

Economic Transformation in Bangladesh and the Income Velocity of Broad Money: An Econometric Analysis

Ms. Sharmina Khanom

Lecturer, Department of Economics and Banking, International Islamic University Chittagong, Bangladesh

Abstract

This study has undertaken an econometric analysis of economic transformation and income velocity of broad money. To find out the relevant determinants of income velocity of money this paper used time series data on year basis. This paper focus to discover the key determinants of the velocity of money in Bangladesh using the Augmented Dicky Fuller (ADF) unit root test to inspect the stationary, Engle-Granger residual-based cointegration approach to demonstrate the co-integrating association among variables. The main conclusions of this paper are: (i) relationship exists between the velocity of money and financial development. Other important variables that determine GDP growth show a negative relationship with the velocity of money but maintain a positive relationship with the deposit interest rate. Finally, this study concludes by giving some policy recommends for Bangladesh with respect to the velocity of broad money and the monetary policy.

Keywords: Velocity of broad money; Financial development; GDP growth; Unit root test; Co-integration.



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1. Introduction

The income velocity of money (IVM) is very vital in designing and accomplishing monetary policy. The number of times that a unit of money is exchanged on the total charge of goods and services produced per year is defined as the income velocity of money. Indeed, the mathematical value of the velocity of money and its determining elements perform a vital role in ensuring the effectiveness of monetary policy for ensuring monetary stability, price stability, and sustainable economic growth according to economy's potentials.

In the mid-80s, the global economy goes through a deep and curtail financial reform including Bangladesh. The core objectives behind thus reform were to reform and boost up the financial sector as a whole. But the reform turned into a global financial instability. This financial instability cause shifts in money velocity and this break the rigid link between money and income. Therefore financial instability turns into monetary instability.

Therefore, reliable estimates of income velocity of money and its forecasts are significant to conduct proficient monetary policy operations. Consequently, when the income velocity of money is erratic, the demand for money is likely to be unstable making the standard relationship between GDP, inflation, and money supply undecided. Thus devoting to the weak effect of monetary policy.

2. Review of Literature

By using cross-section data of 37 industrialized and less developed countries [Ezekiel \(1969\)](#) have investigated the deeds of income velocity of money of post-war period. They didn't draw any conclusion about the velocity of currency but the found an inverse association between income level and velocity of narrow and broad money. ([Ezekiel, 1969](#)).

[Khan \(1974\)](#), considered the velocity of Money for the time from 1960 to 1973 in Pakistan. During that period, the velocity of money showed a downward trend. Khan was drawn a conclusion with the findings that the velocity of money was positively correlated with per capita income, expected rate of inflation, share of monetary and trading sector and the number of bank branches ([Khan, 1974](#)).

[Khan \(1990\)](#), dropped a note on the income velocity of money. Their study was dividing into two phase: pre-liberation phase and post-liberation phase. They found that the velocity of money takes the shape of 'U', that means at the earlier stage of economic development the velocity likely to fall and than in the developed stage of economic development the velocity function stars to rise. The study also recommended decreasing money supply and increasing government expenditure to avoid hyperinflation and ensure the continuity of financial development. ([Khan, 1990](#)).

By using quarterly data [Kabir \(1993\)](#) examined the determinants of income velocity of money of Bangladesh for the period 1974(I) to 1989 (IV). They used real income, inflation and proxy of financial development as the determinants of the velocity of money. Their empirical result indicates that the income velocity of money positively correlated with real income and inflation but negatively correlated with financial development (DD/TD). They concluded with that, as real income and velocity of money move in the identical direction, if national income decrease, the velocity tend to decrease. Therefore without making any change in overall expenditure the central bank only lessen the money supply to control inflation ([Kabir, 1993](#)).

Akhtaruzzaman (2008), used 140 observations of quarterly data from 1973: I to 2007: V and VAR model to determine the speed of determinants of income velocity of both narrow money (M1) and broad money income (M2) with respect to Bangladesh perspective. The findings of his research do not coincide with the traditional constant view of the velocity of money. Moreover, he found that both the economic growth and financial development negatively affect the income velocity of money and consist almost 75 percent share of the speed of velocity of money (Akhtaruzzaman, 2008).

Akinlo (2012), investigated the impact of financial development on income velocity of money (IVM) in Nigeria. He found that the exchange rate and per capita income respectively have a negative and positive effect on the income velocity of money (Akinlo, 2012). He also found that there was a noteworthy relationship between financial development and income velocity of money (IVM). He also suggested the monetary authority not to print much money as it may cause inflation (Akinlo, 2012).

By using panel data from the year 1991 to 2012 Muhammad Zahir (2014) did their study to inspect the affiliation of financial determinants of income velocity of money (IVM) of five South Asian countries (India, Pakistan, Bangladesh, Sri Lanka, and Nepal). Their study suggests that population, price level, government revenue will increase are inversely related to income velocity of money. On the other hand, government expenditure is positively associated with income velocity of money (Muhammad Zahir, 2014).

