**International Journal of Economics, Commerce and Management**
United Kingdom Vol. V, Issue 12, December 2017
*http://ijecm.co.uk/* ISSN 2348 0386

# THE TRANSMISSION OF MONETARY POLICY IN MOROCCO: FROM POLICY RATE TO COMMERCIAL BANKS' LENDING RATES

**Mossadak Anas**
Mohammed V University, Faculty of law, economics and social sciences (Salé)
Department of economics and management, Morocco
anas.mossadak@gmail.com

**Abstract**
*The main objective of this paper is to explore the impact of monetary policy decisions on the lending rates of commercial banks in Morocco. For this purpose, A Vector Auto regressive (VAR) model is estimated in order to measure the impact of policy rate variations on the commercial lending rates, namely: treasury rate, consumer credit rate, equipment rate and mortgage rate. The main empirical finding is that variations in policy rate impacts the rates of commercial bank and the effect is more important on the short run than on the longer run rates.*

*Keywords: Monetary policy, Interest rate channel, VAR, Impulse response functions*

## INTRODUCTION

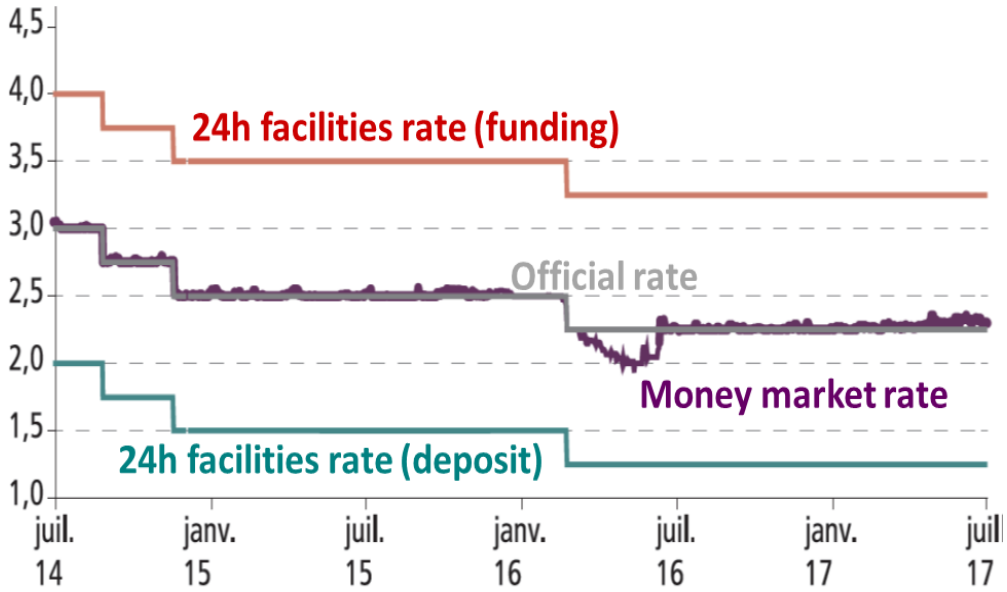
Monetary policy refers to the actions undertaken by the Central Bank to influence monetary and financial variables such as interest rates, money and credit, which in turn affect the economic behavior of households and firms. The aim is to influence the final demand components during the short run. In the long run, the monetary policy has no impact as the supply conditions drives the economy and the influence of money is only on price level.

The money supply is mainly the role of commercial banks through loans operations. However, their money supply power is limited because of the structural need of high-powered money (M0) that are the notes and coin (demand from costumers) and the bank's deposits at the central bank (operation in the money market). Each time the commercial banks need to be

refinanced in high powered money, they address their demand to the central bank that has the supply monopoly of M0.

The central Bank chooses the price (interest rate) at which it will lend high-powered money to commercial banks. This is the official rate that will ensure, all things being equal, the objective of the central bank that is price stability (and economic growth for some central banks). Thus, the interest rate in the money market must stay around the official rate. To insure this linkage between the official and the money market rate, the central bank can use various instruments such as Automatic facilities, Open market, FX interventions and Minimum reserves.

Graph 1: Rates in the Moroccan money market

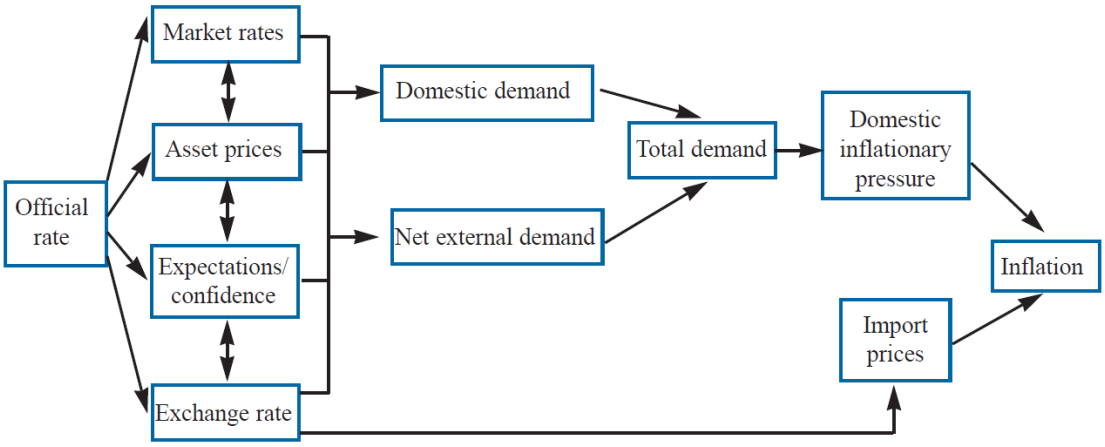



Source: Quarterly report Bank Al-Maghrib

Once this operational objective is achieved, the question is to see if the targeted final objectives are (or will be) reached. It should be noted that some central banks target intermediate objectives such as exchange rate or money growth rate, these indicators help in achieving the final objective of price stability.

