

# The Role of Financial Development in Determining the Velocity of Money in Circulation: The Case of Jordan

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**Abstract:** This paper aimed to analyze the effect of the financial progress that happened in the Jordanian economy on the velocity of money in circulation from the period 1980 to 2019. Specifically, the ratio of demand deposits to time deposits and the share of credit facilities to the private sector from GDP were used as measures of financial development while money supply (1) to GDP and money supply (2) to GDP were used as measures of the velocity of money. To achieve these goals, the paper has used the descriptive approach and the Auto-Regressive Distribution Lag (ARDL) approach. The tests showed that the variables became stationary after taking the first difference, and the variables are co-integration. The results of the study showed that. The ARDL model and cointegration test used in the paper reveal that the estimated parameters of the explanatory variables were more significant in the long term model and short term than in the short term it was not except for dynamics for the velocity of broad money (V2). The share of credit facilities to the private sector from GDP has a significant negative effect on the velocity of narrow money (V1) and has a considerable positive effect on the velocity of money in the wide range (V2). adding to the previous point, the ratio of demand deposits to time deposits has a significant positive effect on the velocity of narrow money (V1) and has a significant negative effect on the velocity of wide money (V2). finally, the interest rate has a substantial positive influence on both the velocity of money in a narrow and a wide range. Based on the results, the paper recommended the central bank of Jordan set strategies to stabilize the money demand function in the Jordanian economy. Since the dynamic change in life, communication and accessing the information the behavior of individuals regarding assets loans and spending is changing rapidly which leading to massive challenges to central banks' policy formulation regarding the velocity of money.

**Keywords:** Money Supply, GDP, Monetary Policy, Financial Development, Velocity of Money, ARDL

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## 1. Introduction

The central banks in the urbanized and unindustrialized countries struggle to control the money supply not for its own sake but for regulating the stream of spending in the economy to contain inflationary pressures. Hence, the velocity of money in any economy is a compass for monetary policies to manage and guide its instruments in a way that is appropriate to the economic cycles and conditions of the country so that can deal with the monetary crisis to maintain the stability of economic. The velocity of money is an important index that reflects the dynamics of the economy and the degree of its development and growth. The quantity theory of money states that the money supply determines the price level assuming velocity and real national income to be

stable, this conclusion has immediately derived by the Friedman [14]. However, the stream of spending depends not only on the money supply but also on its rotation or the velocity circulation which is not under the direct control of the central monetary authorities [33]. Henceforth, several of the economic variables have a major role in determining the speed of cash such as gross domestic product economic growth rates price level inflation rates interest rates [36]. In recent years the financial development in the banking sector has also witnessed a great development of payment mechanisms financial market development and technological development [2]. So that the nature and strength of this role vary according to the characteristics of the studied economy.

Over recent years the money in circulation in Jordan was increasing significance in assessing the effectiveness of the monetary policy. Additionally, the objective of this paper is to identify the effects of the velocity of money in Jordan. Moreover, it looks at whether economic development has any effect on the velocity. However, the problem with this study stems from the considerable variation in the estimate of the impact of the financial development on the velocity of money by scientific studies, which lies in the possibility of determining the factors of financial development that influence in velocity of money. This study estimates the financial development in Jordan and what reflects on the velocity of money, and analysis of its most important determinants that affect the velocity of money, using econometrics analysis. The remainder of this study has been organized as follows: The next section reviews the relevant prior literature. The third section presents the empirical analysis framework of this section. The fourth section shows overview of the velocity of money and financial development in the Jordanian economy. The fifth section describes the Econometric model and the collected data. The results of the empirical analysis have presented and discussed in the sixth section.

## 2. Literature Review

The previous studies about the velocity of money and financial development are enormous with a vast majority of researchers' efforts directed at studying the demand for money and the determinants of the velocity of money these studies are potentially important as an inappropriate monetary policy can deprive a country of a part of the benefits of its progress struggle. For instance, governments in developing countries relied seriously on domestic monetary authority to finance expenditures of their progress process. There have been discussions about the velocity of money in circulation from Classical through Keynesian and Modern Quantity Theory many theoretical and empirical studies have been conducted regarding the velocity of money [6, 13, 34, 10, 11, 7] among others. As Chakrabarty and Varghese study attempted to estimate the velocity of narrow and broad money for the period (1951-1985) including independent variables typically used in money demand functions: such as income interest rates and inflation rates along with an institutional variable the number of bank offices. Their results are unsatisfactory estimated coefficients for explanatory variables are not statistically significant. However, Jadhav Narendra talked about several factors that affect the velocity of money in the Indian economy. He estimated the velocity of money by using seasonally adjusted quarterly velocity series for broad money (V3) between the periods 1970 and 1988. He considered the explanatory variables as the real income the feast of banking interest rates and the degree of financial sophistication achieved in the economy with these variables, he has found that these variables explained a 90 per cent variation in the velocity of money [20]. While the Akhtaruzzaman study examined the

determinants of the velocity of money in Bangladesh for the velocity of narrow and broad money for the period from 1973 to 2007. The researcher found an adverse relationship between the velocity of money with economic growth indicating a declining velocity of money over time in Bangladesh also the study found that financial development affects the velocity of money negatively [1]. In addition, the study Akinlo demonstrates the influence of financial development on the velocity of money in Nigeria from 1986 to 2010. His study confirmed the existence of a unique and statistically significant relationship between the velocity in circulation and measures of financial development and the study showed that the exchange rate has a negative effect on the velocity of money in Nigeria per capita income has a statistically significant relationship with the velocity of money which supports the quantity theory. Also, the results showed that money issuing authorities cannot obtain additional leverage by issuing more money without generating high inflationary pressure [2]. Too, the study Altayee and Adam aimed to know the impact of financial development on the velocity of money under interest-free financing in Sudan during the period 1992-2012 which saw a significant change in the structure of the financial sector after the implementation of the interest-free Islamic banking and financing system in Sudan's country. This study considered the independent variables such as per capita income financial development narrow money supply rate of return under interest-free financing inflation rate and the spread of commercial bank branch networks. Researchers concluded that the velocity of narrow money was volatile in the mid-1990s and appeared to be more stable and predictable after two thousand. As well this paper supports the existence of a meaningful relationship between the measures of financial development and the velocity of narrow money [4]. Moreover, the study Ng'imor and Muthoga showed the influence of financial development on the velocity of money in Kenya through examine assessing the determinants of the velocity of money emphasizing structural aspects in the financial segment and defining the range to which structural factors affect the velocity of currency. The researchers used the time series data and the ARDL model for analysis. the study concluded to the real exchange rate was a vital adverse impact on the velocity of money real GDP had a positive impact on the velocity in circulation. This study as well confirmed that the progress of the financial segment has an inverse relationship with the money in circulation. The study suggested that strategies for the development of the financial sector should emphasize the stabilization of real exchange rates to preserve a stable money demand [29]. Besides this, the study of AlJuijati and AlMushahadani aimed to determine the factors affecting the velocity of money in its narrow (M1) and wide (M2) in Jordan during the period between (1980-2015) by using the autoregressive distributed lags Model (ARDL) model. The investigators found there was a short-term and long-term equilibrium relationship between the explanatory variables (income inflation financial development number of banks) during the study period the