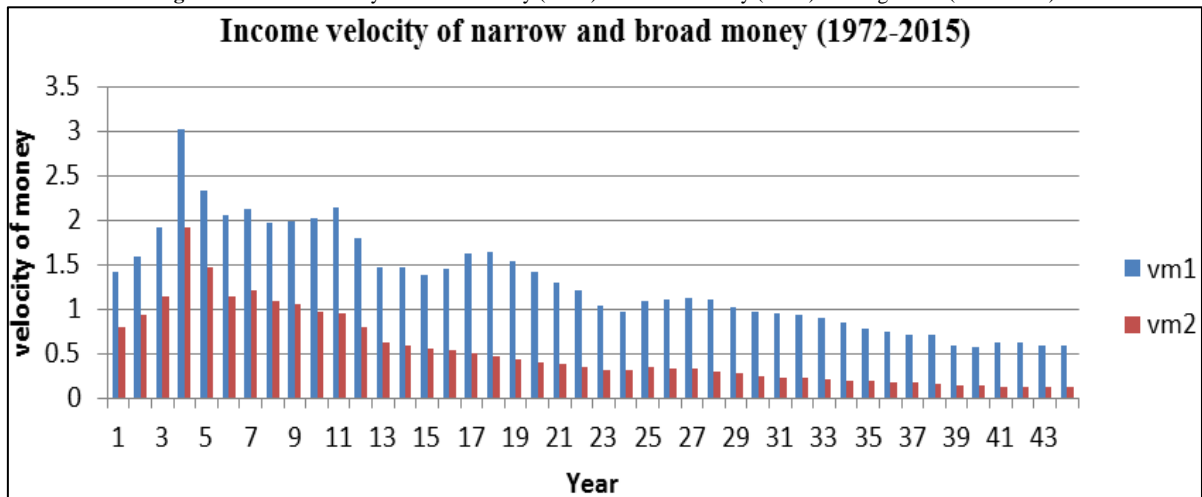
Ravi (2014) presented their research on the IVM in India by using yearly data from the period 1982 to 2012 and got three important observations: first, they found that velocity did not follow random walk behavior, then, the money velocity in India was not affected by electronic transaction, and lastly, found that yearly money velocity response positively in response to external sectors (Ravi, 2014).

Peter and Okafor (2013), used quarterly data from 1985:1 to 2012:4 for Nigeria to discover the determinants of income velocity of broad money. By using the VECM model they have shown that the income growth and interest rate were positively related with income velocity of broad money but the financial sectors development was inversely related with income velocity of broad money. They have also shown that the inflation rate has a noteworthy inverse relation with the velocity of money. They concluded with the hope that their finds would help to set an efficient and credible monetary policy in Nigeria (Peter and Okafor, 2013).

3. Behavior and Trend of the Money Velocity in Bangladesh

In Bangladesh, two procedures of money supply are largely used; Narrow Money Supply (M1) and Broad Money Supply (M2). Consequently, two separate measures of income velocity of money could be defined, i.e. Velocity of Narrow Money (VM1) and Velocity of Broad Money (VM2). The movement and trend of the velocity of money are not static in Bangladesh. If we want to extract the inner compulsion of this dynamic behavior of the income velocity of money (IVM), we see that in 2014, Bangladesh has achieved the status of lower-middle income country with the Gross National Income per capita (GNI) and targeted to promote as a middle-income country by the year 2021 on its 50th birthday. Therefore, its growth does not follow a steady trend so does the income velocity of money. Revise wage scale of the government employee, a new level of minimum wage for garments worker, change in price level, the spread of banking services (ATM), interest rate fluctuation make a move in the behavior of income velocity of money. Moreover, some other causes are mentions here that influence the income velocity of money to move:

- Long run targeted economic growth,
- Beginning of financial liberalization since the late 1980s,
- Radical and deep change in the banking system, including more elastic and translucent rules for licensing new banks, bank branches in private sectors, liberalization of lending and borrowing interest rate.
- Privatization of nationalized commercial banks NCBs.
- Expansion of rural banking system. Especially from 2010, Bangladesh Bank offers the opportunity to the ultra-poor farmer to open an account only worth TK10 which enabled them to take a collateral-free loan of Tk 50,000 from a bank for a year, where six-month is a grace period.
- Spread of new and effective technology like ATM and mobile banking system. State-owned commercial banks set the trend and set up the first ATM here in 1992 in Bangladesh. Now the numbers of ATM were 8320 as of April 2016. (Payment Systems Department, Bangladesh Bank.)
- Moving trend of CRR and SLR.
- The growth of Remittance inflow.
- These kinds of reform affect the demand for money as well as the velocity of money (VM). The movement of VM can be exposed in the following figure:

