On the liquidity effect in Algeria and Morocco: An Empirical Investigation

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Abstract— The objective of this paper is to test for the liquidity effect in Algeria and Morocco using multivariate threshold autoregressive model (MVTAR) as proposed by Tsay (1998). Our empirical results have several important implications. First, results do not support threshold behaviour in the case of Algeria. Moreover, when using M1 as a proxy of monetary policy, the liquidity effect hypothesis is rejected in this country. When using bank deposit assets (BDA), results show that there is a negative relationship between monetary shocks and interest rate, and accordingly accepting the liquidity effect. Secondly, in the case of Morocco, however, results show an asymmetric response of interest rate to positive and negative shock of monetary policy. Moreover, these results strongly support a threshold behavior when BDA is employed, while weakly supporting the same behavior using M1. Furthermore, and using the proxy of bank deposit assets, the liquidity effect is accepted in the low inflation regime, whereas it is rejected in the high inflation regime. Hence, the threshold behavior offers an interesting alternative for explaining the relationship between interest rates and monetary policy shocks. The results presented herein may give more insights on the transmission mechanism of monetary policy in different inflationary environments. Accordingly, a good inflation targeting policy would yield better results in this context. Indeed, the liquidity effect breaks down for the high inflation regime, as inflationary expectations are immediately responsive to money growth. In a low-inflation regime, however, money is not considered to be neutral, as it could affect output through the liquidity effect

Index Terms— Liquidity effect –Money- Inflation – Algeria- Morocco – MVTAR Model
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I. INTRODUCTION

  Although the question of how, and to what extent, monetary policy can affect the economy is very controversial, monetary economists and policy makers accept the proposition that in the short run, changes in the money supply can induce changes in short-term nominal interest rates of the opposite sign; this is called the liquidity effect (LE). Indeed, traditional economic theories hold that expansionary monetary policy can generate a transitory decline in nominal interest rates. A key element in the transmission from money supply to interest rates is short-run stickiness of prices in the labor and goods market. Therefore, the increase in money supply leads to an increase in real money balances and an excess supply. As the real money supply increases, economic agents become more liquid and adjust their portfolios by buying more bonds. This

bids up real bond prices and generates a liquidity effect by decreasing the nominal interest rate. Guirguis (1999).

A negative short-run response of interest rates to an exogenous increase in money supply (the liquidity effect proposition) is important in the literature for several reasons. First, conventional wisdom about the transmission mechanism of monetary policy tells us that an increase in money supply has a powerful direct influence on expenditure if it lowers interest rates. Therefore, the effectiveness of monetary policies requires the existence of the liquidity effect.

The liquidity effect is secondly also a structural element in monetarist models. Conventional analysis in the monetarist models of Friedman (1968) and Cagan (1972) points out that an increase in money supply depresses the nominal interest rate in the short-run, but the expected inflation effect caused by the increase in money supply will dominate the liquidity effect in the long-run. Finally, the liquidity effect has important implications for the construction of quantitative macroeconomic models with money. In early monetary real business cycle models, a surprise monetary expansion raises nominal interest rates since interest rate–money dynamics are dominated by strong anticipated inflation effects. Christiano (1991) argues that the liquidity effect is an important characteristic that any good model should have.

In spite of the importance of the liquidity effect in theoretical models and policy concern, its empirical support has yielded mixed results in the literature.

In general, papers based on single equation methods fail to detect a liquidity effect (Mishkin, 1982; Richenstein, 1987; Thornton, 2001).

Moreover, the majority of empirical studies are based almost entirely on linear VAR models. Standard linear time series analysis fails to detect the role of nonlinear variables that could be regarded as propagator of shocks as envisioned in much of the recent theoretical literature on monetary policy.

Accordingly, the objective of this paper is to test for the liquidity effect in Algeria and Morocco using a nonlinear framework based on a multivariate threshold autoregressive model (MVTAR) as proposed by Tsay (1998).

Our empirical results have several important implications. First, results do not support threshold behaviour in the case of Algeria. Moreover, when using M1 as a proxy of monetary policy, the liquidity effect hypothesis is rejected in this country. When using bank deposit assets (BDA), results show that there is a negative relationship between monetary shocks and interest rate, and accordingly accepting the liquidity effect.