study found that 90% of changes in the velocity of money in the narrow were explained by the independent variables and 75% of the velocity of money in the wide also the study concluded the ability of monetary policy in Jordan to predict the velocity of money [3]. While the Sharmina study aimed to demonstrate the impact of financial development and other variables on the velocity of broad money by using time series data between (1972 and 2015) in Bangladesh. The study found there was a relationship exists between the velocity of money and financial development as well the researcher found that GDP growth showed an opposing relationship with the velocity of money while there was a positive relationship with the deposit interest rate [24].

### 3. Theoretical Framework

The velocity of money (V) called the velocity of circulation is the average frequency with which a unit of money was paid for new locally produced goods and services in a specified time. The relation between money output and prices is the focus of attention between theory and monetary policy alike. Also, what lies at the heart of this relationship is the velocity of money which is the ratio of nominal income to the money supply [20].

First of all, Irving Fisher's version of the Quantity Theory of Money started from the formalization of the truth that over any period the volume of money expenditures must equal the sum of cash payments received (Fisher 1911). the idea of the velocity of money is deep-rooted in the classical quantity theory of money which is based on Fisher's equation of exchange ( $MV=PY$ ) that is associated with an assumption of a constant velocity of money. Fisher's equation (V) was interpreted as a transaction's velocity ( $MVT=PTT$ ) and taken to be determined by payments methods and the structural merit of the economy influencing the usage of money as the middle of exchange [17]. As well the economist Petty compared the funds available for circulation with the volume of economic transactions and concluded that funds available for exchange are less than the size of economic transactions [32].

The classical economists argued that the classical quantity theory of money gives a causal relationship between two variables stock of money and price the other two variables the velocity of money and real income are taken as constant so that velocity in circulation has only a fixed role. The theoretical explanation behind the fixation of the constant velocity of money initiates from the conviction of the classical economists that real income stays constant in both the short run and long run therefore the velocity of money is also steady that the real income is given as static due to the operating economy in full-employment and arrive equilibrium accordingly any deviations will be automatically empty by money supply and price so that the equilibrium is well-adjusted. The classicists supposed that the velocity of money in circulation relies upon some exogenous variables that are

not exposed to substantial change both in the short and long terms. For instance, the mindset of individuals about lending and borrowing behaviors social and institutional factors determine the method of payment and people's saving and consumption performance. Then the classical theory claimed that these factors are unlikely to amend significantly, in the long run, the velocity of money can be supposed as constant. In this manner, classicists prepared the role of the velocity of money as rigid that can be taken as constant for the long run [15, 21].

Keynes criticized in 1936 in his book "The General Theory of Employment Interest and Money" the classical view that velocity was constant. Keynes agreed with Cambridge's theory on the importance of the role of interest rate in determining the demand for money. Keynesian economists believed that the velocity of money is unstable and changes rapidly and offsets changes in the money stock Keynes's liquidity preference theory shows that velocity is constantly fluctuating as it is influenced by the level of interest rates. Keynes clarified that changes in the money supply may reduce interest rates hence encouraging people to hold money and thus reducing the velocity of money. Then prices do not essentially have to vary with changes in the money stock. However, Keynes held that since velocity is positively related to interest rates then it follows that it is regularly altering depending on the dominant market interest rates. [26].

On the other hand, monetarists supervised by Friedman discussed treating the velocity of money as a parameter and examined those variables that could affect the value of the velocity of money in circulation. monetarists approach viewed demand for money as equivalent to the demand for any other asset. However, the monetarists consider that the stability of the velocity of money (V) is significant also monetarists think that the velocity of money is relatively stable and changes within the limits of its predictability to a large degree. Friedman's theory which is also referred to as the modern quantity theory of money demand was introduced in the 1970s and proclaims that society wants to hold some real money balances as cash. The level of real balances depends on permanent income the opportunity cost of holding money which is represented by the difference between expected returns on bonds minus return on money expected return on equity minus return on money and expected inflation rate minus return on money According to Friedman theory money demand for real balances is positively related to permanent income and negatively related to the opportunity cost of holding money while most of the Quantity Theory of Money was held explanation of changes in income until the development of the income-expenditure approach begun by Keynes It is mean a conflict between Keynesians and Monetarists although modern Monetarists accept much of the Keynesian analysis and many contributions of the Monetarists analysis are accepted by those considered as Keynesians [23, 14, 26, 26].

#### 4. Overview of the Velocity of Money and Financial Development in the Jordanian Economy

Many other factors can be recognized that would add further complication in predicting the velocity of money and its movement meantime. First, the Jordanian economy has undergone deep and fundamental changes in the banking segment and experienced important financial development further down the financial liberalization and started to apply for reforms program in the 1990s after the breakdown of the exchange rate for Jordanian dinar. It has already implemented several vital liberalization measures such as liberalization of borrowing and deposit interest rates more flexible and transparent rules for opening new banks in the private segment and removal of government limits and controls to finish the capital flows. Accordingly, new banks and many other financial organizations started working in the private sector. However, it is probable therefore that financial liberalization procedures might have carried tougher interest rate sympathy of money demand and in loaning behaviors of the individuals.