Figure-1. Income velocity of narrow money (VM1) and broad money (VM2) in Bangladesh (1972-2015)

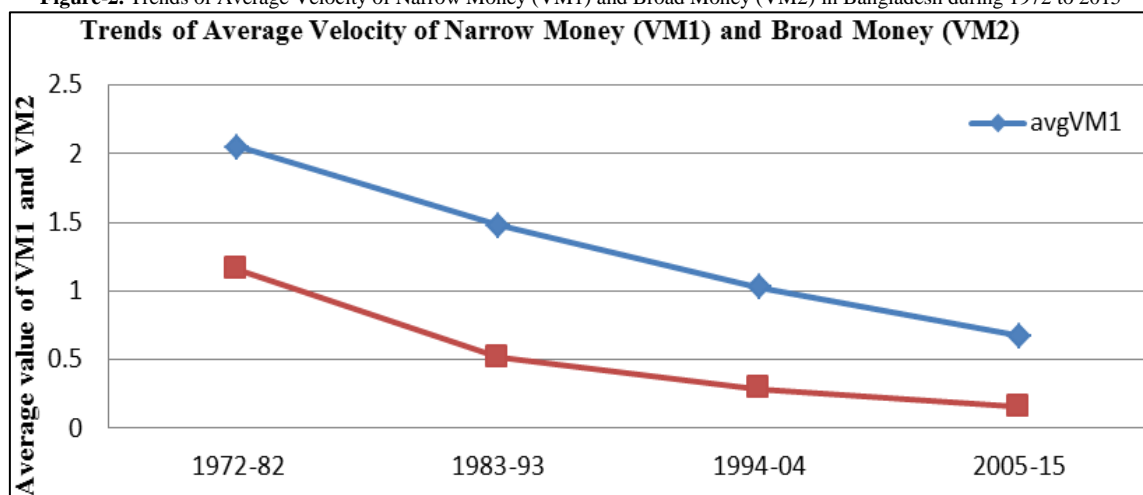
Source: Self-compiled from Monthly Economic Trend, Bangladesh bank

In the last five FY 2010-11, 2011-12 2012-13, 2013-14, and 2014-15 the value of velocity of broad money were 0.135, 0.131, 0.126, 0.120, and 0.119 respectively. The above figure depicts that the income velocity of both narrow and broad money is on a waning trend over the past several years representing that the Movement of GDP growth, money supply growth, financial liberalization, inflation, and many other explanatory variables make a change in the constant state of IVM.

To inspect the trend in the velocity of money in Bangladesh, this paper attempt to subdivided the entire time period into 4 sub-periods namely 1972-1982, 1983-1993, 1994-2004 and 2005-2015. For the entire period as well as each sub-period the average Velocity of Narrow Money (VM1) and the average Velocity of Broad Money (VM2) and their variability as measured by the standard deviation (σ) are presented in the following table and the graph depicted the same values:

Table-1.Trends in Velocity of Money in Bangladesh Economy: [1972 to 2015]

Year/Period	VM1		VM2		Gap between VM1 and VM2
	average	variability	average	variability	
1972-1982	2.054354	0.411967	1.154486	0.31105	0.899869
1983-1993	1.484901	0.163015	0.513846	0.129868	0.971056
1994-2004	1.021979	0.079034	0.282924	0.04749	0.739054
2005-2015	0.671876	0.091315	0.151489	0.027498	0.520387
Overall Time Period					
1972-2015	1.308277	0.569201	0.525686	0.423321	0.782521

Figure-2. Trends of Average Velocity of Narrow Money (VM1) and Broad Money (VM2) in Bangladesh during 1972 to 2015

Source: Self-compiled from Monthly Economic Trend, Bangladesh bank.

The above table shows that the Average Velocity of narrow money (VM1) was 2.054354 during 1972-1982. During 1983-1993 it decreased to 1.484901 and during 1994-04 it falls to 1.021979 and again decreased 0.671876 during 2005-2015. Similarly, the Average velocity of broad money (VM2) showed an overall steady deteriorate for the time period. It was 1.154486 during 1972-1982 and 0.513846 during 1983-1993. Then it came down to 0.282924 during 1994-04 and to 0.151489 in 2005-2015. Thus, the trend of the value of the average velocity of money concluded that the velocity of broad money (VM2) is constantly lower than that of the velocity of narrow money

(VM1). The gap between the two (VM1 AND VM2) however, seems to have narrowed over the period. The decreasing tendency of the velocity of money (VN1 & VM2) is consistent with the Keynesian theory of velocity of money which states that VM is unstable and changes rapidly with the change of economic growth and financial development.