At this point intervene the concept of “monetary policy transmission channels”. These channels describe how monetary policy decisions, affecting the interest rate and / or the amount of money in circulation, affect real variables such as production and consumption. Following the Bank of England Monetary Policy Committee (2000), the transmission of monetary policy can be represented as illustrated in the figure 1.

Figure 1: Transmission channels for monetary policy




Source: Bank of England

The variations of the official rate will affects immediately the money market rate which will impact, other things being equals, in his turn the short run interest rates. The impact on longer-term interest rates however is more uncertain because they are influenced by the current and expected level of short term interest rates and inflation expectations.

Changes in rates also affect the price of financial assets such as bonds and equities. Following the Tobin Q (Tobin, 1969), there is a negative relationship between the price of bonds and the long-term interest rate; a rise in long-term interest rates lowers bond prices, and vice versa. Higher interest rates also automatically lower other securities prices because expected future returns are discounted by a greater interest rate, so the present value of any given future income falls.

The exchange rate is the relative price of domestic and foreign currency. In an open economy with a flexible exchange rate, the transmission of interest rate variations to the exchange rate is ensured through the uncovered interest rate parity (UIP). Following the UIP, the difference in interest rates between two countries is equal to the expected change in exchange rates between the countries' currencies. If this parity does not exist, there is an opportunity to make a risk-free profit using arbitrage techniques. Thus, a fall in the domestic interest rate relative to the foreign rate reduces the attractiveness of deposits in the national currency and leads to a depreciation of the currency. This depreciation will impacts external trade and consequently final demand and inflation.

The central bank can also influence expectations of economic agents about the future to achieve his objectives (price stability). Through this channel, the Central Bank can reduce the cost of its interventions because the transmission of monetary policy decisions is made through

the influence of central bank announcements on economic agents. If the announcement (about inflation, growth, exchange rate…) is considered credible, transactions will be based on it before decisions are actually implemented and, at the end of the process, the central bank will achieve its objectives without making effective monetary policy decisions.

The necessary conditions for the effectiveness of this channel are the independence of the Central Bank and the inter-temporal credibility of its monetary policy decisions (Bennouna, Lahlou, Mossadak, 2016).

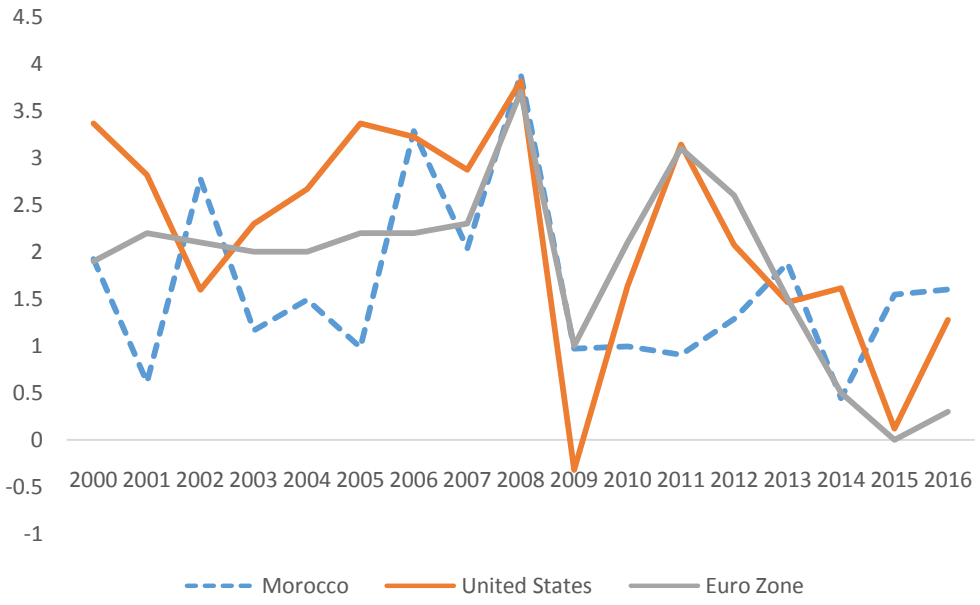
All these channels leads to a change in total demand (domestic, i.e Investment and consumption) and external net demand (export-import) and external prices. The variations of demand and external prices will impact the level output and inflation in the short term.

## MAIN CHARACTERISTICS OF THE MOROCCAN MONETARY POLICY FRAMEWORK

The effectiveness of monetary policy transmission in any country depends essentially on its economic structure. In this section we present the main characteristics of the macroeconomic framework that may influence the implementation of monetary policy in Morocco.

Morocco adopts a fixed exchange regime (fixed parity, 60% euro and 40% dollars), carries out most of its foreign trade with the Eurozone and devoted subsidies to energetic products (This was the case until 2014, after that the price of fuels is indexed to international market and the subsidies concern only cooking gas and a few number of basic products).