The velocity of money measured as the money to output ratio shows the ratios of money supply (M1) to GDP and money supply (M2) to GDP. Figure 1 shows the velocity of broad and narrow money from 1980 to 2019 it is clear from the graph that the velocity of money in narrow was staidly decreased through the years of study but there are some fluctuations in some years for example in 1981 the velocity

of narrow money recorded 1.22 in next twenty years decreased to reach around 0.81 then in 2019 a little rose even reached 0.90. While when we look at the velocity of broad level, we see many variations throughout the years the beginning of the study the value of velocity in circulation on broad was around 1.96 and in the middle of the study in 1999 noted 3.5 approximately then the fluctuations happen from year after year when the value of velocity recorded nearly 3.1 in 2019. Nevertheless, figure 2 indicates that the money supply (M1) has also been on an upward trend like the GDP indicating this trend shows that the increase in money supply has generally been in line with GDP growth in Jordan. in particular how has the financial sector development affected the behavior of velocity of money in Jordan? This is constituting the matter and path of the study. The Jordanian financial system has undertaken some notable alterations as an outcome of the improvements and plans applied by the monetary authorities after the trade balance crisis and the collapse of the Jordanian dinar exchange rate that happened in 1989 cooperation with the International Monetary Fund has begun to apply for reforms program through the next years The effects of these modifications are shown in the fast growth of financial variables such as saving deposit loaning borrowing and money supply. The interest rate and other key rates experienced upward movement following the financial sector reforms after 1992 (Center for Strategic Studies 2016). the trend of GDP and Money supply display that the increase in money supply has mostly been in stripe with GDP growth in the Jordanian economy. Especially the money supply (M1).

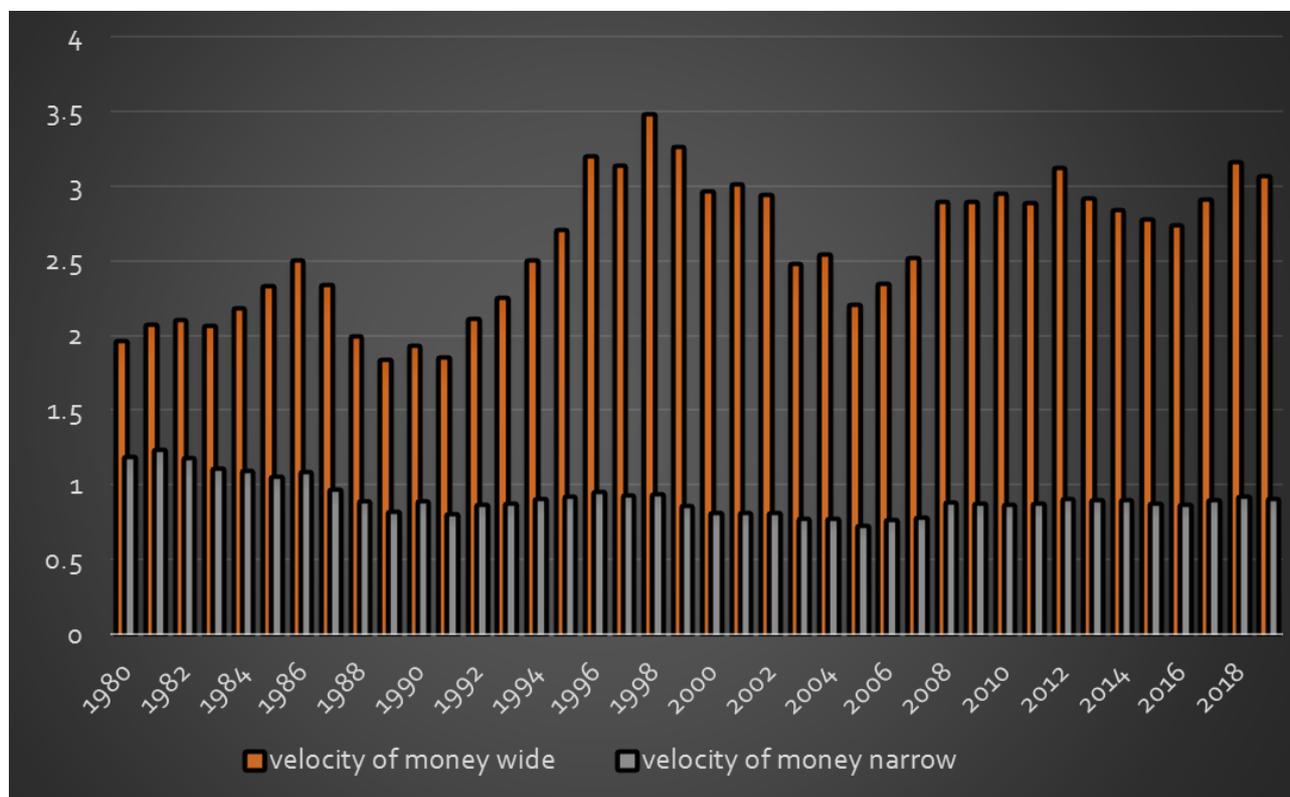


Figure 1. The Velocity of money in Jordan in the Wide and Narrow ranges.