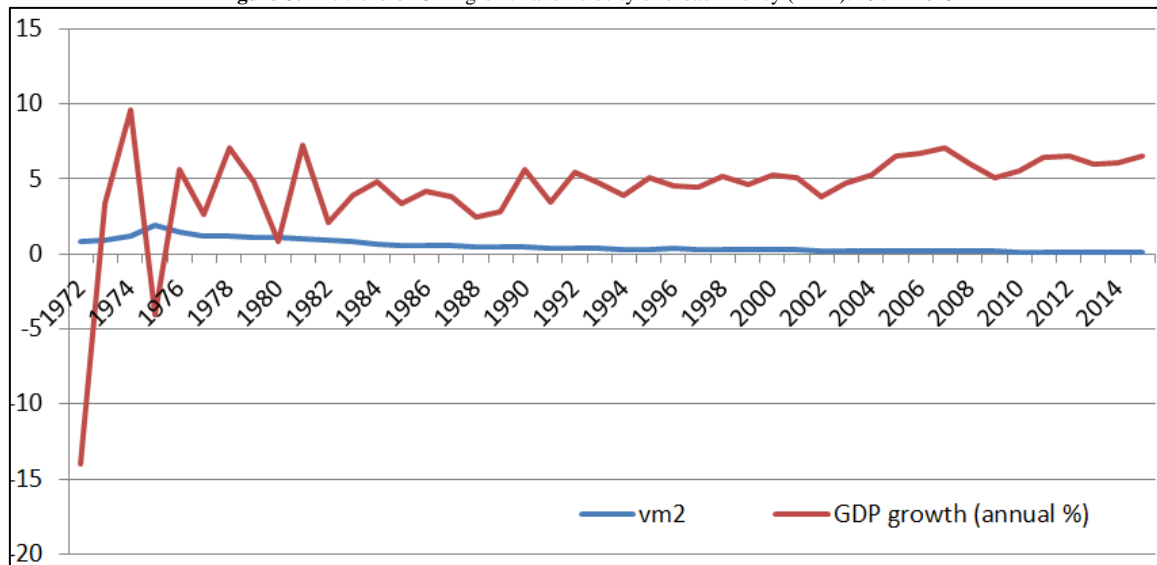
4. Determinants of the Money Velocity

The proportion of Nominal GDP to money supply (narrow and broad) is usually defined as the velocity of money. Previous study and theoretical aspects of income velocity of money supply influence this study to set various determinants of the velocity of money, some of the representative determinants are explained and shown her for better understand like, GDP growth, financial development, interest rate, inflation.

4.1. GDP Growth Rate

The velocity of money means how quickly the holders of money hands off their money to the other person or simply denoted as the circulation of money. It's a natural human behavior of human being when their income increases money demand (transaction demand as well as precautionary money demand) also increases. In economic term income elasticity of money, demand is greater than one. Thus we can conclude that there is a possibility of a negative affiliation between the velocity of money and GDP growth (as a determinant).

Figure-3. The trend of GDP growth and velocity of broad money (VM2): 1972- 2015

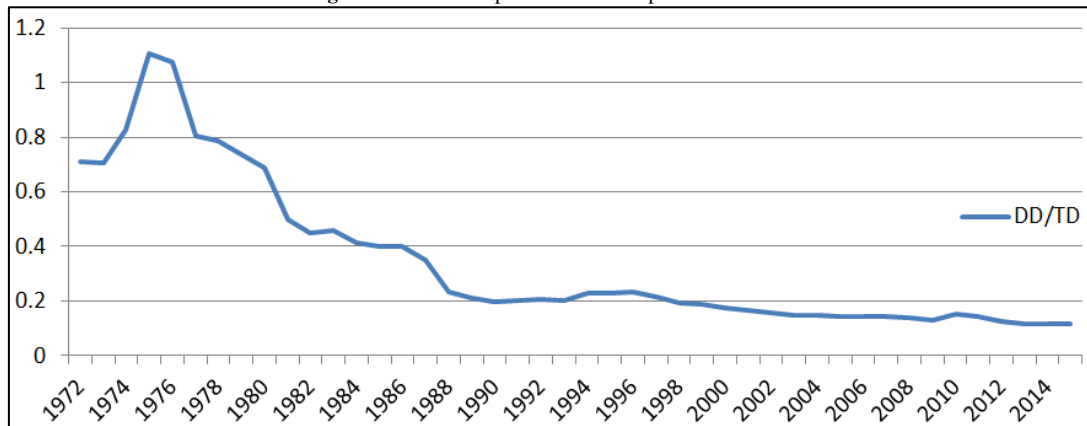


Source: Self-compiled from Monthly Economic Trend, Bangladesh bank and World Development Indicator

The above figure shows the growth of GDP growth (annual %) and the velocity of broad money in Bangladesh from the year 1972 to 2015. There is a little fluctuation in GDP growth, but overall it follows an upward trend or the Bangladesh economy grow gradually in its 45 years history of economic growth and development. As the GDP growth increase gradually there is a tendency of a downward trend in the nature of velocity of money (VM1 & VM2)

4.2. Financial Development and Money Velocity

The stages of financial development affect the value of income elasticity of money and thus the rate of the velocity of money (VM). Different alternatives can be used as substitute of financial development like deposit volume, demand deposit to currency ratio (DD/C), time deposit to currency ratio (TD/C), demand deposit to time deposit ratio (DD/TD), number of bank branch, number of non-bank financial institutions, number of ATM's, volume of technology uses in the financial institutions. In this paper, demand deposit to time deposit ratio (DD/TD) is used as a proxy of financial progress. The probable sign of DD/TD could either be positive or negative in velocity function lay on the value of DD and TD.