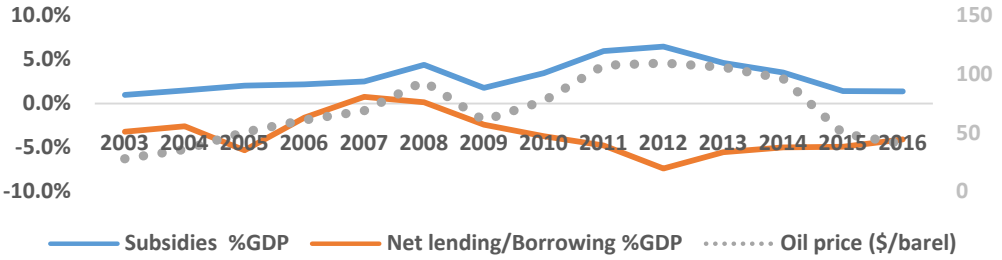
Graph 2: Evolution of inflation in Morocco, US and Euro Zone




Source: IMF (WEO) and Eurostat, author's calculations

During the 2010-2014 period, where the oil price reached historical levels, the energy subsidies helped considerably to maintain inflation at a controlled level, but deteriorates dramatically the situation of public finances.

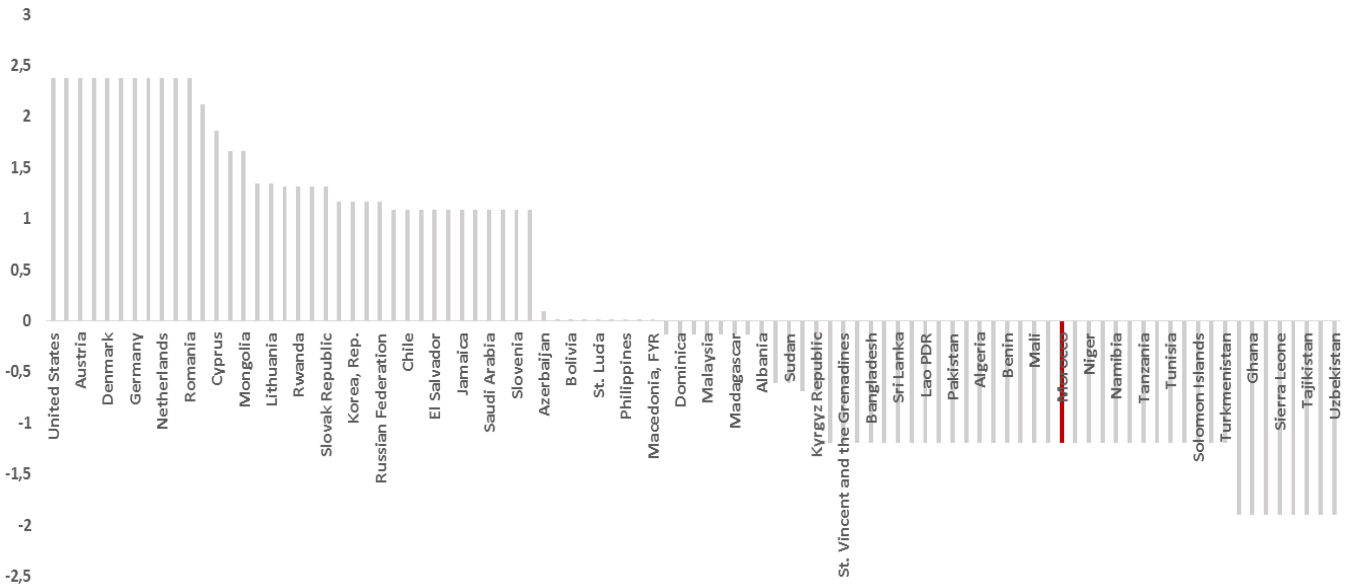
Graph 3: Evolution of oil price ($) subsidies, and fiscal deficit (%) during the period 2003-2016




Source: ministry of finance, author's calculation

As it's shown by the chinn-Ito index, the Moroccan capital account is almost closed. This characteristic indicates that the evolutions in international capital markets have a moderate impact on domestic financial developments.

Graph 4: Chinn Ito index (2015) for a panel of countries

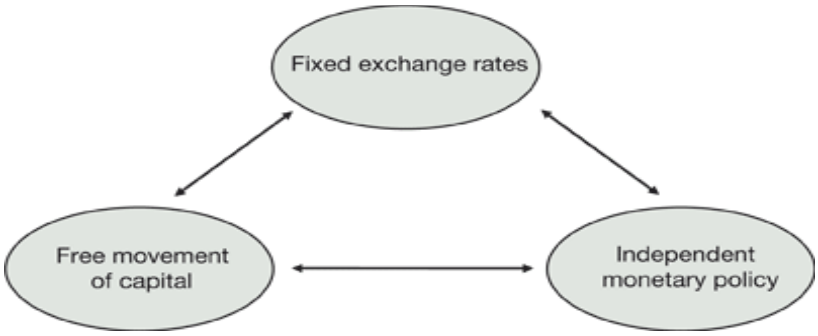



Source: Chinn-Ito data base, author's calculations

According to the impossible trinity, these characteristics imply that the major reason of the low Moroccan inflation is the low "imported" inflation from the Eurozone (main commercial partner)

as the main objective of the European Central Bank is to keep inflation below 2%. However, because of the low financial openness, Moroccan authorities can have some autonomy in conducting monetary policy.