Secondly, in the case of Morocco, however, results show an asymmetric response of interest rate to positive and negative shock of monetary policy. Moreover, these results strongly support a threshold behavior when BDA is employed, while weakly supporting the same behavior using M1. Furthermore,

using the proxy of bank deposit assets, the liquidity effect is accepted in the low inflation regime, whereas it is rejected in the high inflation regime.

Hence, the threshold behavior offers an interesting alternative for explaining the relationship between interest rates and monetary policy shocks.

The results presented herein may give more insights on the transmission mechanism of monetary policy in different inflationary environments. Accordingly, a good inflation targeting policy would yield better results in this context. Indeed, the liquidity effect breaks down for the high inflation regime, as inflationary expectations are immediately responsive to money growth. In a low-inflation regime, however, money is not considered to be neutral, as it could affect output through the liquidity effect.

The remainder of the paper is structured as follows. Section 2 describes some previous empirical studies. We use a non-linear framework based on a multivariate threshold autoregressive model (MVTAR) as proposed by Tsay (1998) in section 3 as well as the description of data. Test results are given in section 4. Finally, concluding remarks are provided in the last section.

II. SOME PREVIOUS EMPIRICAL STUDIES:

Although the relationship between money and the interest rate is straightforward in theory, empirical evidence of a liquidity effect has been puzzling. Historically, the theoretical explanation of the liquidity effect was considered plausible and researchers focused on estimating the strength and persistence of the interest rate decline in response to the growth of the money stock.

Cagan and Gandolfi (1969), and using monthly data in the US from 1910 to 1965, find that a 1% increase in the growth rate of M2 led to a maximum decline in the commercial paper rate of 2.6%. Melvin (1983), however, undermines the reliance on a simple theoretical relationship by discussing the vanishing liquidity effect and shows that the liquidity effect disappears within a month after the increase in money growth rate in the 1970s due to a dominant anticipated inflation effect.

Using an efficient markets approach, Mishkin (1982) finds that interest rate innovations derived from the term structure are positively related to unanticipated money growth. Grier (1986) demonstrates that Mishkin's results are robust to sample and specification changes.

More recent empirical studies have been unable to find evidence of a systematic negative relationship between monetary innovations and interest rates. For instance, and using VAR methods, Sims (1992), find a positive relationship between money and short-term interest rates.

Reichenstein (1987) finds similar results obtained from estimating an equation where a distributed lag of money growth is regressed upon interest rate changes.

Thornton, (2001) based on single equation methods fail to detect a liquidity effect.

Cochrane (1989) uses a spectral band pass filter technique to re-establish the liquidity effect from 1979 to 1982.

To investigate for the influence of other variables on the relationship between money and the interest rate, Leeper and Gordon (1992) estimate a four-variable vector autoregression (VAR) model (money growth rates, interest rates, the consumer price index (CPI) and industrial production). They find no liquidity effect since the relation between the monetary base and the federal funds rate is never negative.

Using simple cross-correlation analysis between the federal funds rate and different monetary aggregates, Christiano and Eichenbaum (1992) show that **broad monetary aggregates** used in the previous studies are inappropriate for identifying the existence of the liquidity effect due to their large endogenous component because changes in broad aggregates reflect both demand and supply shocks creating the money endogeneity problem.

Christiano and Eichenbaum (1992) argue that the quantity of non-borrowed reserves (NBR) is the best indicator of the policy stance. **With NBR included in a VAR model instead of broad money supply**, the fed funds rate exhibited a sharp, persistent decline. Thus , using another proxy for monetary policy rather than the monetary base (M1) would be a better indicator.

Bernanke and Blinder (1992) suggest that the Fed watches the fed funds rate closely and conclude that changes in this rate could be used as measure of policy shock. Strongin (1995) proposes using the proportion of NBR growth that is orthogonal to total reserve growth as a policy measure. This author shows that including this measure in a VAR model estimated on sub-samples similar to those used by Leeper and Gordon (1992) yields a highly significant and persistent liquidity effect.

III. RESEARCH METHODOLOGY

The majority of previous studies have used VAR (Vector auto regressive) models. Beaudry and Koop (1993), Potter (1995), and Pesaran and Potter (1994), however, have shown that linear models are too restrictive. The authors argued that linear models have a symmetry property which implies that shocks occurring in a recession are just as persistent as shocks occurring in an expansion. Thus, linear models cannot adequately capture asymmetries that may exist in different macroeconomic models.

