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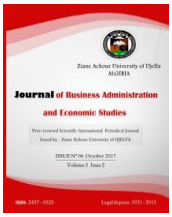

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Analysis of asymmetry between velocity of money and inflation in Algeria

تحليل عدم التماثل بين سرعة دوران النقد والتضخم في الجزائر

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Abstract

This paper aims to analyze the asymmetry of the relationship between inflation, both negative and positive effects of the speed of cash circulation in Algeria, based on the descriptive analytical methodology and some standard approaches alongside the views of different theories of economic schools regarding the speed of cash circulation through their determinants, and the factors that influence change And the methodology of the studies: a study of the characteristics of the variables to study the relationship of simultaneous integration using NARDL and determining the optimum distribution period, as well as the models of error correction and discrimination in a short term in the long term, where an annual sample was used from 1970 to 2017

Keywords

Velocity of money ; asymmetry ; nonlinear ARDL models

JEL Classification Codes : C58 , E49, E52

الملخص

تسعى هذه الورقة إلى تحليل عدم تماثل العلاقة بين التضخم، والآثار السلبية والإيجابية لسرعة تداول النقد في الجزائر ، بناءً على المنهجية التحليلية الوصفية وبعض المناهج القياسية الى جانب وجهات نظر النظريات المختلفة للمدارس الاقتصادية فيما يتعلق بسرعة تداول النقد من خلال محدداتها ، والعوامل التي تؤثر على التغيير ومنهجية الدراسات: دراسة خصائص المتغيرات لدراسة علاقة التكامل المتزامن باستخدام NARDLوتحديد فترة التوزيع المثلى ، وكذلك النماذج تصحيح الخطأ والتمييز باختصار على المدى الطويل ، حيث تم استخدام عينة سنوية من *1970*الى 2017 ،

الكلمات المفتاحية

سرعة النقد , عدم التماثل , الانحدار غير الخطي للابطاء الموزع

تصنيف JEL: C58 , E49, E52

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I.NTRODUCTION:

The velocity of money is defined as the frequency at which the average same unit of currency is used to purchase newly domestically-produced goods and services within a given time period, that's usually flexible and defined by the ratio of real income to the cash of mass. It also highlights the importance of the velocity of money in determining the total demand, and how to control it by controlling the monetary policy tools to the demand for cash balances, and highlight the role of money in the economy in both perspective demand and supply.

The research on the essence of the interrelationships between macroeconomic variables, necessitates the researchers to know and test the reality, the course of these relations and the extent of their permanence and persistence, and inflation as a complex economic and monetary phenomenon which linked to many other economic variables. But the problematic that we are asking is whether inflation is related to the velocity of money as one of its determinants is in the same direction, in the sense of whether the rising prices in Algeria increasingly affects the velocity of money in the same format in the case of low prices?

1.hypothesis:

In this study, we try to test the hypothesis on the impact of inflation that is not equal to its positive effect (high prices), with inflation having a negative effect on the velocity of money. Gordon , Eric(1998)

2.The significance of research:

The aim of this study is to answer the problem presented to many objectives, including: - Understanding the theoretical concepts of the velocity of money and its limitations - Identify the dimensions of the impact of inflation in the velocity of money. - Distinguishing inflation as an explanatory variable - Measuring inflation in a statistical model

.3. Methodology:

This research is based on both analytical descriptive method. Also,theoretical aspect and standard method in this case study by using the indicators of the velocity of money, the negative and positive impacts of inflation, in addition to short term and long term variables.

Inflation gaps, nonlinear gradient regression (NARDL), gradual stepwise, and finally asymmetry. Montoussé (2000)

Study plan: The study is divided into three parts, the first depends on the methodological aspect, the second is on the analytical and the theoretical side, the third is on the case study which depends on the sample of an annual study from 1980 to 2015 applying a lot of modern methods of statistical and standard studies

II. THEORETICAL FRAMEWORK AND PREVIOUS STUDIES:

Its study of the is related to the concept of cash in general and to the demand for money in particular. The studies fall from the contributions of the classics to the present day

We will try to limit our study to three schools: Mishkin (1994)

- Classical school or the theory of the amount and stability of money in general

- Keynesian theory has changed a lot of positions for the constant or change this speed

And finally the critical theory of Milton Friedman and the attempt to revive some classical theories regarding the relative stability of velocity.