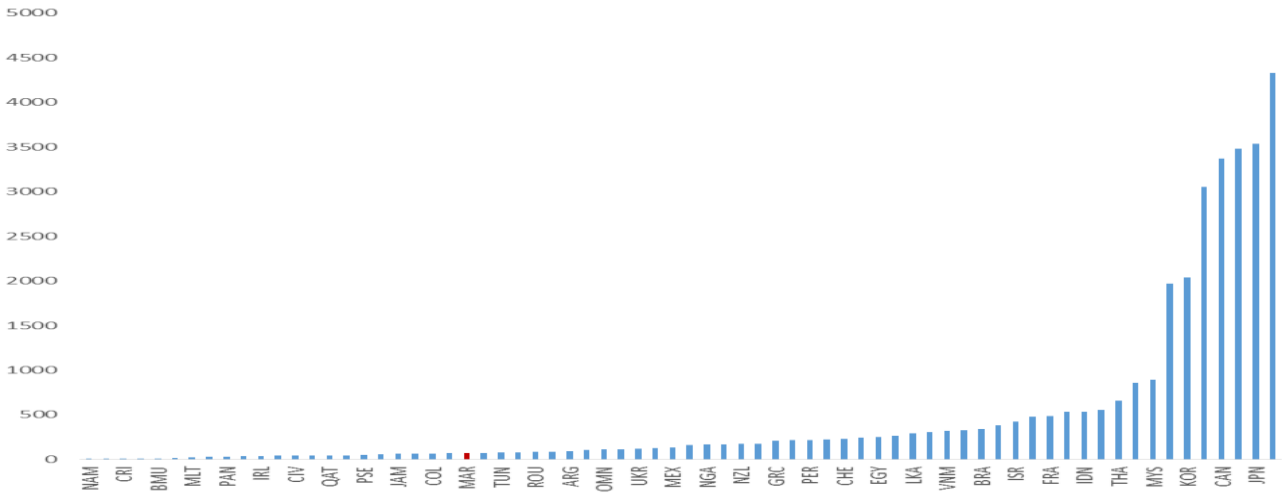
Figure 2: The impossible trinity




Source: Mundell, R. (1962)

Concerning the structure of the financial market, the banking system appears very developed in comparison with financial market.

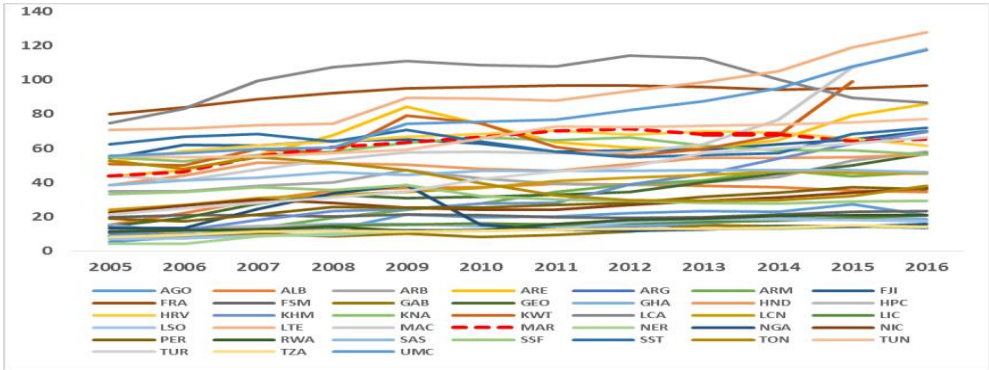
Graph 5: Number of companies listed in the stock exchange by country (2016)




Source: The World Bank

In fact, there is less than 80 firms that are listed in the Moroccan stock market. This number is very low in comparison of other developing countries. Concerning the banking sector, morocco is well ranked as the credits of the banking sector represent more than 65% of GDP.

Graph 6: Domestic credit to private sector by banks (% of GDP)



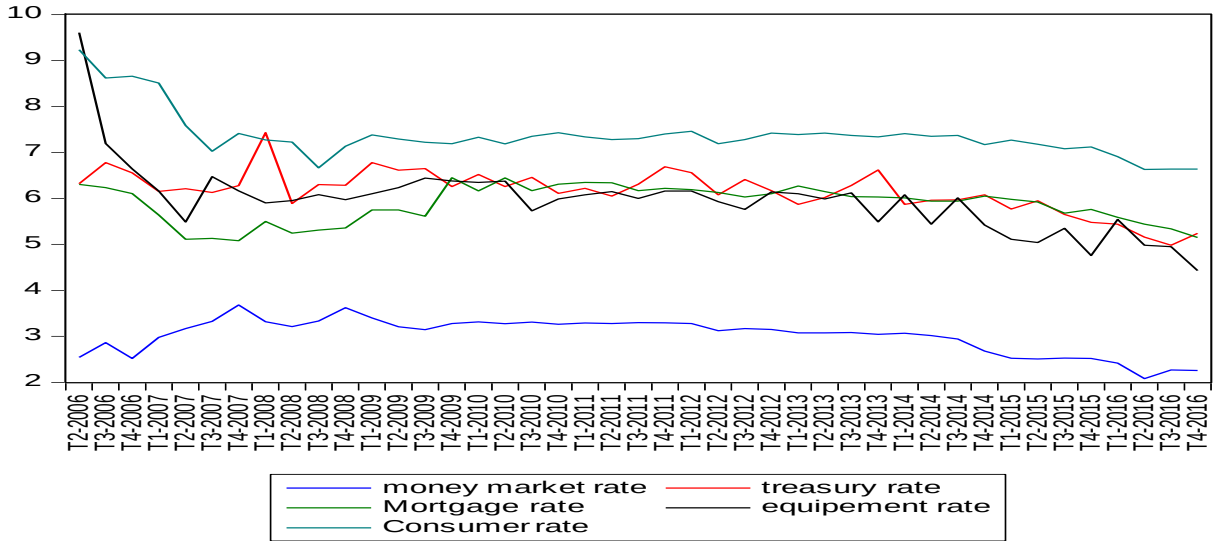

Source: The World Bank

All the characteristics of the Moroccan economy indicate that the credit channel could play an important role in the transmission of monetary policy. This transmission is possible if the variation of the official rate are transmitted to the medium and long term rates. In the following sections we will try verify this supposition empirically.

