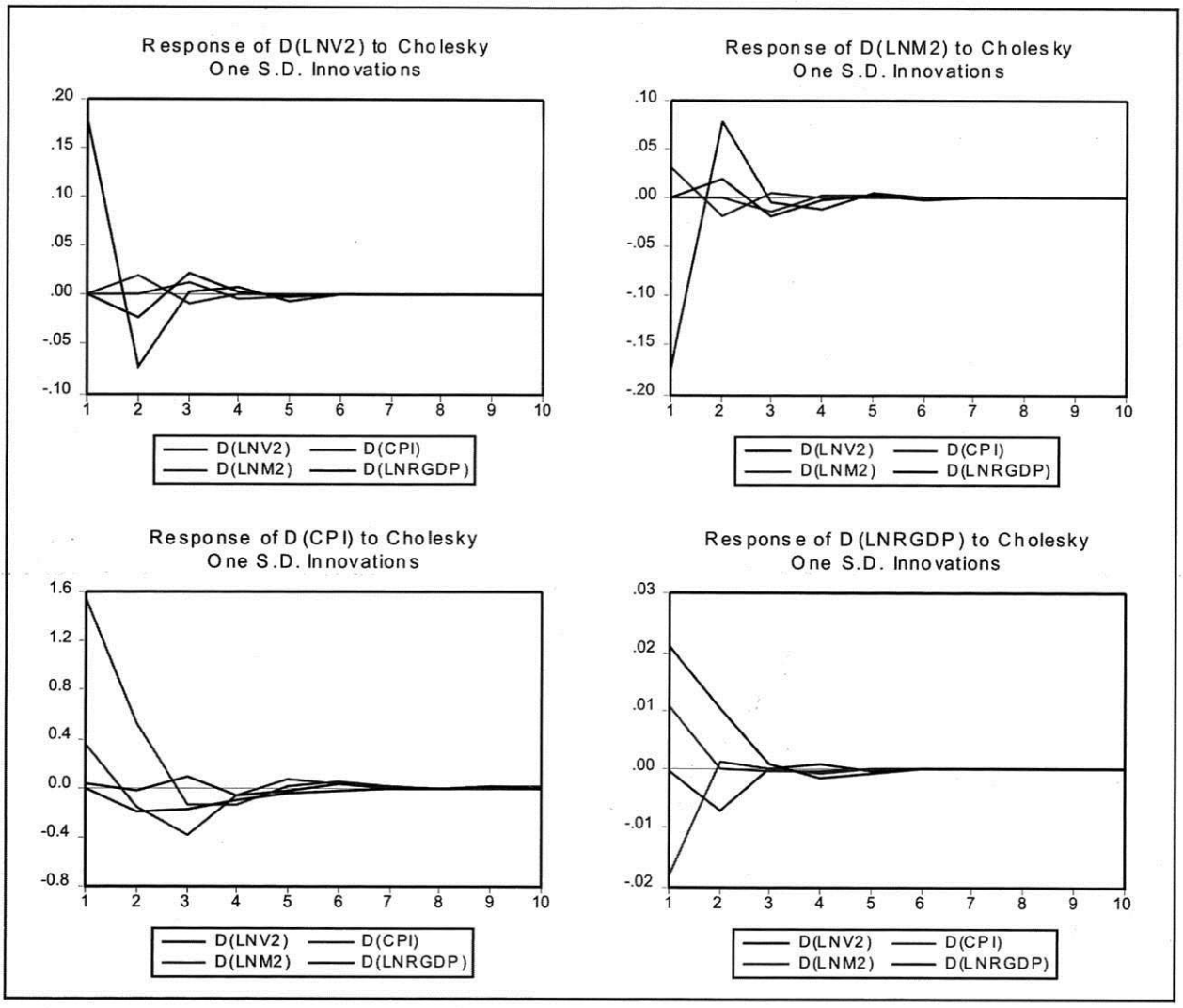
The unexpected change in broad money supply arising due to a one standard deviation shock to money supply (Panel B) have a small effect on the innovation in velocity of money that is not more than 3.6%. But the innovation in the income velocity of money arising due to a one standard deviation shock of broad money supply have a large impact in predicting the forecast error or variation of broad money supply. Which is supported by the Granger causality that income velocity granger cause the broad money supply. To conclude the variability of income velocity of money in Ethiopia is not influenced or arising from the fluctuation of broad money supply. But this is contradictory with Oluwole (1997) study of thirty less developing countries including Ethiopia found that large proportion of the variability in income

velocity of money is stemmed from volatility in the growth of money supply.

4.6 Impulse response Function

The impulse response allows us to analyze the dynamics of a VAR model by converting in to its vector moving average (VMA) representation. This method used to trace out the dynamic impacts of changes in each of the endogenous variables over time. Impulse response can be defined as the response of endogenous variables to a unit shock change to innovations.

Figure -3- Impulse Responses to Generalized One S.D Innovation



Using the above impulse response function of figure-3-we can interpret the relationship between variables as follows.

4.7 The income velocity of money

Innovation which has been shocked by one standard deviation of the income velocity residuals caused the income velocity to increase by 0.1797 percent. It means the velocity of money increases by the total amount of shock emanating from its own residuals in the first round. Or the innovations coming from the residual of income velocity money is fully absorbed by the velocity itself in the first quarter. In the second round (one period ahead) income velocity declined by 0.0723 percent relative to the base period as a result of exogenous shock to income velocity of money.

Whereas broad money supply and consumer's price index increased income velocity by .001995% and by 0.0019% respectively but RGDP reduced it by 0.022% and so on. The effects of all the variables are dying after quarter six.