1. Classical School:

The ideas of this institution emerged in the 19th century and are classified by specialists in economic thought to the marginal school and there are those who call it a more accurate and the theory of the amount of money, this institution believes that money is only a medium of exchange and then it depends on the motive of exchanges, And services and ask for money and since the money has the property and is the general acceptance in all exchanges between goods and services, the money received will be spent after a while, besides the exchange mediation property Classic thought that the money stored value

The theory of the amount of money in its simplified form to the rapid circulation of cash on its stability in the short term and assuming that the economy at the level of full employment, the production is stable in the short term and this means that the general level of prices the same amount of cash change and this through the expansion of banks In the

granting of credit (borrowing) and it can be said that the price level is the balance of demand and money supply Choud hury (1999)

When analyzing the speed of cash circulation we mention two formulas:

2.Fisher formula:

This formula is based on the volume of commodities exchanged or the volume of transactions in the economy. It considers that the quantity of money in circulation is equal to the general level of prices in the volume of exchanges and can be abbreviatedly abbreviated in the following equality

$M \times V = P \times T$ (1)

Where M = the amount of cash in an economy

V = the speed of cash circulation

P = the general level of prices that balances the demand for money and its supply

T = the volume of trade and expressed by real income Sichel (1993)

Where V is the number of times the cash is traded annually to purchase the output of the goods and services expressed in T, the value is according to the formula of Irving Fisher

$V = (p \times T) / M$ (2)

As a result of the income calculation criteria, it has become difficult to include the transactions of goods and services in the current period, as well as the development in the national income account, which focuses on the current production of any final purchases.

$MV = PY$

$V = (p \times Y) / M$ (3)

According to the above we conclude that there is a direct relationship between the quantity of money and the speed of circulation on the one hand and a direct relationship between them and between the price level Goldfield ,Quandt (1973)

And an inverse relationship between the level of prices and income,

The above figure shows that at the full operational level and if the income is stable at this level, any increase or change in the amount of money from M0 to M1 will lead to a general

price increase from P0 to P1. On the other hand, Negative for both M0 and M1, which means an inverse relationship between Y and P

3.. **Marshall formula (or Cambridge formula)**

Cash balances are also present. This formula starts from the fact that money is a store of value. As a result, demand for money arises at the amount that individuals want to keep cash in the form of cash balances. This formula is not very different from the previous one. The major difference lies in the desire of individuals to maintain liquid cash balances and this affects the volume of production

Then the income and finally the general level of prices and see this formula that individuals prefer to retain a proportion of their income in the form of financial assets for several reasons called the principle of monetary preference and among these factors that call to keep cash in the form of idle balances

- Interest rates - Individual wealth - Purchase facilities - Forecast

The cash demand function is based on this formula as follows

$Md = K \times Y$ (4)

Where: Md = represents the request for cash

K = represents the cash preference, ie, the percentage that individuals wish to maintain as liquid cash balances and are written as follows:

$K = Md / y$ (5)

Since y = P × and compensated in equation (3) we find:

$Md = K \times P \times Y$ (6)

Since the relationship between monetary preference (K) and money circulation (V) is inverse:

$K = 1 / v$

The demand function for money becomes according to the Cambridge formula

$Md = = K (P \times Y)$

Note that the relationship between income and monetary preference (inverted speed of money circulation) is a positive relationship

4- Keynesian theory in the interpretation of the velocity of money

Classical ideas continued to prevail in economic explanations in general and in critical analysis in particular until the Depression of 1929, until Keynes revolutionized the ideas of these theories by his contributions to critical analysis Tong (1990)

To summarize the Keynesian vision of monetary interpretation, it is based on fixed money supply over time and interest rate is not affected

The demand for money is motivated by Keynes's three motives:

Transaction motivation: The demand for money depends on income and its relationship is positive

Reserve: It is dependent on income but tends to have more predictable income and a more direct relationship

Speculative impulse: This impulse depends on the rate of interest that is inversely reversed

To be the total demand function for money, according to Keynes et al

Md = f (Y, i) Ramzy (2007)

In order to understand the rapid circulation of cash in the Kinsey proposition, the real money demand is:

M / P = f (Y, i) Md / P = KY-h i (7)

III .Literature review

Many researchers see that previous studies that applied and focused attention on the speed of cash circulation were rare, especially if it comes to developing countries. For comparison, we will try in this axis to list some previous studies in developing countries, :including

Mokabila (1999)

It is a time series extending from 1963 to 1990 in the Jordanian economy, as it was measured by the effect of both inflation and individual income and the number of branches.