## METHODOLOGY

In order to study the transmission from short to long run interest rates, we estimate a Vector Auto Regressive (VAR) model and analyze the response of commercial banks interest rates to the variations of the money market rate as we consider that the transmission from the official rate to the money market rate (TMP) is given (see Graph 1).

Graph 7: Evolution of interest rates (2006-2016)




Source: Bank Al-Maghrib

The VAR model is as follow:

$$X_t = A(L)X_{t-1} + u_t$$

With $X_t = [\Delta MR, \Delta ER, \Delta CR, \Delta TR, \Delta TMP]'$ a vector of endogenous variables in first differences to work with stationary variables as the variables in level are integred of order 1. MR is the mortgage rate, ER the equipment rate, CR the consumer rate, TR the treasury rate and the TMP the money market rate. $A(L)$ is a matrix of coefficients and $u_t$ is a vector of errors.

The ordering of the variables follows a Cholesky decomposition which imposes, during the identification of the impulse responses, a lower triangular matrix and consequently a disposition of the variables going from the most endogenous to the most exogenous variable (Berkelmans, 2005).

$$\begin{bmatrix} \Delta \boldsymbol{MR} \\ \Delta \boldsymbol{ER} \\ \Delta \boldsymbol{CR} \\ \Delta \boldsymbol{TR} \\ \Delta \boldsymbol{TMP} \end{bmatrix} = \begin{bmatrix} \mathbf{1} & \mathbf{0} & \mathbf{0} & \mathbf{0} & \mathbf{0} \\ 1 & 1 & 0 & 0 & 0 \\ \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{0} & \mathbf{0} \\ \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{0} \\ \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{1} & \mathbf{1} \end{bmatrix} \begin{bmatrix} \Delta \boldsymbol{MR} \\ \Delta \boldsymbol{ER} \\ \Delta \boldsymbol{CR} \\ \Delta \boldsymbol{TR} \\ \Delta \boldsymbol{TMP} \end{bmatrix} + \begin{bmatrix} \boldsymbol{u_{MR}} \\ \boldsymbol{u_{ER}} \\ \boldsymbol{u_{CR}} \\ \boldsymbol{u_{TR}} \\ \boldsymbol{u_{TMP}} \end{bmatrix}$$

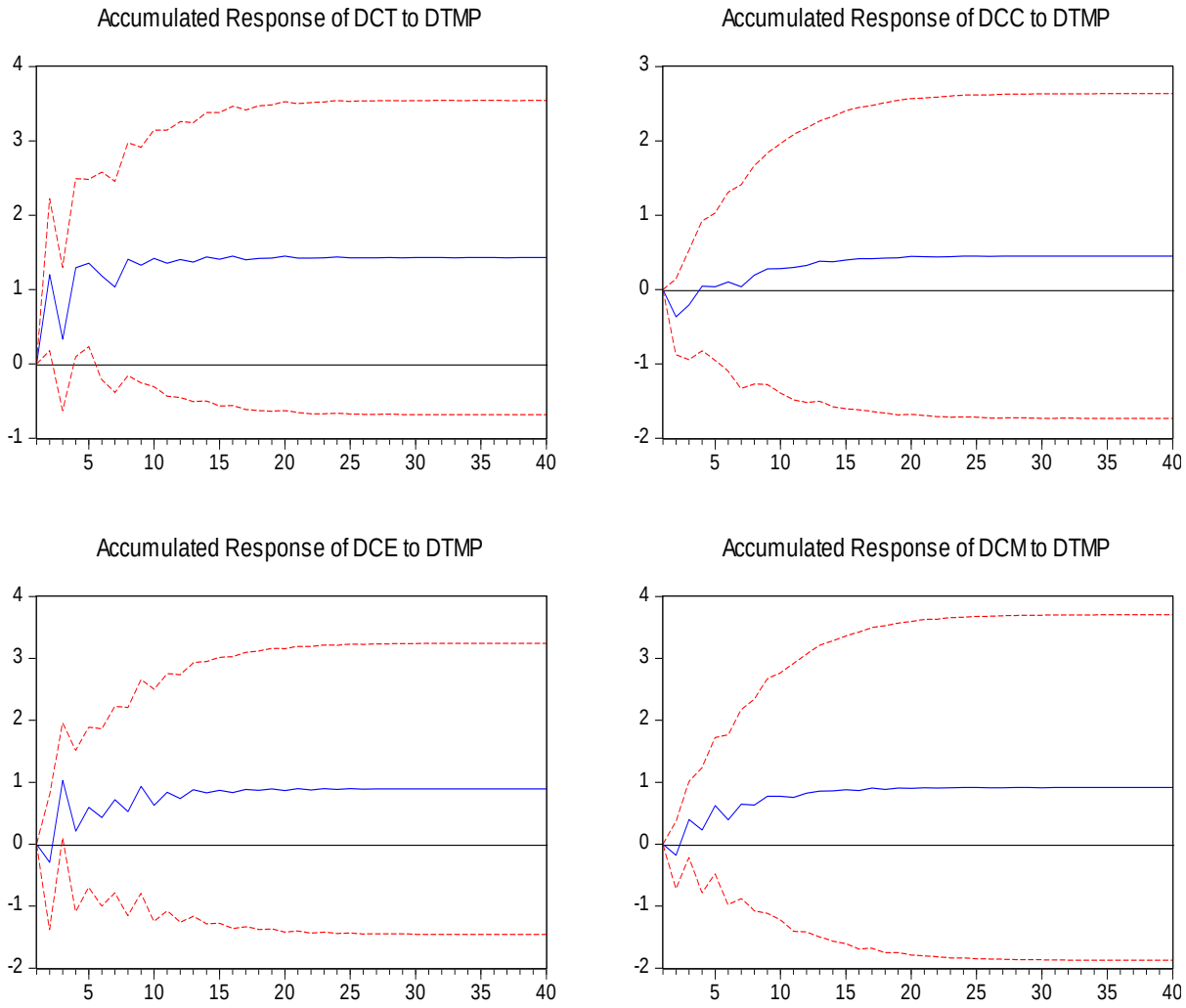
We suppose that the degree of endogeneity is a function of time. It reflects the fact that the central bank has the capacity to influence interest rates in the short term more than the longer terms which depend on other macroeconomic variables such as anticipation of inflation. The used data are quarterly covering the period from Q2-2006 to Q4-2016. The choice of the period of analysis is conditioned by the availability of the data: the publication of interest rates series starts on Q2-2006 and the latest available observation is Q4-2016.

