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Measuring the Relationship of Selected Macroeconomic Variables and the Velocity of Money Supply in the Iraqi Economy

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Macroeconomic variables are the backbones of any state's economy, whether existing financially or as reserves. This research will provide a better picture and clear understanding on the influential role of macroeconomic variables on the velocity of money supply in the Iraqi economy. Particularly, price inflation, real gross domestic products per capita (GDP), and interest rates have been investigated by using the co-integration model based on the Vector Autoregressive approach. The strong and significant role of selected macroeconomic variables has been recorded using a time series ranging from 2004 to 2017. GDP proved to be indispensable and needs proper consideration when economic fluctuations are deep down. In short, it is foremost important, necessary and in the need of hour to initiate the government regarding price stability, and improving supervisory and regulatory systems in order to assure a typical financially stable system. The government of Iraq should also lineate the policies and make their implementation perfect, as per their maximum possible practice.

Key words: *Money Velocity, Inflation, GDP, Interest Rate, CPI, Iraq.*

Introduction

The opinion regarding the influence of money supply over macroeconomic variables in the economy still needs proper consideration. Monetary policies are well-known everywhere, having the stance of macroeconomic variables. It is almost impossible to precise all macroeconomic variables in a single research project. Yet, eminent ones are gross domestic products, inflation rate, money supply and regulatory policies within the state. All play a vital

role when defining a state's economy. Literature provides a lot of information to solve the mysteries involving the economy and macroeconomic variables. Either directly or indirectly, it justifies the macroeconomic variables' status when it comes to the economy term.

Analysing the relationship between money supply and interest rates is usually treated frictionless. The Iraqi Dinar exchange rate faced a non-stop decline against the dollar at the cost of the parallel marketplace throughout the nineties because of the exhaustion of foreign exchange reserves. The exchange rate is an absolute measure in marketing internationally and is an emerging trend to keep the pace with companies within the state and abroad. Importing and exporting do require the funds and investment in local currency to make the deals successful. The supply and demand process is time consuming, hence the exchange rates are dealt within the next 48 hours at the time of the contract. This contract may be verbal, written or psychological or expecting services. Another form is the immediate one, such as applying the rate at the fulfillment of the contract projecting the exchange rates. Both methods do indulge an indirect relationship with the economy. In regards to Iraq, it has always confronted the longitudinal tides and waves in the economic phase. A stable and adequate exchange rate was always a hard-to-achieve and a challenge for Iraqi think-tanks and economists.

Price inflation is another transmitted form of money supply; defined as the abrupt and uneven raise of prices in the market. Accelerating or decelerating inflation has always been evidenced in either war or peace situations in Iraq, and accompanied with ups and downs of money supply. Inflation and money growth are bounded to each other like a nut in a shell. Particularly, in a politically unstable state like Iraq. The Iraqi Government's assessment about the check-and-control of price hikes has always lacked an efficient program and sustainability. This results in poor money supply, hence, leading to an unsteady economic situation.

Unemployment has always been an issue whenever Iraq has gone through a transmuting period. Its ever presence has created perturbing economic circumstances throughout the state. Since the ending of the Second World War, Iraq has still been coping with economic imbalance. Unemployment is not a direct macroeconomic variable, yet, its influence on the later mentioned has been evidenced from literature several times (Muthee, 2012). Unemployment derails the macroeconomic variables and henceforth, inferring to an unbalanced money supply.

The Iraqi Government is being isolated by most of the international unions and federations of trade; it has constantly suffered the deficit of inefficient developing monetary policies. High interest rates and heavily imposed tax endanger the money supply. On the other hand, continuous failure of Iraq in alluring foreign investors and marketers to state has caused the supply money graph to decline. A bird's eye view on the literature will draw the conclusions

of facing drastic collisions of economy and macroeconomic variables (Meenai, 2001). Administrative immaturity is one of the ground realities behind such a mega fall of the economy.