Commercial banks with the cash circulation speed indicators v1 and v2, and the researcher believes that it is necessary to exclude the effect of the interest rate and that Because it was unstable after 1990 due to the flotation

Chowdhury (1994)
This researcher based on a cross-sectional study of 23 developing countries during the period 1955-1988 and he used the cash circulation speed indicators, which are v1 and v2, in addition to the wholesale price index for sales and the low gross domestic product, and divided the economy into two agricultural and non-agricultural sectors, and he has reached results, including

Mouidjal(2004)
The Master thesis dealt with the determinants of the speed of money circulation in the Kingdom of Saudi Arabia with a study of its measurement for the time series from 1968-2002 and the variables specified were real income, interest rate, number of exchange devices, the value of stock market operations, and the dependent variables included the three measures of the speed of cash circulation and These are v1, v2, and v3, with the introduction of the logarithm of some variables studied. After applying common integration and its the existence of an inverse -known techniques, the study reached some results, including relationship between v1, v2 and v3 on the one hand and real income and the value of shares traded on the other hand The relationship between the three variables, the interest rate, and the exchange devices was also inverse the results of the velocity of money circulation v1 and v2 are better than the results of v3 Teräsvirta (1994) because they are linked to the M2 money supply that is used to finance current deposits and this is always the case in the economy of the Kingdom of Saudi Arabia

III. METHOD AND PROCEDURES:

We will testing the relationship or effect of inflation, whether positive or negative on the speed of circulation of cash and the state of variation of this effect, the relationship does not become linear between the two variables. If there is a long - term integrative relationship with different stability of the variables between the level and the first difference (without the second difference) The conditions for the application of ARDL models are available. If the effect of inflation varies between the positive and negative effects, the relationship does not become linear and becomes NARDL models.

The first formula: does not contain a constant nor a time trend

$dy\_t = y\ (t\text{-}1) + \lambda\ u\_t$

The second formula: contains only the hard border

$dy\_t = c + \lambda\ y\ (t\text{-}1) + ut$ Pastpipatkul et al (2016)

The third formula: contains the fixed limit and the time trend

$dy\_t = c + Bt + \lambda\ yt\text{-}1\ \_\ (t\text{-}1) + u\_t$

We take the following steps:

1. **Test the criteria for lags:**

- final error prediction FPE Alssimo & Violante (1994)

- AIC information standard

- The standard of the Schwaber SBC

- Standard Information Hanan and Quinn Peel & Speight (2000)

In the following we introduce the variables of the equilibrium relationship between the two variables after they were generated from the two variables INF

And VOM according to the following table

$1 / V \times P \times Y$

At the equilibrium of the money market, the demand for money is equal to its offer

$Md = Ms,\ MV = PY$

table 1: definition of variables

A vaible in long term	explication	A variable in short term	explicatio n
Vom	Dependant varible	Dvom	**Diff of dependant variable**
Vom(-1)	Dependant varible in lag 1	Dinf	**Diff of independant variable**
Inf(-1)	independant varible in lag 1	Dinf(-1)	**Diff of indep in lag1**
Inf_p	Positif effect of independent variable	Dinf_p	**Positif effect of indep defference**
Inf_n	Negatif effect off independant variable	Dinf_n	**Negative effect of indep variable in defference**

2. Determination of lags :

The gaps depend on the studied situation according to the delay criteria represented by one delay gap, p = 1, as we will see

This is confirmed by the test delay criteria

Using the e views program in its ninth version, for an annual sample size of 48 observations: For the dynamic process of the time series, we set the delay or delay times

Since the method of this method depends on the distribution of the delay or delay periods, we may obtain delay data for the model variables we have identified in the following table,

Table2: lag order selection criteria

variable	AIC	SC	FPE	LR	H-Q
vom	1	1	1	1	**1**
inf	1	1	1	1	**1.**

From the researcher's setting: depending on the results of the eviews 08

3. Test of unit root in nonlinear regression :

This test is done using some stability tests and we selected KSS

(Kapitanos Shin Snell), a similar test for the ADF Fourier, but valid if the relationship between variables is not linear

After the test, we obtained the following table. Based on the results of the stability test, the time series is static. The infinitive series contains the root of the unit in its level, which made us accept the strong hypothesis. We did not settle until after the first difference. Is a combination of I (0) and I (1) and this is a condition of using the ARDL approach

Table 02: Stability Test (KSS)

series	level		1st differance		rank
	intercept	Intercept & trend	Intercept	Intercept & trend	
vom	* -5.12	* -5.06	/	/	I(0)
inf	/	/	* -4.00	* -4.03	I(1)

*sig at 1% from researcher's setting : depending on results of Gauss 09

** sig at 05%

4. Simultaneous Integration Testing:

As previously mentioned, the NARDL models are more effective in small samples and therefore their integration test requires a special type of test called the Wald test compared to Fisher's non-standard statistics. The decision is as follows:

H0: calculated F.-stat value less than I (1)

There is no synchronous integration

H1: F-stat calculated value greater than I (1) There is a long-term synchronous integration between the studied variables and I (0) and I (1) are the limits of joint integration.