After estimating the VAR model, we analyze the causality between the money market rate and the commercial banks' lending rates using the Granger causality test. This test uses past information of a variable x to explain the current value of a variable y. If past information is useful to explain y, x is said to Granger causes y.

**ANALYSIS AND RESULTS**

The accumulated impulse responses (see appendix for more details about the estimation) indicate that an increase of the money market rate is transmitted to the all the interest rates. In fact, a 1% increase in the money market rate implies approximately an increase between 1.4% and 0.2% in the commercial rates. The change is essentially transmitted during the first 5 quarters following the monetary policy decision.

Graph 8: Accumulated responses of the variables to a shock of 1% in the official money market rate (TMP)




Source: author's calculation

Approximately after 8 quarters the final impact of 1% shock to money rate is an increase of 1.4%, 0.2%, 0.5% and 0.6% respectively in treasury, consumer, equipment and mortgage rates. The results of the Granger causality test are in favor of the previous result. Two times out of four the causality is going from the money market rate to longer term interest rates, especially to treasury rate and consumer rate, the causality is not significant for mortgage and equipment rate. In fact, these rates concern long term operations which are impacted by other factors such as inflation expectations and return on investment.

Table 1: Granger causality analysis

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|---|---|---|---|
| DCT does not Granger Cause DTMP | 39 | 1.90769 | 0.1482 |
| **DTMP does not Granger Cause DCT** | | **2.75428** | **0.0586** |
| DCM does not Granger Cause DTMP | 39 | 4.04311 | 0.1052 |
| DTMP does not Granger Cause DCM | | 1.86300 | 0.1557 |
| DCE does not Granger Cause DTMP | 39 | 2.16752 | 0.1111 |
| DTMP does not Granger Cause DCE | | 1.45704 | 0.2447 |
| DCC does not Granger Cause DTMP | 39 | 10.8243 | 5.E-05 |
| **DTMP does not Granger Cause DCC** | | **3.54542** | **0.0253** |

Source: author's calculation

These findings indicate that the central bank has a real power to influence the commercial bank interest rates.

It should be noted that the analysis is valid when there is an increase and not a decrease in the official rate. The VAR model is linear and one can be attempted to only reverse the signs to conclude for the result when there is cut in interest rate. However, the degree of competitiveness in the Morocco banking sector let us think that the result could differ considerably.

Graph 9: Banking concentration according to Herfindahl-Hirschman Index


Source: Bank Al-Maghrib

As shown by the Herfindahl-Hirschman Index, the concentration in the banking sector is equal to 0.17 which indicates the existence of a moderate concentration. Also, the table below indicates that the first 5 banks hold 81% of total loans in the Moroccan credit market.

Table 2: Change in the credit concentration on a consolidated basis (in %)

| | Total loans | | |
|---|---|---|---|
| | 2013 | 2014 | 2015 |
| First 3 banking groups | 65 | 65 | 65 |
| First 5 banking groups | 81 | 82 | 81 |

Source: Bank Al-Maghrib

## CONCLUSION

The present study investigated the transmission of monetary policy decisions impacting the official rate to the lending rates that the commercial banks use in their operation with costumers. The analysis was performed thought a VAR model and the examination of causality between the official rate and the lending rates using the Granger causality test.

The accumulated impulse responses indicate that an increase of the money market rate is transmitted to the all the interest rates. In fact, a 1% increase in the money market rate implies approximately an increase between 1.4% and 0.2% in the commercial rates. The results of the Granger causality test are in favor of the previous result. In fact, two times out of four the causality is going from the money market rate to longer term interest rates and not into the opposite direction. These results indicate that the central bank has a real power to influence the commercial banks interest rates when there is a tightening in monetary conditions.

## REFERENCES

Al-Mashat, R., Billmeier, A. (2006). “The Monetary Transmission Mechanism in Egypt”. IMF Working Papers,No. 285.

Amisano, G., Giannini, C. (1997). “Topics in Structural VAR Econometrics”. Springer Seconde Edition, Berlin.

Angeloni, I., Kashyap, A., Mojon, B., et Terlizzese, D. (2002). “Monetary Transmission in the Euro Area: Where Do We Stand?”. ECB Working Papers, No. 114.

Bates, S., Hachicha, A. (2009).“Empirical Analysis of Monetary Transmission in Tunisia:What do SVAR Models Tell us”.The Open Economics Journal,Vol. 2, 1-9.

Bennouna, H., Lahlou, K., Mossadak A. 2016) “Analyse de la transmission de la politique monétaire au Maroc”, Document de travail, Bank Al-Maghrib.