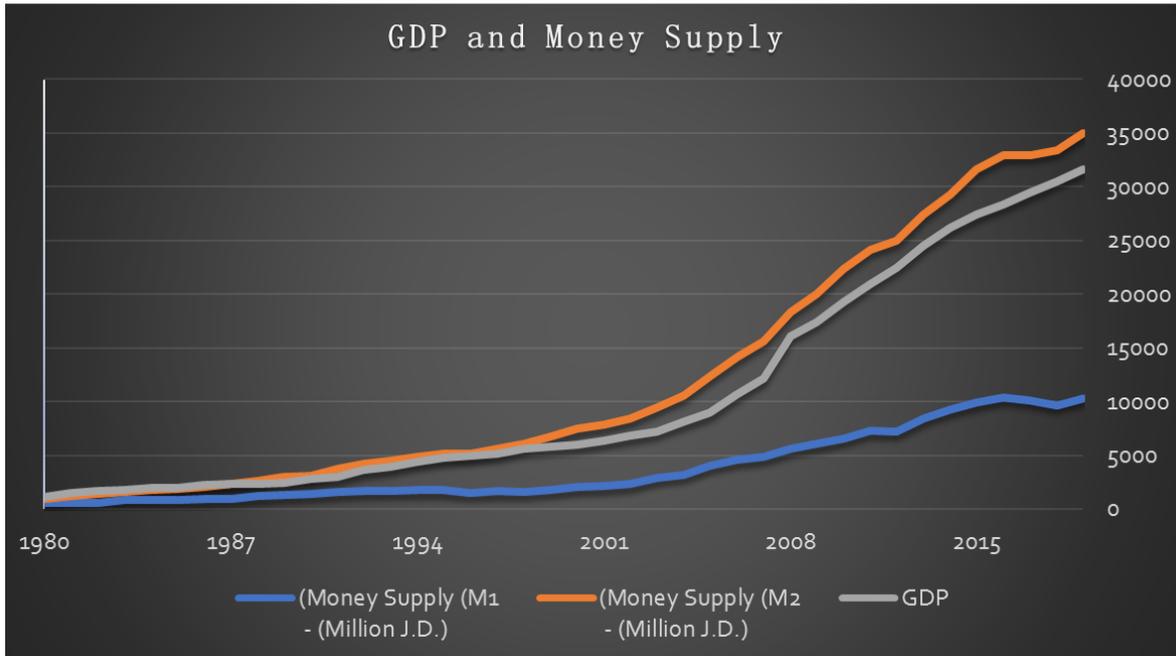


Figure 2. Gross Domestic Product and Money supply in Jordan.

Figure 3 demonstrates the credit facilities extended by licensed banks to the private sector as a percentage of GDP and demand deposits with licensed as a percentage of time deposits with licensed banks between 1980 and 2019. The vertical axis represents the percentage from 1% to 90% and the horizontal axis represents the period from the year 1980 to the year 2019. Firstly, the financial development (FD1) increased from just under 50 per cent in 1980 to around 76

per cent in 2019 during this period there are some fluctuations over years. for instance, the (FD1) reached the highest recorded at 86% in 2007 and the rate dipped as low as twenty per cent when reached about 66% in 2010. Secondly the Financial development (FD2) that the demand deposits/time deposits ratio. The demand deposits include all short-term deposits such as all checkable and current account deposits and traveler’s checks [18].

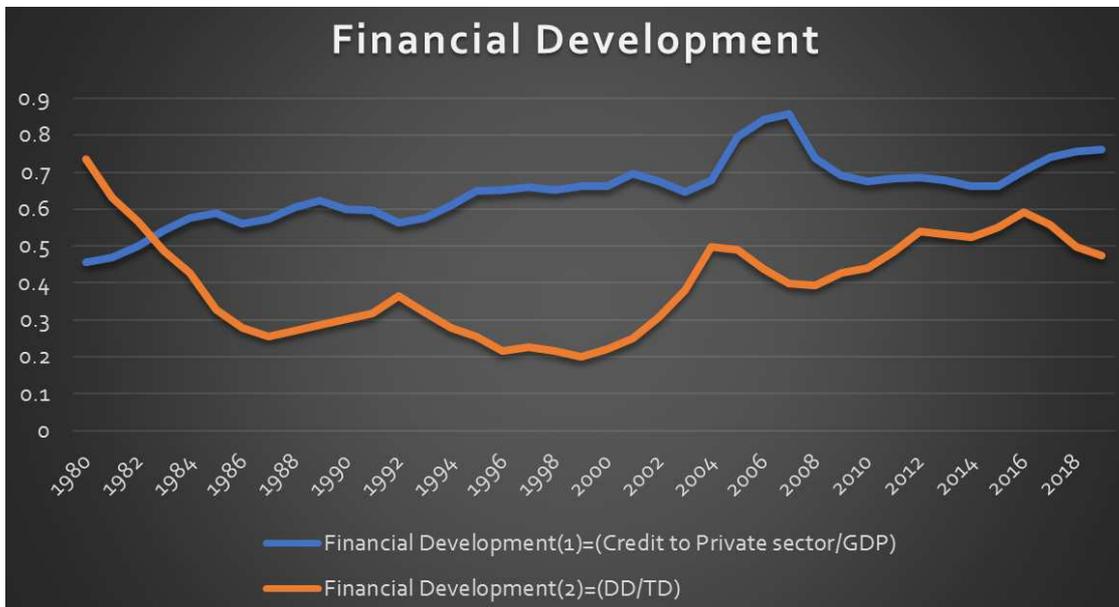


Figure 3. The Financial Development Index in The Jordanian Economy.

In the lack of substitute financial assets to money in most unindustrialized countries, individuals lean towards substitute demand deposits to time deposits for increasing income and getting profit without investing this money in the real sector because there are many obstacles and risks. The financial

development leads to reduce transaction costs related to the transmission of funds among demand and time deposits so lower transaction cost is probable to raise the savings held in time deposits. Hence financial development is likely to upsurge the collection of time deposits (TD) at a higher rate

than demand deposits (DD) leading to a decline (the DD/TD) ratio when financial development is becoming more advanced. Consequently, the anticipated sign of (DD/TD) ratio might either be positive or adverse with the velocity of money that is reliant on the level of financial development in the Jordanian economy. Through growing financial maturity individuals will hold more money as a time deposit which leads to slow the speed of velocity of money by lowering the value of money multipliers and velocity will be inversely related to (DD/TD) ratio [1, 5] identified three stages of financial development: (i) the financial repression stage when the financial sector is subject to many regulations and restrictions; (ii) the financial development stage which started after the financial liberalization activity in the 1980s when the financial sector experienced exponential growth and witnessed the emergence of financial derivatives securitization and shadow banking; and (iii) the financialization stage which refers to the aggressive increase in the size and power of the financial sector that might exert negative effects on the economy.

## 5. Methodology

### 5.1. The Description of the Econometric Model

Based on what was described in the literature review and theoretical framework to achieve the objectives of this study It relied on a model and indices applied to the case of Jordan

$$\Delta(V_t) = B_0 + B_1 \Delta(V_{t-1}) + B_2 \Delta(RGDP_t) + B_3 \Delta(FD1_t) + B_4 \Delta(FD2_t) + B_5 \Delta(I_t) - \text{CointEq}_{-1} + \sum_{j=1}^n a_1 * (RGDP) + \sum_{j=1}^n a_2 * (FD1) + \sum_{j=1}^n a_3 * (FD2) + \sum_{j=1}^n a_4 (I) + \mu \quad (3)$$

Whereas:

$\Delta$ : is the first difference operator.