Table-3 cointegration test

relationship	F-stat	prob	K
$F_{(vom/,inf,)}$	5.26	0.007	**2**
bounds	I(0)	I(1)	
01%	3.93	5.23	
05%	3.12	4.25	
10%	2.75	3.79	

Data prepared by the researchers based on the results of Eveiws8

Based on the table above, we have two hypotheses

H0: = C4 = C3 = C2 = 0 There is no common integration

H1: C4 ≠ C3 ≠ C2 ≠ 0 There is a common integration

Hence, since the value of asymmetric F= 5.26 is greater than the upper bound of the critical values at 1%, I(1) which is greater than 5.23, and therefore we recognize the existence of a common integration between vom and inflation positive and negative effects, and this in the long term, By estimating nardl models because the relationship here is asymmetric and this is due to the inequality of long-term parameters and acceptance of the alternative hypothesis and thus non-linear relationship between the two variables

Table 04: Estimating the NARDL model

variable	Estimeted value	prob
C	1.54	**0,004**
vom(-1)	-1.24	**0.000**
Inf_p (-1)	0.04	**0.015**
Inf_n(-1)	0.03	**0.031**

Dinf_n (-1)	-0.029	**0.35**
Dinf_n)	-0.03	**0.39**

R^2	**0.86**	**D-W**	**2.02**
Adj R^2	0.81	AIC	**1.99**
F	8.98	Prob F	**0.000**

Prepared by the researchers based on the outputs of the Eveiws8

IV.STUDY RESULTS (ANALYSIS AND DISCUSSION) :

Since the characteristics of NARDL models are characterized by short-term separation from long, according to the elasticities, this effect can be divided into two parts:

1. Long term:

By dividing the long term coefficients -c (3) / c (2)

and -c(4) /c(2)

Ultimately, we get the next long-term relationship model

VOM = 1.54 + 0 .03inf_p + 0.02inf_n

We note that the elasticity of the positive effect is greater than the effect

.**2.Asymmetry test**:

This test is based on accepting or not accepting the idea of symmetry or symmetry of influence, in the sense that does inflation affect equally the speed of money circulation? or not? If the answer is yes, the relationship between the two variables is linear, and therefore the long-term impact is the same. Because the relationship is a long-term relationship and vice versa, if the answer is no, the relationship between the variables becomes nonlinear and not equal. This leads us to test the following hypotheses

H0: C (3) / C (2) = C (4) / C (2) There is no asymmetry in the relationship

H1: C (3) / C (2) ≠ C (4) / C (2) / There is asymmetry in the relationship

Using the WALD test, we find the following table

Table 05 the asymmetry between 2effects

Hypothesis	F-stat	F -stat	decision
H0: **C(3)/C(2)=C(4)/C(2)** **H1:** **C(3)/C(2) ≠C(4)/C(2)**	5.26	0.004	H0 rejected There is an asymmetry in the long-term effect between inf_p and inf_n on vom

Prepared by the researchers based on the outputs of the Eveiws8 program

V.CONCLUSION:

The study is a relationship between the speed of circulation of cash and inflation positive and negative effects

- The speed of money circulation varies by creating inflation

- Many theories of the interpretation of money and the speed of rotation of a large part of these interpretations

- There are many determinants of the speed of cash circulation in Algeria

- The speed of cash circulation is affected by the balance of demand and money supply

- In Algeria, the rate of cash circulation is particularly affected by inflation and its positive impact is particularly pronounced

The qualitative determinants are too many, including the payment habits of the monetary system and the tendency of savings individuals

- As for the explanatory relationship between vom as a dependent variable and other explanatory variables, most of them agreed with economic theory

- Since the model in linear form characterized its variables with simultaneous integration and its standard weakness in the case of ols estimation, we used the NARDL model, which we used to be valid for estimation

- We relied on the estimation of the gradual stepwise approach that eliminates non-moral variables

- The model is generally characterized by instability and may be due to the large number of structural corrections in the course of monetary policy and the banking system in general and during the study period such as the law of cash and loan 90-10 currency reduction year 94 Complementary Law No. 11-03

- The clear contrast between the contractionary monetary policy during the 1990s and the expansionary policy beginning in 2005 had the most significant impact on the instability of a model applied to the case of Algeria

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