In this section we present the MVTAR (Multivariate threshold Autoregression) model that we will be using in our empirical work. Appropriate hypotheses and test structures are discussed.

3-1- The MVTAR model:

MVTAR (Multivariate Threshold Autoregressive) models are models that could take different regimes. Each regime can be represented by a VAR (Vector Autoregressive) model. However, the switching of the regime is governed by a switching variable so that any crossing above or below the threshold will trigger the regime to change. These models are presented by Tsay (1998) as follows:

$$Y_t = \begin{cases} f_1(Y_{t-1}, Y_{t-2}, \dots; \varepsilon_{1t} | \theta_1) & if\ z_{t-d} \le r \\ f_2(Y_{t-1}, Y_{t-2}, \dots; \varepsilon_{2t} | \theta_2) & if\ z_{t-d} > r \end{cases} \quad (1)$$

Where

$Y_t = (M1\ (ou\ BDA), interest\ rate, consumer\ price\ index,$

, $f_i(.)$ is a funxtion defined as $f_i(.) \ne f_j(.)$ if $i \ne j$, θ_i are parameters with finite dimensions, d is a positive integer representing the delay of the switching variable z_{t-d} that should be stationary (Hansen, 1996) (In our case, this variable is the rate of inflation (CPI)).

In his work, Tsay (1998) use a linear model that depends on a vector of endogenous variables Y_t, and a V- dimention vector

of exogenous variables $X_t = (X_{1t}, \ldots, X_{vt})'$, with $r \in \Gamma = [\underline{r}, \overline{r}]$, Γ is an interval (Usually balanced) of the possible threshold values. In these conditions, Tsay (1998) notes that Y_t i follows an MVTAR model with a switching variable lagged d period, if it satisfies the following form:

$$Y_t = c_j + \sum_{i=1}^{p} \emptyset_i^{(j)} Y_{t-i} + \sum_{i=1}^{q} \beta_i^{(j)} X_{t-i} + \varepsilon_t^{(j)} \quad if\ r_{j-1} \leq \ldots$$
(2)

with $j = 1, \ldots, s$, c_j vectors of constants, p and q are numbers of non-negative integer. The satisfied innovations $\varepsilon_t^{(j)} = \sum_j^{1/2} a_t$, and $\sum_j^{1/2}$ symmetrical positive matrixes and defines, $\{a_t\}$ a sequence of random vectors that are not auto-correlated with a 0 mean and a covariance matrix covariance I (the identical matrix). The switching variable is stationary with a continuous distribution. This model with s regimes is considered linear in the threshold space z_{t-d}, but non linear in time where $s > 1$.

For the estimation of model (2), Tsay (1998) adopt a generalization of the results of Chan (1993) and Hansen (1996) of the uni-variate case. To simplify, the model is written in:

$$Y_t = \begin{cases} X_t' \Phi_1 + \sum_1^{1/2} a_t & if\ z_{t-d} \leq r_1 \\ X_t' \Phi_2 + \sum_2^{1/2} a_t & if\ z_{t-d} > r_1 \end{cases}$$
(3)

With $a_t = (a_{1t}, \ldots, a_{kt})'$, z_{t-d} is stationary and continuous with a density function $f(r)$ on a defined subset fuction of the real line $R_0 \subset R$, $d \in \{1, \ldots, d_0\}$, d_0 is a fixed positive integer. In order to estimate the parameters of model (3) $(\Phi_1, \Phi_2, \sum_1, \sum_2, r_1, d)$, Tsay (1998) use two stage conditional least squares. First, and taking into account the values of d and r, the model (3) is divided into two multivariate linear regressions with the least squares estimators of Φ_i et $\sum_i$ (with $i = 1,2$) :

$$\hat{\Phi}_i(r_1, d) = \left(\sum_t^{(i)} X_t X_t' \right)^{-1} \left(\sum_t^{(i)} X_t Y_t' \right)$$

And

$$\hat{\sum}_i(r_1, a) = \frac{\sum_t^{(i)} (Y_t - x_t' \hat{\Phi})(Y_t - x_t' \hat{\Phi}_i)'}{n_i - k}$$
(4)