$B_1 B_2 B_3 B_4 B_5$ : denotes the short-term coefficients.

$a_1 a_2 a_3 a_4$ : denotes long-term coefficients.

CointEq-1: error correction factor.

$\Sigma$ : is the number of lagged for each variable.

$\mu$ : is the error term.

Two measures of the velocity of money were used as dependent variables. These represented the two main components of money supply specifically narrow money M1 and wide money M2 and are given as:

$$V_1 = \frac{GDP}{M_1} \quad V_2 = \frac{GDP}{M_2} \quad (4)$$

### 5.2. The Description of Variables and Data

This study aims to estimate the value of the velocity of money and the impact of real gross domestic product credit facilities extended by banks to the private sector as a percentage of GDP demand deposits as a percentage of time deposits and interest rate on the velocity of money in Jordanian economy for the period extended 1980 until 2019. The price level was taken into consideration as the level of inflation affects the real GDP [35] and prices for the year (2010) were considered as a base year to reduce the impact of inflation.

the model aims to measure the impact of real gross domestic product credit facilities extended by banks to the private sector as a percentage of GDP demand deposits as a percentage of time deposits and interest rate on the velocity of money Based on studies [2, 29], and [3] according to the following formulation:

$$V = F (RGDP \text{ FD1 } \text{FD2 } I) \quad (1)$$

Whereas:

V: the velocity of money

RGDP: real gross domestic product.

FD1: credit facilities to the private sector as a percentage of GDP.

FD2: The ratio of demand deposits to time deposits.

I: the interest rate.

When taking the velocity of money real GDP credit facilities to the private sector and demand deposits/time deposits in statistical form the equation turns into as follows:

$$V = a_0 + a_1 RGDP + a_2 FD1 + a_3 FD2 + a_4 I + \mu \quad (2)$$

After accomplishing the primary statistical tests that it becomes obvious that the Autoregressive Distributed Lag (ARDL) method is the most suitable model used in this study. based on [30, 31] the ARDL model is formulated as follows:

The velocity of money is a measurement of the rate at which money is exchanged in an economy. It is the number of times that money moves from one entity to another. Gross Domestic Product (GDP) represents all the value of final goods and services produced in the Jordanian economy where the logarithm of real GDP was used as an indicator of economic growth in Jordan. Domestic credit facilities to the private sector as a percentage of GDP refers to financial resources provided to the private sector by financial corporations such as through loans purchases of nonequity securities and trade credits and other accounts receivable that establish a claim for repayment. Demand deposits as a ratio of time deposits which financial development is probable to increase the collection of time deposits (TD) at a higher rate than demand deposits (DD) implying declining DD/TD ratio with financial development. Therefore, the expected sign of DD/TD could either be positive or negative in velocity function depending on the level of development of the Jordanian economy as proxied by GDP growth. The interest rate is the weighted average interest rate on saving deposits that represent the opportunity cost variable.

### 5.3. Descriptive Analysis

The Descriptive statistics of the data are available in Table

1. Comparing standard deviation to the mean value there is variables that are candidates for explaining such volatility in significant volatility in velocity measure as well as in velocity.

*Table 1. Result of Descriptive Analysis.*

observation=40	V1	V2	RGDP	FD1	FD2	I
Mean	0.907	2.593	12188.24	0.65	0.40	2.81
Median	0.886	2.617	8801.31	0.66	0.40	1.45
Maximum	1.228	3.476	25277.60	0.86	0.74	6.80
Minimum	0.722	1.828	4935.59	0.46	0.20	0.00
Std. Dev.	0.120	0.449	6804.84	0.09	0.14	2.32
Skewness	1.088	-0.081	0.79	0.09	0.33	0.27
Kurtosis	3.671	1.839	2.04	3.23	2.25	1.39
Jarque-Bera	8.637	2.292	5.68	0.15	1.66	4.81
Probability	0.013	0.318	0.06	0.93	0.44	0.09
Sum	36.275	103.703	487529.40	25.97	16.00	112.30
Sum Sq. Dev.	0.562	7.873	181000000.0	0.30	0.71	209.97

Source: Authors' calculations by using EViews.

#### 5.4. The Unit Root Test (Augmented Dickey-Fuller Test-ADF)

Before performing the standard analysis that there are some preliminary tests must be done to avoid falling into spurious regression to reach accurate and precise results

some important tests must be done. The results in Table 2 show that the time series for data study variables are not Stationary at the level I(0) but turn Stationary afterwards taking the first difference I(1).

*Table 2. Result of Augmented Dickey-Fuller test-ADF.*

Variables	Critical Value	T-Statistics	Decision
Stationary at Level			
V1	-3.60	-2.44	Non-Stationary
V2	-3.60	-2.26	Non-Stationary
RGDP	-3.60	-1.00	Non-Stationary
FD1	-3.60	-2.58	Non-Stationary
FD2	-3.60	-2.27	Non-Stationary
I	-3.60	-0.14	Non-Stationary
Stationary at First Difference			
V1	-2.94	-3.18**	Stationary
V2	-3.60	-5.33*	Stationary
RGDP	-2.94	-3.13**	Stationary
FD1	-3.60	-5.67*	Stationary
FD2	-2.94	-3.29**	Stationary
I	-2.94	-3.47**	Stationary

\*\* represent 1% 5% level of significance respectively with Intercept.

#### 5.5. Cointegration Test

*Table 3. Bound Test.*

Equations	F-calculated	1%		5%		10%		K	Decision
		I0	I1	I0	I1	I0	I1		
Result bond test									
V1=f [RGDP FD1 FD2 I]	7.4	3.3	4.4	2.6	3.5	2.2	3.1	4	Co-integration
V2=f [RGDP FD1 FD2 I]	4.6	3.3	4.4	2.6	3.5	2.2	3.1	4	Co-integration
RGDP=f [V1 V2 FD1 FD2 I]	19.9	3.1	4.2	2.4	3.4	2.1	3	5	Co-integration
FD1=f [V1 V2 RGDP FD2 I]	7.5	3.1	4.2	2.4	3.4	2.1	3	5	Co-integration
FD2=f [V1 V2 RGDP FD1 I]	15.6	3.1	4.2	2.4	3.4	2.1	3	5	Co-integration
I=f [V1 V2 RGDP FD1 FD2]	4.9	3.1	4.2	2.4	3.4	2.1	3	5	Co-integration

\* Source: Prepared by the researcher using the program EViews.