Berkelmans, L. (2005). “Credit and Monetary Policy: an Australian SVAR”. Reserve Bank of Australia, Research Discussion Paper.

Bernanke Ben, S., Blinder, A. (1992). “The Federal Funds Rate and the Channels of Monetary Transmission”. American Economic Review, Vol. 82, 901-921.

Bernanke, B-S., Boivin, J., et Piotr, E. (2004). “Measuring the Effects of Monetary Policy: A Factor-Augmented Vector Autoregressive (FAVAR) Approach”. NBER Working Papers, No.10220.

Bernanke, B-S., Gertler, M. (1995). “Inside the Black Box: The Credit Channel of Monetary Policy Transmission”. The Journal of Economic Perspectives, Vol. 9, 27-48.

Boughrara, A. (2009). “Monetary Transmission Mechanisms in Morocco and Tunisia”. Economic Research Forum, Working Paper, No. 460.

Catão, L., Pagan, A. (2010). “The Credit Channel and Monetary Transmission in Brazil and Chile: A Structural VAR Approach”. Central Bank of Chile Working Papers, No.579.

Cecchetti, S-G. (1995). “Distinguishing Theories of the Monetary Transmission Mechanism”. Federal Reserve Bank of St Louis Review, 83-97.

Clarida, R., Gali, J. et Gertler, M. (1999). “The Science of Monetary Policy: A New Keynesian Perspective”. NBER Working Papers, No. 7147.

Eddie George and Al. (2000). “The transmission mechanism of monetary policy”, Bank of England.

Era, D-N., Holger, F. (2006). “Transmission Mechanisms of Monetary Policy in Armenia: Evidence from VAR Analysis”. IMF Working Papers, No. 248.

Erdem, B., Ozgur, O., et Cagri, S. (2007). “The monetary transmission mechanism in Turkey : New developments”. Central Bank of the Republic of Turkey Working Papers, No. 704.

Lütkepohl, H., Krätzig, M. (2004). “Applied Time Series Econometrics”. Cambridge University Press, Cambridge.

Mishkin, F. (1996). “Les Canaux de Transmission de la Politique Monétaire: Leçons pour la Politique Monétaire”. Bulletin de la Banque de France, No. 27.

Mukherjee, S., Bhattacharya, R. (2011). “Inflation Targeting and Monetary Policy Transmission Mechanisms in Emerging Market Economies”. IMF Working Papers, No. 229.

Mundell, R. (1962). “The Appropriate Use of Monetary and Fiscal Policy under Fixed Exchange Rates”. In IMF Staff Papers, Vol. 9, 70-79.

Peersman, G., Smets, F. (2001). “The Monetary Transmission Mechanism in the Euro Area: More Evidence from VAR Analysis”. ECB Paper Series, No. 0091.

Poddar, T., Sab, R., et Khachatryan, H. (2006). “The Monetary Transmission Mechanism in Jordan”. IMF Working Papers, No. 48.

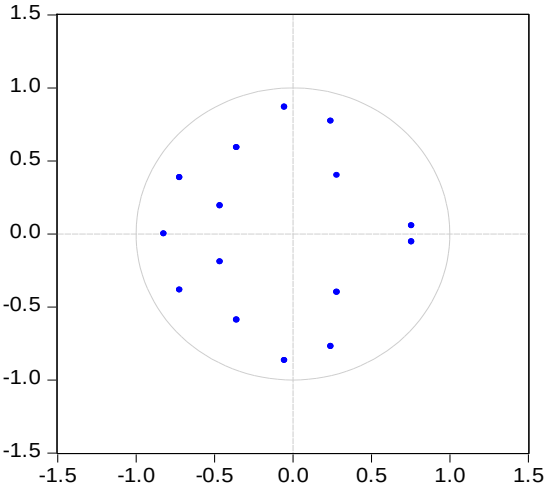
Taylor, J-B. (1995). “The Monetary Transmission Mechanism: An Empirical Framework”. Journal of Economic Perspectives, No. 9, 11-26.

Tobin, J. (1969). “A General Equilibrium Approach to Monetary Theory”. Journal of Money Credit and Banking, Vol. 1, No. 1, 15-29.

## APPENDICES

### VAR stability test:

Inverse Roots of AR Characteristic Polynomial




### Normality test of residuals:

VAR Residual Normality Tests

Orthogonalization: Cholesky (Lutkepohl)

Null Hypothesis: residuals are multivariate normal

| Component | Skewness | Chi-sq | df | Prob. |
|---|---|---|---|---|
| 1 | -0.380826 | 0.942685 | 1 | 0.3316 |
| 2 | 0.182628 | 0.216795 | 1 | 0.6415 |
| 3 | -0.149135 | 0.144568 | 1 | 0.7038 |
| 4 | 0.283234 | 0.521441 | 1 | 0.4702 |
| 5 | -0.072026 | 0.033720 | 1 | 0.8543 |
| Joint | | 1.859208 | 5 | 0.8683 |

| Component | Kurtosis | Chi-sq | df | Prob. |
|---|---|---|---|---|
| 1 | 2.992667 | 8.74E-05 | 1 | 0.9925 |
| 2 | 2.218368 | 0.992791 | 1 | 0.3191 |
| 3 | 2.529455 | 0.359795 | 1 | 0.5486 |
| 4 | 2.238176 | 0.943111 | 1 | 0.3315 |
| 5 | 3.279238 | 0.126707 | 1 | 0.7219 |
| Joint | | 2.422491 | 5 | 0.7881 |

| Component | Jarque-Bera | df | Prob. |
|---|---|---|---|
| 1 | 0.942772 | 2 | 0.6241 |
| 2 | 1.209585 | 2 | 0.5462 |
| 3 | 0.504362 | 2 | 0.7771 |
| 4 | 1.464551 | 2 | 0.4808 |
| 5 | 0.160427 | 2 | 0.9229 |
| Joint | 4.281699 | 10 | 0.9337 |

**Residual correlation test:**

VAR Residual Serial Correlation LM Tests

Null Hypothesis: no serial correlation at lag order h

| Lags | LM-Stat | Prob |
|---|---|---|
| 1 | 31.25584 | 0.1807 |
| 2 | 24.06833 | 0.5154 |
| 3 | 26.42756 | 0.3851 |
| 4 | 28.73553 | 0.2751 |

Probs from chi-square with 25 df.