The GDP of Iraq is directly linked to the money supply as can be seen by the equation MV = nominal GDP (Akhtaruzzaman, 2008), where M is the money supply and V is its velocity. This equation of exchange shows nominal GDP equals to the money supply, times by the numbers of expenditure in a particular period. Being a developing country, Iraq is also confronting challenges like stabilising the GDP. Nevertheless, it is worth mentioning that the money supply has a strong influence over the GDP.

Literature Review

Economists and policy makers do feel the influential role of the money supply upon the macroeconomic variables and towards growing the economy (Owolabie & Adegbite, 2014). The money supply is a flowing substance used in the exchange, expansion of resources in production, trade facilitation, promotion of specialisation and in contribution of welfare of a society (Thorton, 2000). Money supply has a magnanimous importance as it highly affects the major macroeconomic indicators. Such as inflation, unemployment, economic growth, exchange rates and vice versa (Yunana et al., 2014). Many of the monetarists presume the money supply as a pillar to strengthen the economy building, and some even claim this very firmly. Another school of thought predicts the money supply as a determinant of economic factors, and countries that pay adequate attention to money supply seldom suffer economic downfalls (Harding & Pagan, 2001). It was also believed that the economic fall of 1929 in European countries was the aftershock of money supply instability (Grossman, 1994). Many nations observe the damage of the economy level in response to oil price collapses and sudden price hikes as the output of economy, such as the GDP had a troubled imbalance in the monetary base.

The economy is usually characterised by the structural rigidity. Iraq, being an import dependent country, faces the duet of currency. This inevitably generates the high demand in forex exchange, causing unevenness in the exchange market and leading to a disturbance in the economy. The fluctuations in exchange rates operate in losing the confidence in the local currency (Iraqi dinar) which impacts the consumers' behaviours and their convictions. This increases their demand on goods in the market that are based on the trade-off between money and consumer goods (Hassan & Boulevard, 2016). Meanwhile, staying or going aboard bounds individuals or people to carry currency to trade services at the local level and it is self-obligatory (Abu-Ahmad 2002). In a model (Ebele Ifionu, 2015), it assumed the following equation MV=PQ; M is money supply in an economy during a period, V is the velocity of money in final expenditures, P is the price level associated with transactions for the economy

during the period and Q is the real output. This equation clearly foresees the relationship between inflation and money supplies. Inflationary implications and the consequent loss of purchasing power would halt the economic growth. The relationship between money supply and the GDP has been studied using the St. Louis model demonstrating the delicacy between both ends (Asogu, 1998). A long relationship has also been verified to exist between money supply, the GDP and inflation for a developing country (Tyrkalo & Adamyk, 1999; Doroshenko, 2001). The countries with a more flexible exchange rate observed less or average inflation, compared to ones having pegged exchange rates (Gosh et al. 1997). Monetary growth, money supply, exchange rate, real income and inflation are combined with a long-term relationship, according to a case study of Ghana (Mahmadu & Philip, 2003). Since Iraq is in a developing phase of the economy, all presumptions regarding money supply verified in other developing countries may be tested here. Monetary policies and interest rates also run along the path of money supply. Controlling these can be assistive to stabilise economic agitations. As an example, the Federal Reserve policy based on the US post war money supply leads to different conclusions about the impact of federal policy on macroeconomic stability, more than previous studies based on interest rate rules (Clarida et al., 2000). In short, literature is full of evidence claiming the vigorous role of monetary policies and interest rates in defining a sustainable and harmonious economy.

Research Methodology

This study aimed to investigate the role of macroeconomic variables on money supply. Secondary data has been utilised, ranging from 2004 to 2017. The data is collected from the Wind Database and the World Bank open database. In the first step, we applied a unit root test to check the stationary of variables. Further, a co-integration analysis was also carried out to determine the co-integration among variables. In addition to this, we utilised the OLS regression technique to measure the direction and magnitude of the relationship among variables of interest.