At that moment all variables of the study were still at the level and become Stationary when the first difference I (1) the results of the bond test shown in the table 3 above that the variables in the former models have long-term relationships

by comparing the value of F-calculated with the bond and therefore do not accept the null hypothesis. Then we do not accept the null hypothesis which states that there is no co-integration which showed that the value of F-calculated is

higher than the higher value (I1) in all models. Therefore, we reject the zero hypotheses that there is no co-integration between the variables of the study, and this indicates the existence of a long-term relationship between the variables.

### 5.6. Multicollinearity by Using Correlation Matrix Test

Table 4. Correlation Matrix.

	V1	V2	RGDP	FD1	FD2	I
V1	100%	-25%	-30%	-74%	32%	61%
V2	-25%	100%	55%	50%	-17%	-20%
RGDP	-30%	55%	100%	62%	48%	-67%
FD1	-74%	50%	62%	100%	-4%	-64%
FD2	32%	-17%	48%	-4%	100%	-29%
I	61%	-20%	-67%	-64%	-29%	100%

\* Source: Prepared by the researcher using the program EViews.

Through the results in Table 4 it is clear there is no Multicollinearity problem between the independent variables in the model also the highest percentage of correlation between independent variables in the model is (67%). Thus, there is no problem with Multicollinearity which is a good and desirable quality in the model. Also, the Variance Inflation Factors (VIF) were less than 5 for all independent variables according to [16] Variance Inflation Factors of less than five show the nonappearance of a multicollinearity problem.

## 6. Results Analysis

### 6.1. Estimate the Model

After the results of the primary statistical tests showed

that the variables were stationary at the first difference I (1) and presented the existence of a co-integration between variables in the long-term the model was estimated by using the ARDL. Tables 5 and 6 displayed the estimated model in the short term and long term of equation (3) with a differenced log of V as a dependent variable. Firstly, the velocity of money is estimated using narrow money (M1) which is used as the dependent variable. Secondly, the velocity of money is estimated by using broad money (M2) which is used as the dependent variable. Table 5 illustrates that there is no effect for the real GDP on the velocity of money in narrow money and broad money in the short-run and long-run there is an effect at the lowest level this relationship is consistent with the result of the study of [3]. These results are against by theory. as an increase in real GDP generally does not lead to an increase or increase at the lowest level to the velocity of money in a narrow and broad meaning.

The credit facilities to the private sector as a percentage of GDP have a significant negative effect on the velocity of money (V1) which is estimated to be (-0.834) and (-0.29) respectively in the short-term and long-term. While the credit facilities to the private sector as a percentage of GDP has effect in the (V2) in the short-term is insignificance statistic and in the long-term by about (4.078) that significance at 5% as shown in Table 6 meaning that if credit facilities to the private sector as a percentage of GDP in the long-term increases by (1) then the velocity of money increases around (4) in other words the increase in (V2) by (0.24) that increase the real FD1 by (1). This finding is consistent with economic theory and study [28].

Table 5. The results of long and short-term estimates by using the method (ARDL).

Variable	Coefficient	Std. Error	T-statistic	Prob.
(1) Short term Coefficient				
D (FD1)	-0.8346	0.1280	-6.5224	0.0000*
D (FD2)	-0.333	0.1076	-3.0958	0.0047*
D (I)	0.0087	0.0034	2.5405	0.0174**
D (I(-1))	-0.0091	0.0043	-2.1329	0.0425**
D (I(-2))	-0.0176	0.0037	-4.6902	0.0001*
CointEq(-1)*	-0.6830	0.0905	-7.5504	0.0000*
Diagnostic tests				
R-squared		0.7447	S.E. of regression	0.0252
Adjusted R2		0.7035	Sum squared resid	0.0198
(2) long term Coefficient				
C	0.742722	0.145299	5.111669	0.0000*
RGDP	0.000005	0.000002	2.165232	0.0397**
FD1	-0.294731	0.164419	-1.792561	0.0847***
FD2	0.423954	0.126491	3.351651	0.0025*
I	0.041158	0.008709	4.726092	0.0001*
Diagnostic tests				
R-squared	0.9319		S.E. of regression	0.0276
Adjusted R2	0.9057		F-statistic	35.5581[0.000]

Note: \* \*\* \*\*\* represent 1% 5%, 10% level of significant respectively.

\* Source: the author by analyzing the study model using EViews.

$V1 = 0.7427 + 0.0000*RGDP - 0.2947*FD1 + 0.4240*FD2 + 0.0412*I$ .

**Table 6.** The results of long and short-term estimates by using the method (ARDL).

Variable	Coefficient	Std. Error	T-statistic	Prob.
(1) Short term Coefficient				
D (RGDP)	0.00001	0.00005	0.18582	0.8541
D (RGDP (-1))	-0.00012	0.00006	-2.10608	0.0454**
D (RGDP (-2))	0.00018	0.00005	3.34158	0.0026*
D (FD1)	-0.13512	0.77285	-0.17484	0.8626
D (FD2)	-0.25009	0.80652	-0.31008	0.7591
D (FD2(-1))	1.45027	0.74912	1.93597	0.0643***
CointEq (-1) *	-0.46823	0.08389	-5.58146	0.0000*
Diagnostic tests				
R-squared		0.63062	S.E. of regression	0.14293
Adjusted R2		0.55674	Sum squared resid	0.61285
(2) long term Coefficient				
C	-0.78498	1.27284	-0.61672	0.543
RGDP	0.00009	0.00002	4.72304	0.0001*
FD1	4.07870	1.59389	2.55896	0.0169**
FD2	-2.70637	1.00487	-2.69324	0.0125**
I	0.25879	0.06331	4.08756	0.0004*
Diagnostic tests				
R-squared	0.9108.		S.E. of regression	0.15657
Adjusted R2	0.87155		F-statistic	23.20544[0.000]
Note: * ** *** represent 1% 5%, 10% level of significant respectively.				