Figure-4. Demand deposit and Time deposit ratio : 1972-2015

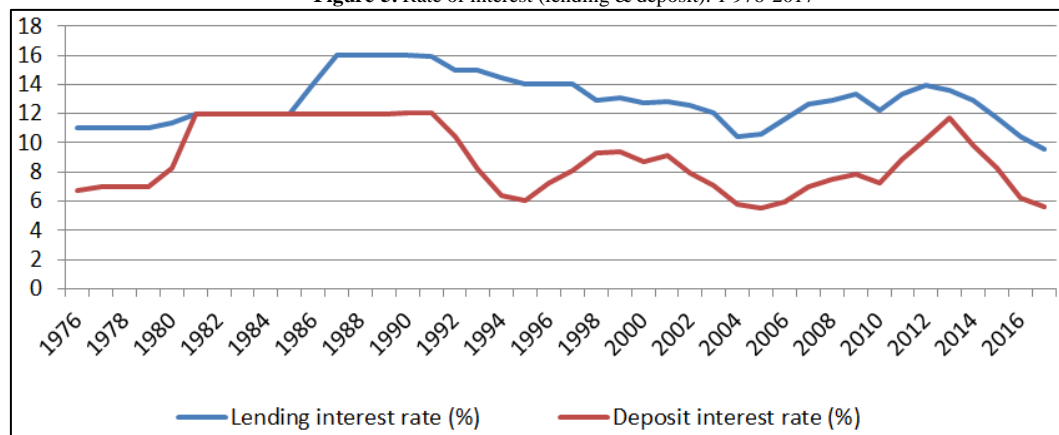
Source: Self-compiled from Monthly Economic Trend, Bangladesh bank

In many pieces of research, DD/TD is used as the proxy of financial development as a determinant of the velocity of money. If some time deposits convert into demand deposits, the DD/TD will increase as well as the velocity of money. The above graph depicts that the DD/TD ratio is on the way to decreasing trend as demand deposits converted into time deposits so that the velocity of money will decrease. Thus the study is expected a positive sign with respect to the velocity of money.

4.3. Interest Rates and Velocity of Money

The central bank is the supreme authority to set up the interest rate for banks and other nonbank financial organizations. Generally, two types of interest rate draw the attention of economic agents such as (i) deposit interest rate and (ii) lending interest rate. Deposit rate of interest act as an opportunity cost of holding money and a rise in deposit interest rate may lower the money demand thus the increases the velocity of money. On the contrary, the higher lending interest rate may hinder the path of smooth investment thus reduces the value of the velocity of money. In the perspective of Bangladesh economy, the lending interest rate against the deposit interest rate moves in the same direction for the period 1976- 2017. The deposit interest rate was at all time higher in the year 1993 where the lending interest rate was highest in the year 2012. In the fiscal year, 2018-19 Bangladesh bank decided to keep the lending rates below 10 percent such that they discourage investment. It is also clear from the figure-03 that the spread between deposit and the lending interest rate is kept below 5 percent from last several years.

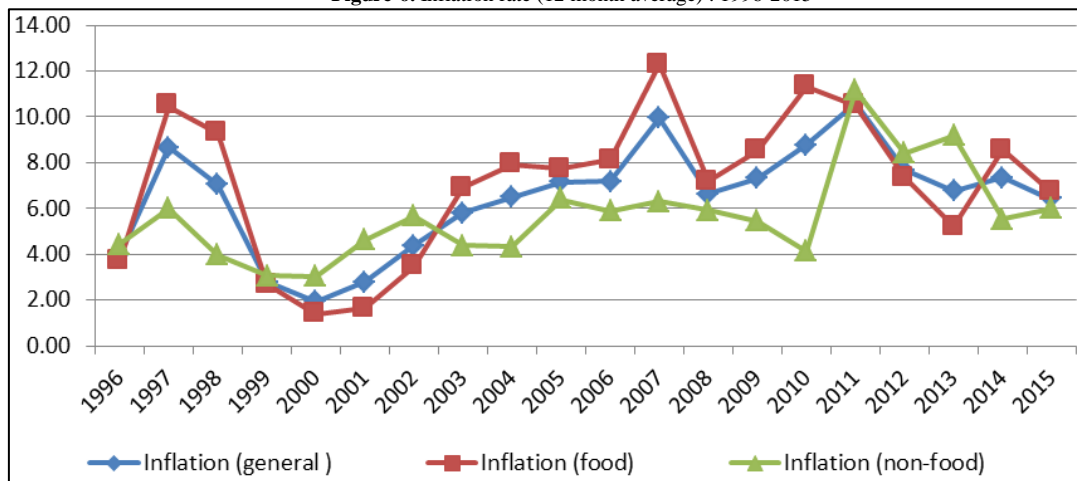
It is worth to mention that the interest rate is not documented in many Muslim countries as it is forbidden under Muslim law. They may use the exchange rate as a proxy of interest rate.