The data was collected from multiple sources, including the Work Bank open database and the Wind database.

V= *f*(CPI, GDP, IR, X)
Where,
V= Velocity of Money
CPI= Inflation
GDP= per capita real GDP
IR= Interest rate

The velocity of money is measured by broad money, which is a proportion of the residential cash supply that incorporates M1 in addition to Quasi-cash (reserve funds and time deposits), medium-term repurchase claim, and individual currency accounts. Generally, broad money incorporates cash that can be immediately changed over to narrow money. Hence, this study utilised broad money (M2) as a proxy of money velocity in Iraq. To measure the inflation CPI, is it usually utilised based on aggregate prices of consumer goods in an economy. At a particular point when the costs of various goods shift by a different rate, CPI is used to record movement in prices over the period of time. The GDP represents the per capita real GDP. The way per capita income influences the speed of money, it relies on the demand and supply elasticity of income. If the increases in income elasticity surpasses one, there will be a negative effect of per capita income on cash velocity, an vice versa. In any case, over time, the wage versatility of interest for cash is observed to decrease to around one (Khan, 1994). Despite, the fact that hypotheses by quantity of money theory and conflicting observational investigations have additionally demonstrated that money velocity has a negative effect of per capita income. Further, the rate of interest is shown by IR in the equation 1. The rate of interest determines the demand of money. For instance, an increase in the rate of interest will affect the demand of money in a negative way. The increase in interest rate will affect the cost of holding money, therefore a negative trend would start in holding money. Subsequently, a loan fee is considered a substitute of rate of calling money. Hence, a determinant of cash speed has been incorporated into the model to see its effect on cash speed in Iraq.

In the first step, the unit root is applied to test the stationary of the variables. We applied the ADF and PP test to calculate the stationary among variables. The reason to apply both tests is the weakness of these tests over each other. An augmented Dickey-Fuller test is applied to measure the unit root in the auto regressive model. However, variance is considered invariable and error term is taken as independent in the ADF test. The following equation two (2) is used to apply the ADF test:

$$Y_t = \alpha Y_{t-1} + \epsilon_t \quad (2)$$

The weakness of the ADF test stimulates to apply the Philip-Pearson (PP) test to allow the heterogeneity in the error term. The following equation three (3) is used to apply the PP test:

$$Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_{t(t-\frac{T}{2})} + \epsilon_t \quad (3)$$

Both these tests specify that the dependent variables should be integrated at the first difference, while the other variable may have a mixed level of integrations, i.e. I_0 and I_1. The results of the unit root analysis presented in Table 1 express that the results are according to the presumptions. Both series are integrated at the first level. Hence, a linear combination at the stationary level exists.

Table 1: Unit Root Test Analysis

Variables	Lag Length	ADF I_0	ADF I_1	PPP I_0	PPP I_1
V	1	-2.006	-6.083	-2.315	-6.816
CPI	2	-2.626	-7.168	-1.217	-9.587
Ln GDP	4	-1.215	-4.829	-1.018	-7.936
IR	1	-1.533	-3.973	-1.154	-6.938
10%		-4.836	-4.712	-4.173	-4.823
5%		-4.287	-3.732	-4.026	-3.152
1%		-3.327	-3.923	-3.362	-3.073

The stationary of the series at the first level argues that Johansen and Juselius' (1990) maximum likelihood test of co-integration is the appropriate choice.

$$Z_t = K_1 Z_{t-1} + K_2 Z_{t-2} + \cdots \ldots \ldots + K_{k-1} Z_{t-k} + \mu + V_t \quad (4)$$

Where Z_t represents a vector of 2×1 (*Bf, M2*). K is a 2×4 matrix of parameters and μ is constant vector and V_t represents the independent error term. We further modified equation two (2) and converted it into the vector error correction model:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \cdots \ldots \ldots + \Gamma_{k-1} \Delta Z_{t-k-1} + \Pi Z_{t-1} + \mu + V_t \quad (5)$$

In equation five (5) a 2×4 matrix of coefficients is used to determine the long-term relationship. To decide the quantity of vectors which are con integrated, probability proportion tests named as the Trace test and Eigen value test are utilised (Johansen & Juselius, 1990). There is no co-integration among the variables as hypothesised in the null hypothesis of this test. Johansen and Juselius incorporate two probability proportion tests for the assurance of the number of co-integrated vectors, the maximal Eigen value and the trace statistic. Further, the AIC value is utilised to determine the lag length.