$$V2 = -0.7850 + 0.0001*RGDP + 4.0787*FD1 - 2.7064*FD2 + 0.2588*I.$$

The ratio of demand deposits to time deposits (FD2) affects the velocity of money (V1) negatively in the short-term and positively in the long-term around (-0.33 0.42) respectively and significant only in the case of the velocity of narrow money. This positive effect possibly arises from the fact that financial innovation encourages the use of money substitutes or quasi money that reduces the demand for money and hence brings the velocity of money up. The demand deposits to time deposits ratio (FD2) shows up negative effect in the short-term and long-term about (-0.25 - 2.70) respectively and significant in the case of the velocity of broad money. the result is consistent with theory and the studies of [25, 2] support the claim that financial development and modernization improve the economy holds and transact less with cash through the increasing financial maturity people tend to hold more money in time deposits which reduces the speediness of velocity through lowering credit and money multiplies and therefore illumination the opposite relationship between the velocity of money and demand deposit to time deposit ratio.

The results display that the change in the interest rate with its lags was significant at the 5% level. This implies that changes that happened in the interest rates may not play an important role in determining changes in the velocity of money thus the outcome supports the argument that interest rates are sticky in the short run making the relationship between the velocity of money and prices weak significant in the short run and this result is consistent with other results in developing economies that are relatively interested inelastic [25, 27]. But in the long term, there is a significant positive effect for the interest rate on the velocity of money that means (0.04) were significant at one per cent level that a percentage increase in interest rate leads to an increase in the velocity of money by 4%.

## 6.2. Diagnostic Tests

First: To ensure the efficiency of the used model and that it is not an econometrics problem the following tests were performed.

**Table 7.** Diagnostic Tests.

Equation	Diagnostic Test	Test Statistic	Prob.
V1=F (RGDP FD1 FD2 I)	Serial Correlation (Breusch-Godfrey Test)	F-statistic=0.364189	Prob. F (2,24) =0.6985
	Heteroscedasticity (Breusch-pagan-Godfrey Test)	F-statistic=0.992424	Prob. F (10,26) =0.4743
	Jarque-Bera Test	Jarque-Bera=1.3288	Prob.=0.5145
V2=F (RGDP FD1 FD2 I)	Serial Correlation (Breusch-Godfrey Test)	F-statistic=2.820926	Prob. F (4,21) =0.0511
	Heteroscedasticity (Breusch-pagan-Godfrey Test)	F-statistic=1.269019	Prob. F (11,25) =0.2973
	Jarque-Bera Test	Jarque-Bera=1.1719	Prob.=0.5565

\* Source: Prepared by the researcher using the program EViews.

The results in Table 7 show that the two models do not exist a Serial Correlation since the value of the F-statistic was greater than 5% so it is accepted the null hypothesis that there is no problem with Serial Correlation between Errors. Besides that, they are not also a problem with the stability error variance Homoscedasticity as the value of the F-statistic was greater than 5%. It should be noted that the null hypothesis can be accepted that there is no problem with Homoscedasticity. The results also demonstrate that the two models are not the problem of normal distribution since the probability value of

the Jarque-Bera test was greater than 5% therefore the remainder of the model follows the normal distribution.

Second: To reveal the stability of the parameters of the model the accumulated residual path test (Test Cusum) and (Cusum of Squares) must be performed after performing the two tests it was found that the error limit value falls within the critical limits and at a significant level (5%). This means that the variables are stable during the time used in the study and there is no need to divide the time into partial periods, as shown in the following figures:

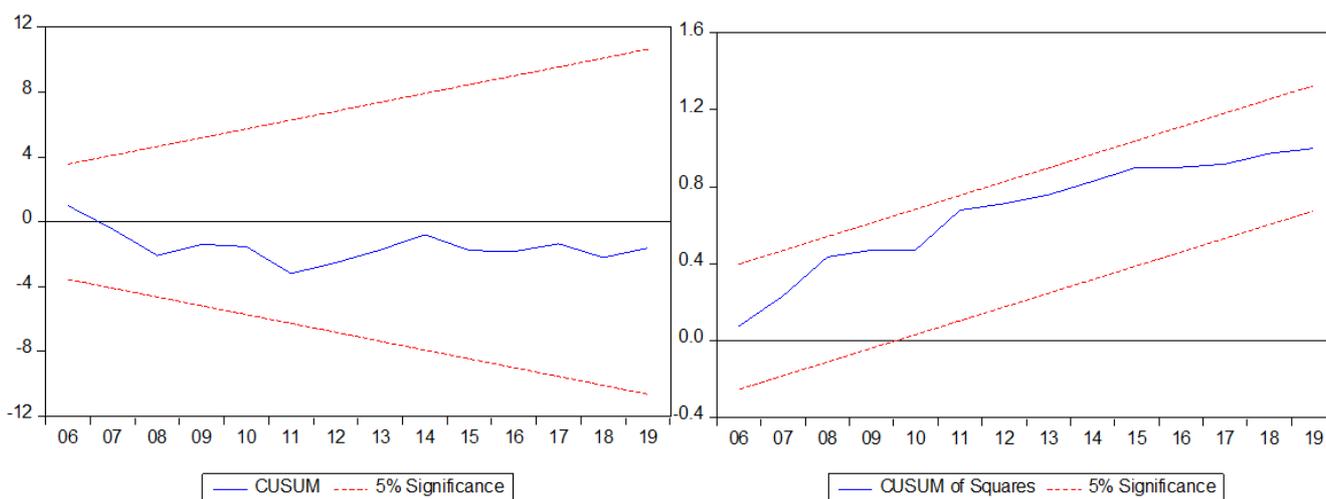


Figure 4. Cusum of Squares Test & Cusum Test.