4.8 Broad money supply

A one standard deviation shock to broad money supply increase money supply by 0.0316% and quickly dies out after quarter four. The same shock does not have any innovation effect from CPI and RGDP. Or CPI and RGDP do not have innovation effect on money supply in the first round. But by the second round money supply declined by 0.0184% relative to the base year as a result of the exogenous shock to broad money supply and increased by 0.078%, 0.0015%, 0.02% as a result of shock from income velocity, CPI and RGDP respectively. All the variables effect dies out after the 5th quarter.

4.9 CPI

A one standard shock arises from CPI residual will increase it by 1.54% initially and gradually dies out at quarter eight or after two years. From the same shock the innovation coming from broad money supply and income velocity reduces CPI by 0.17% and 0.037% respectively in period one. But after quarter two the shock will have its innovation until it die out in period nine.

4.10 Real GDP

Finally if we look at the RGDP residual shock in the first quarter it increases RGDP by 0.021% and the innovation from broad money supply and income velocity decreased RGDP by 0.0005% and 0.018% respectively where as CPI increased it by 0.011%. Almost all the variables die out before quarter seven.

5. Policy Implications

From the above analysis we found that the income velocity of money is stable or it is not affected by the change in money supply in Ethiopia. The policy implication of this finding is stated as follows.

i. When the growth of money supply Granger cause income velocity of money it is impossible to predict the future behavior of income velocity of money by monetary authority. Therefore the instability of the income velocity of money following a change in the money supply will affect the objective of price stability by monetary authorities. Hossain (2009) found that it was due to this reason the unstable income velocity of money that the Philippines monetary authority switched in to inflation targeting in 2002 under flexible exchange rate system. Generally the unpredictable volatility in the velocity of money violates the basic assumption in the conduct of monetary policy. It means monetary aggregates cannot be used as reliable intermediate target variables because either it becomes to less controllable or the relationship between their growth rate and economic activities are weakens. And the only option available for the monetary authority is to use rate of interest rate as intermediate variable which is impractical to a country like Ethiopia where there is no capital market and with a limited money markets. If it is exercised even for emerging economies it is very dangerous because they lifted control in capital flows.

ii. Velocity of money is a constant function not a single number then velocity can vary systematically and predictably in response to variables in the function. This implies that a growth rate of money supply becomes a key determinant of inflation in the long run. Therefore, if the growth of money supply do not give rise to volatility in the income velocity of money, then it is possible to curtail down inflation by controlling money supply growth. Therefore from the analysis we obtained that the variation in the income velocity of money in Ethiopia is not affected by the volatility of money supply then we can recommend or support to use broad money as intermediate target variable of monetary policy.

iii. When an increase in money supply is followed by an opposite and equal movement in the velocity of money, then the shock will not be transmitted to the price level or output. Any expansion in money supply would be completely absorbed by a change in the velocity of money, without any change in output or the price level. Therefore, the direction and extent of the movement of velocity of money have profound implications for the reliability and

effectiveness of monetary policy in bringing changes in output or the price level. This implies that when there is variability in the income velocity of money the use of monetary aggregate to regulate aggregate economic activity may be highly questionable.

iv. The stability of income velocity of money confirms the long run stable relationship between the growth of money and nominal income growth. But if there is variability in the growth of income velocity it will break the long run relationship between money growth and nominal income growth. And at this time discretionary or rule based monetary policy could results considerable shock in nominal income which would brought price fluctuations and very difficult to achieve price stability in the economy. Due to the variability of income velocity of money targeting nominal GDP could result significant economic destabilization.

v. Whenever there is a stability of income velocity of money the central bank has full control over money supply since money multiplier is stable and income velocity is predictable.

References

Akhtaruzzaman, M. (2009). Financial Development and Velocity of Money in Bangladesh : A Vector Auto-Regression. Policy Analysis. Bangladesh Bank. down loaded from_www.bangladesh-bank.org_on Nov29/2011.

Arnold, I.J.M. (1996). Stochastic Trends in The Long-run Behavior of Velocity : Anew Test of Institutional Hypothesis. Journal of Policy Modeling. Vo.18. No.6 Pp.623-641.

Bordo, M.D. , and Jonung , L.(1990). The Long-run Behavior of Velocity : The Institutional Approach Revisited. Journal of Policy Modeling. Vol. 12. Pp. 165-197.

Bordo,M,D., Jonung ,L. and Siklos, P.L. (1993). The common Development of Institutional Change as Measured by Income Velocity. A Centaury of Evidence from Industrial Countries. NBER working Paper.

Brandt, P. T. and Williams, J.T. (2007). Multiple Time Series Model. (London: Sage publications, Inc.)

Hossain , A.A. (2009). Central Banking and Monetary Policy in Asian Pacific. (U.K. Edward Elgar.)

Mishkin, F.S. (2007). The Economics of Money, Banking, and Financial Markets. 7th Ed. (New York: Person Addison Wesely.)

Oluwole, O. (1997). Income Velocity and the Variability of Money Growth: Evidence from Less Developed Countries. Journal of Applied Economics. Vol.29. No.4. Pp. 485-496.

Owoye, O. (1997). Income Velocity and Variability of Money Growth: Evidence From Less Developed Countries'. Applied Economics . Vol. 29. No. 4. Pp. 485- 496.

Short, B.K. (1973). The Velocity of Money and Per Capita Income In Developing Economies: Malaysia and Singapore. Journal of Development Studies, Vol.9. Pp. 291-300.

Sun, S.(n.d.). Does Transaction Velocity of Money Work on GDP ? An Empirical Study. Un published Paper.