With $\sum_t^{(i)}$ the sum of all the observations in the regime i, $\hat{\Phi}_i^* = \hat{\Phi}_i(r_1, d)$, n_i the number of observations in the regime i , and k is the dimension of X_t ($k < n_i$ $for\ i = 1,2$). The sum of the squared errors is :
$$S(r_1, d) = S_1(r_1, d) + S_2(r_1, d)$$
With $S_i(r_1, d)$ the trace of $(n_i - k)\hat{\sum}_i(r_i, d)$. Secondly, the estimators of the conditional least squares of r_1 and d are obtained by :
$$(\hat{r}_1, \hat{d}) = argmin\ S(r_1, d)$$
With $1 \leq d \leq d_0$ and $r_1 \in R_0$. The results of the estimators of the least squares of (4) are :
$$\hat{\Phi}_i = \hat{\Phi}_i(\hat{r}_1, d)$$
And

$$\hat{\sum}_i = \hat{\sum}_i(\hat{r}_1, d)$$

To establish the asymptotic properties of these estimators, Tsay (1998) adopt the same approach of Chan (1993) and Hansen (1996).

To test for the non linearity of the model (i.e. test for the significance of the MVTAR model against the VAR model), Hansen (1996) propose the Wald test. In this test, The null hypothesis is : $\Phi_1 = \Phi_2$, which means that the coefficients are equal for the two regimes (the alternative hypothesis for the non linearity is $\Phi_1 \neq \Phi_2$). However, the ddifficulty of ths test resides in the existence of the nuisances parameters[1]. Indeed, the threshold r_1 is not defined under the null hypothesis. In these conditions, when the errors are *iid*, the most powerful statistic test is the F statistic which is as follows :
$$F = \sup_{r_1 \in T} F(r_1)$$

Due to the fact that r_1 is not identified, this statistic does not follow a chi-square distribution. To overcome this problem, Hansen (1996) proposes an approximation with the bootstrap procedure.

3-2- The Generalised Response Functions :
In the work in hand, we use an MVTAR model to analyse the impact of the monetary policy chocks on the interest rate in the Maghreb countries. We are exploring the impact of the variables change of the monetary policy on the interest rate during the periods of high inflation, and the periods of low inflation. To do so, we use the generalised response functions as proposed by Koop, Pesaran and Potter (1996). Indeed, these functions could be used to examine the chocks in the non linear models. The difference between the response of a variable after a chock and the base line (No chock) represents the value of the generalised response function:
$$GI_y(k, \varepsilon_t, \Omega_{t-1}) = E[Y_{t+k}|\varepsilon_t, \Omega_{t-1}] - E[Y_{t+k}|\Omega_{t-1}]$$
(5)

With k representing the forecasting horizon, ε_t is the chock , and Ω_{t-1} the initial values of the model variables. The generalised response functions GI should be calculated using some simulations in the model. Moreover, We assume that the nonlinear model that produces the variables Y is known. The chock of the ith variable of Y is produced in the period 0, and the responses are calculated for the l periods that follow. In order to calculate, we use the algorithm of Atanasova (2003) taking into account the same number of replications adopted by Koop, Pesaran and Potter (1996) ($R = 500$).

3-3- Data Description:
Two variables are used as a proxy of monetary policy: M1 and BDA (Bank deposit Accounts). The data of these variables are from the IFS for Algeria and Morocco. The second variable that is used in our analysis is the interest rate (It is represented by the deposit rate as a proxy). The other variables are : CPI(Consumer Price Index) and the industrial production. This latter is used as a proxy for revenues. Again, the source of these two variables is the IFS. As for the sample period,, we have not used the same period for the countries. This is due to the non availability of data for the whole period

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[1] The problem of the nuisance parameters non identified under the null hypothesis is well explained in Ploberger (1994), Hansen (1996), and Stinchcombe et White (1998).

in some countries. In sum, Quarterly data are used from 1992Q1 to 2007Q1 for Algeria, and from 1970Q1 to2007Q4 for Morocco.