## 7. Conclusions and Policy Implications

The paper examined the impact of financial development on the velocity of money by using an ARDL model and a Cointegration test. Cointegration stationarity specification errors residual correlation residual normality and structural stability tests are carried out and satisfied. This paper analyzed the relationships between the Velocity of money and financial development in the Jordanian economy from 1980 to 2019. The results confirm the following: a long-run stationary relation among velocity of money real gross domestic product and the share of credit facilities to the private sector from GDP the ratio of demand deposits to time deposits and the interest rate during the period examined. The estimated parameters of the explanatory variables are significant in the long-term model and short-term but not in the short-term dynamics except in the velocity of broad money (V2). Secondly, the real gross domestic product has not a significant effect on the velocity of money while the share of credit facilities to the private sector from GDP has a significant negative effect on the velocity of money (V1) and has a significant positive effect on the velocity of money (V2). Also, the ratio of demand deposits to time deposits has a significant positive effect on

the velocity of money (V1) and has a significant negative effect on the velocity of money (V2) last of all the interest rate has a significant positive effect on the velocity of money (narrow and wide).

The sureness and positive expectation building by the central bank of Jordan will assist significantly in the direction of implementation of policies which will improve the development of the financial system and consequently affect the velocity of money particularly in the long term. In addition, the central bank policies toward economic growth and inflation should target an economic growth rate and inflationary pressure on the economy at least in the short term. Furthermore, the central bank of Jordan should set policies to stabilize the money demand function in the Jordanian economy. Due to the dynamic change in life and the fast changes in the communication and in accessing the information the behavior of individuals regarding assets loans and spending is changing rapidly that leading to huge challenges to central banks' policies formulation regarding the velocity of money. Future researchers are encouraged to conduct studies to find out and measure the effectiveness of financial development across the stock market by introducing an effect on the velocity of money and holding of money.

## Appendix

*Table A1. The data used in the statistical analysis.*

Year	M1	M2	GDP	CPI	RGDP	V2	V1	FD1	FD2	I
1980	594.8	984.8	1164.8	23.60	4935.59	1.96	1.18	0.46	0.74	5
1981	701.7	1179.9	1448.7	25.40	5703.54	2.06	1.23	0.47	0.63	5
1982	787.5	1403.3	1649.9	27.20	6065.81	2.10	1.18	0.50	0.57	5
1983	869.4	1615.2	1786.6	28.60	6246.85	2.05	1.11	0.54	0.49	6
1984	878.4	1757.7	1909.7	29.70	6429.97	2.17	1.09	0.58	0.43	7
1985	848.2	1874.8	1970.5	30.60	6439.54	2.32	1.05	0.59	0.33	7
1986	897.1	2072.4	2240.5	30.60	7321.90	2.50	1.08	0.56	0.28	6
1987	979.8	2372.2	2286.7	30.60	7472.88	2.33	0.96	0.57	0.26	6
1988	1181.4	2646.8	2349.5	32.60	7207.06	1.99	0.89	0.60	0.27	0
1989	1326.5	2971.1	2425.4	41.00	5915.61	1.83	0.82	0.62	0.29	0
1990	1432.7	3122.6	2760.9	47.60	5800.21	1.93	0.88	0.60	0.30	0
1991	1600.4	3717.5	2958	51.50	5743.69	1.85	0.80	0.60	0.32	5
1992	1716.1	4193	3611.6	53.50	6750.65	2.10	0.86	0.56	0.37	5
1993	1730.1	4481.8	3885.2	55.30	7025.68	2.25	0.87	0.57	0.32	5
1994	1746.1	4841.5	4359.2	57.20	7620.98	2.50	0.90	0.61	0.28	5
1995	1745.6	5159.8	4714.7	58.60	8045.56	2.70	0.91	0.65	0.26	5
1996	1539.2	5175.3	4912.2	62.40	7872.12	3.19	0.95	0.65	0.22	5
1997	1642.4	5576.6	5137.6	64.30	7990.05	3.13	0.92	0.66	0.23	5
1998	1613.9	6026.3	5609.8	66.30	8461.24	3.48	0.93	0.65	0.22	5
1999	1777.1	6747.6	5778.1	66.70	8662.82	3.25	0.86	0.66	0.20	4
2000	2026.7	7434.7	5998.6	67.10	8939.79	2.96	0.81	0.66	0.22	4
2001	2119.7	7866.1	6363.7	68.30	9317.28	3.00	0.81	0.70	0.25	3
2002	2316.2	8419.1	6794	69.60	9761.49	2.93	0.81	0.67	0.31	2
2003	2919.9	9465.7	7228.8	71.20	10152.81	2.48	0.76	0.65	0.38	1
2004	3192.9	10571.4	8090.7	73.10	11067.99	2.53	0.77	0.68	0.50	1
2005	4061.3	12364	8925.4	75.80	11774.93	2.20	0.72	0.80	0.49	1
2006	4566.5	14109.7	10675.4	80.50	13261.37	2.34	0.76	0.84	0.44	1
2007	4833.1	15606.8	12131.4	84.30	14390.75	2.51	0.78	0.86	0.40	1
2008	5573	18304.2	16080.2	96.10	16732.78	2.89	0.88	0.74	0.39	1
2009	6039.5	20013.3	17421.9	95.40	18261.95	2.88	0.87	0.69	0.43	1
2010	6550	22306.7	19265	100.00	19265.00	2.94	0.86	0.67	0.44	1
2011	7271.5	24118.9	20962.1	104.20	20117.18	2.88	0.87	0.68	0.49	1
2012	7211.1	24945.1	22460.6	108.90	20624.98	3.11	0.90	0.68	0.54	1
2013	8408.4	27363.4	24462.7	114.10	21439.70	2.91	0.89	0.68	0.53	1
2014	9231.7	29240.4	26161.9	117.40	22284.41	2.83	0.89	0.66	0.53	1
2015	9880.2	31605.5	27396.8	116.40	23536.77	2.77	0.87	0.66	0.55	1
2016	10386.9	32876.2	28323.7	115.50	24522.68	2.73	0.86	0.70	0.59	1
2017	10135.2	32957.6	29400.4	119.30	24644.09	2.90	0.89	0.74	0.56	1
2018	9676.3	33359.3	30481.8	124.70	24444.11	3.15	0.91	0.75	0.50	1
2019	10322.8	34969.7	31597	125.00	25277.60	3.06	0.90	0.76	0.48	1

Source: Central bank of Jordan Research Department Statistical Database.

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