The result of the co-integration test is presented in Table 2 which explains that there is a co-integration among the selected series over the long-term. It has observed that money velocity and per capita GDP has a significant and positive association among one another. The relationship among GDP and money velocity is also dependent on the economic development of the country. Hence, a positive association explains that the Iraqi economy has passed the initial level of development as said by Fry (1988). Further, a positive association among interest rate and money velocity is also noticed. Therefore, the higher the interest rate, it will lower the demand for money. In addition to this, CPI as the proxy of inflation is also found to positively associate with the velocity of money. Therefore, we can conclude that the inflationary trend in the economy affects the spending behaviour and henceforth, the velocity of money increases.

Table 2: Co-Integration Rank Test

No. of CE	Eigen Value	Trace Statistic	P-Value
0	0.572321	68.39366	0.0023
1	0.582363	51.83421	0.1723
2	0.452812	32.14592	0.3618
3	0.172394	8.293520	0.7124
4	0.017253	0.186311	0.7165

Table 3: Co-Integration Vector of Coefficients

	V	CPI	Ln GDP	IR
	1.000	-0.06131	-0.2875	-0.07983
Standard Error		0.0327	0.0143	0.002832
t-value		-3.297	-5.181	-6.287
Log Likelihood	-174.7283			

Further, to determine the contribution of each variable, we applied a variance decomposition analysis to investigate the degree of contribution of each variable on the money velocity.

Table 4: Explained outcomes of the decomposition forecast error variance

Time	Stand. Error	V	CPI	Ln GDP	IR
1	0.06	100	.000	.000	.000
2	0.07	86.81	7.32	13.98	1.63
3	0.08	79.19	7.84	13.52	3.85
4	0.09	72.32	6.28	12.46	5.86
5	0.10	67.85	6.88	14.87	4.12

6	0.11	65.92	7.94	13.79	3.87
7	0.12	63.57	6.28	12.87	4.47
8	0.13	59.73	5.98	13.02	5.98
9	0.14	57.53	5.26	13.74	3.98
10	0.15	56.63	6.28	15.95	5.44
11	0.16	54.28	7.39	15.82	4.35
12	0.17	53.95	7.86	14.74	3.63

It is noted that the selected macroeconomic variables provide a significant contribution to the explanation of money velocity. Inflation has been witnessed to contribute around 6 per cent to 8 per cent in the instability of money velocity. Similarly, the GDP has explained a 12.5 per cent to 16 per cent variation in money velocity. The interest rate has also significantly contributed in the variation of speed of money supply. It is evident that the interest rate has a contribution of about 2 per cent to 6 per cent in the instability of money velocity.

Conclusion

This study presented the empirical results on the relationship between the speed of money (money velocity) circulation in the Iraqi economy and the important macroeconomic variables (i.e. CPI, GDP and IR). This study investigated the proposed framework using the Vector Auto Regressive approach based on Johansen and Juselius' (1999) model. A significant contribution of the selected macroeconomic variables has been witnessed on the money velocity. Therefore, the Government of Iraq should take into consideration these impacts while determining its monetary policy. Furthermore, a strong financial sector will bring steadiness to the interest rate. Therefore, a reform policy for the financial sector is required. The role of inflation on money velocity is also very important. Hence, a tightened inflation control policy is recommended for the Iraqi economy to capture the upward economic trend.

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