Figure-5. Rate of interest (lending & deposit): 1 976-2017

Source: Self-compiled from World Development Indicator (WDI).

4.4 Inflation and Velocity of Money

Keeping inflation low and stable is the main concern of any central monetary authority. The higher rate of inflation lowers the actual income of economic agents. Consequently, it's a matter of great concern to keep inflation under control, especially inflation in the food sector. The flowing figure-04 shows that the inflation rate (12-month average) does not follow any trend in Bangladesh. But it's a matter of little hope that Bangladesh manages to keep overall inflation under double-digit since 2012. In the last fiscal year, 2017-18 Bangladesh bank set its inflation target at 5.5 percent. But the target was not achieved, as the inflation rate was 5.58 percent in June 2018 and the increase was 0.34 percent which was lower than the world growth of inflation 0.40-0.50 percent.

Figure-6. Inflation rate (12 month average) : 1996-2015

Source: Self-compiled from Monthly Economic Trend, Bangladesh bank

Inflation grinds down the real income or purchasing power of people, so there is a craving to hold less of it. As a result, the theoretically reasonable signal of inflation expectation rate is positively employing an inverse affiliation with holding domestic money and hence, a straight affiliation with velocity. On the contrary, when the prices of goods and services go down due to less money supply, there is a larger money demand because of falling prices enables money to buy more in the future and lower the velocity of money.

5. Data and Model Specification

In the present analysis, yearly time series data are used covering the phase 1972 - 2015 for the four variables. This study collects time series data of narrow and broad money from the monthly economic trend of Bangladesh bank and the author compute the velocity of money data on the basis of M1 and M2. The narrow money (M1) involves currency outside banks and demand deposits. The broad money (M2) supply includes M1 plus scheduled bank time deposits. The lending interest rate, demand deposit to Time deposit ratio (DD/TD) and the GDP deflator as inflation data are also extracted from the monthly economic trend of Bangladesh bank. The data of GDP growth (annual %) is collected from the World Development Indicator (WDI).

5.1. Model and Methodology

As a strong statistical tool regression analysis has been done to indentify the important determinants of income velocity of money (IVM). Two regression models are tested. The study has identified the two models as Model-1 and Model-2

$$\widehat{VM}_{1t} = \hat{\beta}_0 + \hat{\beta}_1 GDP_t + \hat{\beta}_2 DINT_t + \hat{\beta}_3 DD/TD_t + \hat{\beta}_4 INF_t + \varepsilon_t \quad (1)$$

$$\widehat{VM}_{2t} = \hat{\beta}_0 + \hat{\beta}_1 GDP_t + \hat{\beta}_2 LINT_t + \hat{\beta}_3 DD/TD_t + \varepsilon_t \quad (2)$$

Where,

VM_t = velocity of money

GDP_t = GDP growth

DD/TD_t = ratio of demand deposit and time deposits.

$LINT_t$ = is the lending interest rate

INF = inflation rate

$$\widehat{VM}_t^2 = \beta_1 GDP_t^2 + \beta_2 LINT_t^2 + \beta_3 DD/TD_t^2 + \beta_4 VM_{t-1}^2$$

ε_t = Residual Term

- **MODEL-1.** dealings with the effect of GDP, demand deposit and time deposit ratio, lending interest rate and inflation on the velocity of money.
- **MODEL-2.** dealings with the effect of GDP, demand deposit and time deposit ratio, the lending interest rate on the velocity of money.

This study adopted the Ordinary Least Square (OLS) as a method and has used secondary time series data for the time 1972-2015. The empirical analysis of the study can be divided into three stages. The first stage, we used the ADF and PP unit root test to check the stationary. In the next stage, the test for co-integration is operated by adopting Engle and Granger method that is authenticate the order of integration of the variables since the various cointegration tests are valid only if the variables have the same order of integration. In the concluding stage, the study also operates different diagnostics tests for the better modeling.