Our main objective is to estimate the response functions in order to analyse the impact of the Changing variables of monetary policy on interest rates. To do so, we have stated by performing a linearity test. Indeed, recent studies have focused on nonlinear relationships when looking for the liquidity effect (Chen S. –L, L. –J Tsai, and J. –L Wu, 2004 ; Shen C. H. and C-N. Chiang, 1999 ; Weise, 1999). To know the nature of relationships between the variables is of crucial importance when estimating the response functions. In the case when this relationship is linear, simple response functions based on VAR models will be used. In the contrary case, however, one should use the generalised response functions (Koop, Pesaran et Potter, 1996) based on MVTAR models. Thus, the stationarity and cointegartion tests are very important in order to know the properties of the variables used in the estimaation of these two models. Guirguis H.S. (1999) argues that the results of Strongin (1995), Christiano and Eichenbaum (1992a, 1992b), and Christiano et al. (1994) suffer from a lack of efficiency due to the fact that they did not included cointegration relationships in the VAR model, and also suffer fromof a type I error since they did not correct the data non stationarity.

Test results and the estimations are presented in the following section

IV. TEST RESULTS

We have two stationarity tests, the PP test (Phillips & Perron, 1988) and the KPSS test (Kwiatkowski & Phillips & Schmidt & Shin, 1992). The first test allows us to test for the unit root hypothesis. The second is used for testing the statioanrity hypothesis. The use of these two tests will permit us to distinguish stationary from non stationary series, and also will give us an idea on the series whose data do not provide enough information on the stationarity.

Test results of the stationarity are presented in table (1). According to these results, and except the M1 of Morroco, all the variables are integrated of order I (using the two tests). For the two above mentioned variables, the PP and the KPSS tests did not give the same results. Thus, we have opted for the PP test, and consequently the variables are integrated of order I (i.e. I(1)).

Table (1) : Stationarity test

	Algeria		Morocco	
	PP	KPSS	PP	KPSS
M1	2.4031* [1.0000]	0.2426*	9.3159* [1.0000]	0.3426**
BDA	-2.1941* [0.4839]	0.2366*	2.0448* [1.0000]	1.0337*
Interest rate	-2.1979* [0.4819]	0.6923*	-0.5994* [0.9774]	0.3590*
CPI	-1.7116* [0.7339]	0.2215*	-1.7480* [0.7249]	1.4800*
Industrial production	-0.5446* [0.4770]	0.2201	-0.5724 [0.8720]	0.2797*

*Integrated of order one, **integrated of order 2

Since all the variables are I(1) series, we have proceed using the cointegartion test Johansen S. & Juselius K. (1990). The test results are presented in table (2).

The cointegartion tests were performed using the two proxies of monetary policy in order to see if the fact of changing the proxy could have an impact on the nature of the relationships of the variables.

Test results in table (2) show, that these exist cointegartion relationships between the variables no matter what proxy of monetary policy is used.

Table (2) : Test of cointegration (maximum eigenvalue)

	Algeria		Morocco	
	M1	BDA	M1	BDA
None	43.3208* [0.0000]	56.6241* [0.0000]	35.7032* [0.0037]	45.3824* [0.0007]
At most 1	17.1599 [0.0621]	13.4255 [0.2017]	18.6050 [0.1088]	23.2332 [0.1059]
At most 2	-	-	-	-
At most 3	-	-	-	-

*denotes rejection of the hypothesis at the 0.05 level
Values between brackets are probabilities.

After conducting stationarity and cointegration tests, we proceed to carry a linearity test as proposed by Tsay (1998). This test will permit us to choose between using a VAR model or an MVTAR model for the estimation of the response functions.

Table (3) : Linearity test results

	Algeria		Morocco	
	M1	BDA	M1	BDA
Threshold estimate	0.635533	1.14393	0.761833	0.761833
LM test for no threshold	55.8998	56.3467	72.8502	71.8527
Bootstrap p-value	0.5197	0.3244	0.0095	0.0165
Chi squared value	2.95046E-9	2.41457E-9	1.3276E-12	2.0999E-12

Values between brackets are p-value.

According to the results presented in table (3), there exist a nonlinear relationship in the case of Morocco, which supports the utilization of an MVTAR model. In the case of Algeria, the results are in favour the utilisation of a VAR model.

The results of the response functions based on VAR models for the case of Algeria are presented in **appendix** 1.

From **Appendix1**, the interest rate has a negative response that tends to decrease without return to equilibrium when facing an M1 chock. Thus, this could be interpreted by a high

liquidity effect of M1. When changing the proxy of monetary policy, the results are different however. Indeed, using the BDA , there is a positive response of the interest rate that tends to increase until the 3rd period, and then decrease to reach the equilibrium in the 4th period. This result reveals a positive relationship in the short term between BDA and the interest rate, and thus the absence of the liquidity effect. In sum, and for the case of Algeria, the M1 has a very strong liquidity effect unlike other proxies of monetary policy.