5.2. Test for Stationery

A time series is stationary if its expectation, variance and autocorrelation do not change over time. The base of time series analysis is stationarity. To investigate the stationarity property of the respective time series Unit Root test has been conducted. The method being involved is the Augmented Dickey-Fuller Test (ADF) and Phillips and Perron (PP) with constant and constant and linear trend.

$$H_0 = \text{the time series follow unit root}$$

$$H_1 = \text{the time series do not follow unit root}$$

Table-2. Results of (ADF) and (PP) unit root test

Panel 1: Levels: Unit root test					
	Constant only		Constant and Linear trend		
Variable level	ADF Test	PP Test	ADF Test	PP Test	Decision
VM2	-2.667665	-1.043243	-8.932953	-3.041014	Non-Stationary
GDP	-2.667665	16.19642	4.634707	6.776621	Non-stationary
DINT	-2.707988	-1.750430	-3.182170	-2.275777	Non-stationary
DD/TD	-1.176862	-1.198045	-1.448755	-1.679478	Non-stationary
INF	-4.991305	-4.991305	-5.847872	-5.847872	Stationary
Panel 2: First Difference: Unit root test					
Variable level	ADF Test	PP Test	ADF Test	PP Test	Decision
VM2	-3.438691	-6.663501	-2.806477	-6.553685	Stationary
GDP	-2.209668	-1.817294	-5.249640	-5.509130	Stationary
DINT	-3.774873	-3.207722	-3.787078	-3.292070	Stationary
DD/TD	-4.748715	-4.513300	-4.739242	-5.998725	Stationary
INF	-11.37429	-24.00958	-11.28137	-40.27481	Stationary

Note: MacKinnon (1996) one-sided p-values t statistics 5% level of critical value is -2.936942

The choice rule is if and only if the “P-value from ADF test > .05” then null is established. Otherwise, the null hypothesis will be discarded.

From the above Table, we find that all most all of the variables seem to be non-stationary at the level, except inflation (INF). So, the decision concludes that all of the variables are I (1) stationary at their first different.

5.4. Coefficient Diagnostic Test

For coefficient diagnostics “Wald test” is used to check whether the explanatory variables significantly influence the income velocity of narrow money. Here the null and alternative hypotheses are:

H₀: the variable is significant;

H_a: the variable is not significant.

Table-3. The result of the Wald test given in the following table:

Coefficient	t-statistic	F-statistic	Chi-square
Model-1			
β_1	-3.967569	15.74160	15.74160
β_2	3.645339	13.28850	13.28850
β_3	26.15933	684.3108	684.3108
β_4	1.228953	1.510324	1.510324
Model-02			
β_1	-4.002020	16.01616	16.01616
β_2	3.849539	14.81895	14.81895
β_3	25.94720	673.2571	673.2571

Here we can decide that the variable(s) is/are significant if and only if the “P-value from WALD-test > .05”. Otherwise, the variable(s) is/are not significant. From the table above, we can conclude that all the explanatory variables are significant for their containing model except the inflation in Model-1 shows an insignificant effect on VM2.

5.6. Regression Result

This paper has run two different models. This paper has added significant variables and deducts the insignificant variables as the determinant of income velocity of broad money. In addition, the paper takes the best fitted model and its regressors are noteworthy. The findings of and analysis is presented at the following tables:

MODEL-1: Independent variable is VM2				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.031995	0.070736	0.452310	0.6538
GDP	-0.000275	6.93E-05	-3.967569	0.0003
DINT	0.016152	0.004431	3.645339	0.0009
DD/TD	1.385275	0.052955	26.15933	0.0000
INF	0.001784	0.001452	1.228953	0.2273
R-squared	0.975552	Adjusted R-squared		0.972758
F-statistic	349.1481	Durbin-Watson stat		0.765970
Prob(F-statistic)	0.000000	Independent Variable is the velocity of broad money		

In model-1 findings imply that the four explanatory variables GDP per capita, deposit interest rate, demand deposit to time deposit ratio (DD/TD) and Inflation, (GDP deflator, annual %) significantly influence the dependent variable VM2. The adjusted R-squared point out that four measured variables can explain 97.27% velocity of broad money. The entire variables positively influence the dependent variable except for the GDP. As the explanatory variable, inflation is stationary at the level, the author simply deducts the variable for model-02. Now, the model-02 includes only three explanatory variables, all of which are non-stationary at level but stationary at their 1st difference. The result of the regression Model-02 are shown and discussed as follows:

MODEL-2: Independent variable is VM2				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	0.039740	0.070952	0.560103	0.5789
GDP	-0.000279	6.97E-05	-4.002020	0.0003
DINT	0.016978	0.004410	3.849539	0.0005
DD/TD	1.382161	0.053268	25.94720	0.0000
R-squared	0.974497	Adjusted R-squared		0.972371
F-statistic		Durbin-Watson stat		0.792334
Prob(F-statistic)	0.000000	Independent Variable is the velocity of broad money		

From the regression analysis the study has found a positive intercept of Model-2. The model has deducting inflation as an independent variable. The regression result also depicts that all the explanatory variables are significance at 5% level. The mark of the parameter indicates that is a positive impact of the ratio of demand deposit and time deposit, the deposit interest rate on the velocity of money but the negative impact of GDP. The result indicates that the increase in deposit interest rate and DD/TD can improve the velocity of broad money but GDP may decrease the velocity of broad money. The model-2 point out that these three variables could autonomously clarify about 97.44 percent of the velocity of broad money of Bangladesh. The value of D-W statistics ascribes that the model is vacant from spuriousness of model specification.