For Morocco, the nonlinearity of the relationship between variables led us to use the generalized response functions based on the MVTAR model. The results of these response functions are presented in **Appendix 2**. These results can be divided into two parts: the upper regime and the lower regime. The upper regime is characterized by a high inflation whereas the lower regime is dominated by a low rate of inflation.

For the upper regime, using M1, we see a positive response from the interest rate that tends to increase until the second period and then decreased till the 8th period where it vanishes. After the 8th period, there is a negative response that tends to decrease with a low speed. By changing the proxy from M1 to BDA, we get a different result. This result is characterized by a positive response which tends to increase continuously. Thus, this can be interpreted by the absence of the liquidity effect for the two proxies used, despite the negative response of low interest rates after the eighth period when using M1.

For the lower regime, and using M1, the result is almost similar except that the speed of change of the positive responses has been weakened, and the speed of change of negative responses has increased, which might be in favor of the liquidity effect. When using the proxy BDA, however, there is a clear negative response that tends to decrease with a low speed. Thus, this negative response reflects a negative relationship between the BDA and the interest rate, which can be interpreted by the existence a liquidity effect.

This result found in the case of Morocco corresponds well with those of Shen C. H. and C-N. Chiang (1999). Indeed, using the MVTAR model we were able to separate the economy into two regimes : High and low inflation regimes. During high inflation periods, the anticipated inflation effect dominates^2 the liquidity effect in all the period. Whereas, the liquidity effect dominates durin low inflation periods.

In addition, this liquidity effect is better detected using other proxy of monetary policy than M1. This is consistent with the literature which postulates that the liquidity effect disappears when using M1 as a proxy of monetary policy (Leeper and Gordon, 1992 ; Christiano and Eichenbaum, 1992).

CONCLUSION

In this paper the main concern is to is to test for the liquidity effect in Algeria and Morocco. In order to consolidate our approach, a multivariate threshold autoregressive model (MVTAR) as proposed by Tsay (1998) is used. If the VAR

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^{2} The comparison between the liquidity effect and the anticipated inflation effect is already used in Cochrane J. H. (1989): « *I present evidence of a negative short-run correlation between money growth and interest rates, which I interpret as evidence that the liquidity effect dominates the anticipated inflation effect* ».

has a nonlinear threshold relationship, it is necessary to differentiate the regime based on a threshold level of the switching variable. Thus, assuming that this latter is the rate of inflation, the MVTAR allows us to subdivide data into low and high inflation regimes.

The literature indicates that the existence of the liquidity effect depends on the proxy used to represent monetary policy. No liquidity effect is detected if monetary policy is measured by M1 [Leeper and Gordon (1992); Christiano and Eichenbaum (1992)], whereas a liquidity effect may be detected if the quantity of nonborrowed reserves (NBR) is employed [Christiano and Eichenbaum (1992); Strongin (1995)]. However, due to the absence of NBR data in the Maghreb countries, we have proposed another proxy for monetary policy, namely the bank deposit assets (BDA).

Our results do not support threshold behaviour in the case of Algeria. Moreover, when using M1 as a proxy of monetary policy, the liquidity effect hypothesis is rejected in this country. When using bank deposit assets (BDA), results show that there is a negative relationship between monetary shocks and interest rate, and accordingly accepting the liquidity effect. Secondly, in the case of Morocco, however, results show an asymmetric response of interest rate to positive and negative shock of monetary policy. Moreover, these results strongly support a threshold behavior when BDA is employed, while weakly supporting the same behavior using M1. Furthermore, using the proxy of bank deposit assets, the liquidity effect is accepted in the low inflation regime, whereas it is rejected in the high inflation regime. Hence, the threshold behavior offers an interesting alternative for explaining the relationship between interest rates and monetary policy shocks.

The results presented herein may give more insights on the transmission mechanism of monetary policy in different inflationary environments. Accordingly, a good inflation targeting policy would yield better results in this context. Indeed, the liquidity effect breaks down for the high inflation regime, as inflationary expectations are immediately responsive to money growth. In a low-inflation regime, however, money is not considered to be neutral, as it could affect output through the liquidity effect.

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