$$VM2 = 0.03 - 0.00279 \text{ GDP} + 0.169 \text{ DINT} + 1.382 \text{ DD/TD}$$

Again, if the central bank increases the deposit interest rate by 1% it will increase the velocity of broad money by 1.69%. The findings of the study coincide with previous theoretical knowledge. As it is established that economic growth increases the demand for money thus decrease the income velocity of money. Therefore, there is an inverse relationship between GDP and income velocity of broad money (VM2) is found in this study. Model-02 reflects the negative magnitude of the coefficient of GDP, if GDP growth increases by 1 percent the velocity of broad money will fall to 0.2% and vice-versa. Theoretically, when the interest rate on deposit increase, people desired to hold less money on hand as the opportunity cost is high. Thus the higher the deposit interest rate the higher the income velocity of broad money (VM2). Here the findings of Model-02 suggests that if, if the central bank increases the deposit interest rate by 1% it will increase the velocity of broad money by 1.69%. In the developing stage of financial development, people habituated to hold money in the nature of DD rather than in the nature of TD as the return take a long time in case of time deposit, though the interest rate is high. Therefore, a higher share of DD to TD circulate money speedily, thus there is a positive relation between DD/TT and income velocity of money. This message also conveys in Model-02, if the ratio of demand deposit and time deposit increase by 1% it will increase the income velocity of broad money by 138%.

5.7. Co integration Test

Economic theory propounds that although the variables are drive from each other in the short term, they may have long run co integration.

Economic theory often propounds that sometimes certain pairs of economic variables should be associated with a long run economic relationship.

Here in the series of five variables, the variables are independently I(1), but there is a possibility that they may have a long run association.

As the series is integrated of order I, that is stationary at first difference the study is performing Johansen Cointegration test to check the long run relationship. The null and alternative hypotheses of Johansen Cointegration test are:

$$H_0: \text{no cointegration equation.}$$

$$H_1: H_0 \text{ is not true}$$

The result is presented bellow and the trace test clearly shows at least two cointegrating equations at the 5% level of significance.

Hypothesized No. of Cointegrations	Trace Statistics	5% Critical Value	P-Value	Max-Eigen Value Statistics	5% Critical Value	P-Value
None ^s	87.38914	47.85613	0.0000	43.61727	27.58434	0.0002
At most 1	43.77187	29.79707	0.0007	32.44832	21.13162	0.0009
At most 2	11.32355	15.49471	0.1924	10.93367	14.26460	0.1575
At most 3	0.389879	3.841466	0.5324	0.389879	3.841466	0.5324

5.8. Granger Test of Causality for the Time Series

In time series analysis, to find out the causal relationship between two variables Granger test of causality is widely used. A variable M is causal to variable N, if M is the cause of N or N is the cause of M. Pair wise result of Granger test of causality are shown the following table:

Pairwise Granger Causality Tests			
Sample: 1972-2015			
Lags: 2			
Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause VM2	42	13.4563	4.E-05
VM2 does not Granger Cause GDP		0.03166	0.9689
DINT does not Granger Cause VM2	42	3.79652	0.0328
VM2 does not Granger Cause DINT		1.44678	0.2499
DD/TD does not Granger Cause VM2	42	5.85103	0.0062
VM2 does not Granger Cause DD/TD		4.39320	0.0194

The paper can soundly reject the null hypothesis of VM2 is not (Granger) caused by GDP but GDP is not Granger caused by VM2 can be rejected. Therefore, it appears that Granger causality runs single way, from GDP to VM2, but not the further away. Again, the null hypothesis DINT does not (Granger) Cause VM2 can be accepted but the null hypothesis VM2 does not Granger Cause DINT can be rejected. But, it is evident that Granger causality runs both ways, from DD/TD to VM2 and also from VM2 to DD/TD.

6. Conclusion

The international monetary policy goes through a long and remarkable history. From the era of the gold standard to till date monetary stability considered as the core mandate of the central bank to ensure sound economic growth. In this way, the income velocity of money (IVM) act as a crucial element. Thus the core concern of the paper, to check out how various determinants accelerate the income velocity of money.

Throughout the analysis by using the OLS method, cointegration test and other diagnostic tests this study tried to investigate the influence of some determinants of income velocity of money. The cointegration test here reflects a positive association with financial expansion and velocity of broad money. The result of the regression analysis also coincides with the economic theory.

In a growing economy like Bangladesh, where GDP is following an increasing trend and the trend of the average velocity of money is in its downward drift, it is prudent to recommend the monetary authority to issue more money to continue the way of economic and financial development of Bangladesh.

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