**VAR estimation output:**

| | DTMP | DCT | DCC | DCE | DCM |
|---|---|---|---|---|---|
| DTMP(-1) | -0.026868 | 1.201228 | -0.369921 | -0.291967 | -0.180406 |
| | (0.16378) | (0.51107) | (0.25414) | (0.54374) | (0.27074) |
| | [-0.16405] | [ 2.35041] | [-1.45557] | [-0.53696] | [-0.66634] |
| DTMP(-2) | 0.067400 | 0.043734 | 0.148708 | 1.320502 | 0.609458 |
| | (0.14145) | (0.44139) | (0.21949) | (0.46960) | (0.23383) |
| | [ 0.47650] | [ 0.09908] | [ 0.67751] | [ 2.81196] | [ 2.60643] |
| DTMP(-3) | -0.015270 | 0.649710 | -0.114982 | -0.200884 | -0.603489 |
| | (0.12875) | (0.40177) | (0.19979) | (0.42745) | (0.21284) |

| | | | | | |
|---|---|---|---|---|---|
| | [-0.11861] | [ 1.61713] | [-0.57553] | [-0.46996] | [-2.83544] |
| DCT(-1) | 0.038026 | -0.694661 | 0.191471 | 0.062135 | 0.126566 |
| | (0.05985) | (0.18677) | (0.09287) | (0.19870) | (0.09894) |
| | [ 0.63535] | [-3.71939] | [ 2.06163] | [ 0.31270] | [ 1.27921] |
| DCT(-2) | 0.045769 | -0.355741 | -0.128759 | -0.115495 | 0.184908 |
| | (0.07028) | (0.21930) | (0.10905) | (0.23332) | (0.11618) |
| | [ 0.65127] | [-1.62216] | [-1.18071] | [-0.49501] | [ 1.59162] |
| DCT(-3) | 0.149281 | -0.224608 | 0.089636 | 0.241262 | 0.259047 |
| | (0.05850) | (0.18257) | (0.09078) | (0.19423) | (0.09671) |
| | [ 2.55161] | [-1.23029] | [ 0.98735] | [ 1.24212] | [ 2.67846] |
| DCC(-1) | -0.196221 | 0.166940 | 0.273768 | 0.569618 | 0.502776 |
| | (0.11697) | (0.36502) | (0.18151) | (0.38835) | (0.19337) |
| | [-1.67747] | [ 0.45734] | [ 1.50824] | [ 1.46675] | [ 2.60004] |
| DCC(-2) | -0.399609 | -0.038523 | -0.685747 | -0.312331 | -0.677408 |
| | (0.11901) | (0.37138) | (0.18467) | (0.39511) | (0.19674) |
| | [-3.35778] | [-0.10373] | [-3.71328] | [-0.79049] | [-3.44320] |
| DCC(-3) | 0.170205 | -0.264516 | 0.353666 | 1.005832 | 0.163276 |
| | (0.09674) | (0.30189) | (0.15012) | (0.32118) | (0.15993) |
| | [ 1.75937] | [-0.87621] | [ 2.35590] | [ 3.13167] | [ 1.02095] |
| DCE(-1) | -0.052769 | 0.141040 | 0.153119 | -0.648628 | 0.221945 |
| | (0.05091) | (0.15888) | (0.07901) | (0.16904) | (0.08417) |
| | [-1.03642] | [ 0.88770] | [ 1.93804] | [-3.83719] | [ 2.63690] |
| DCE(-2) | -0.154469 | 0.486505 | 0.072771 | -0.358980 | 0.105835 |
| | (0.06455) | (0.20143) | (0.10016) | (0.21430) | (0.10671) |
| | [-2.39305] | [ 2.41528] | [ 0.72652] | [-1.67511] | [ 0.99183] |
| DCE(-3) | -0.114442 | 0.290157 | -0.012277 | -0.176478 | -0.052852 |
| | (0.05280) | (0.16477) | (0.08193) | (0.17530) | (0.08729) |
| | [-2.16744] | [ 1.76102] | [-0.14985] | [-1.00674] | [-0.60551] |

| | | | | | |
|---|---|---|---|---|---|
| DCM(-1) | 0.166071 | -0.313079 | 0.447079 | 0.321534 | -0.340297 |
| | (0.09810) | (0.30613) | (0.15223) | (0.32569) | (0.16217) |
| | [ 1.69286] | [-1.02271] | [ 2.93690] | [ 0.98723] | [-2.09836] |
| DCM(-2) | 0.066985 | -0.133052 | -0.105987 | -0.109748 | 0.164020 |
| | (0.10790) | (0.33672) | (0.16744) | (0.35824) | (0.17838) |
| | [ 0.62079] | [-0.39514] | [-0.63299] | [-0.30636] | [ 0.91952] |
| DCM(-3) | 0.278616 | 0.358717 | 0.231414 | -0.222219 | 0.281597 |
| | (0.09195) | (0.28692) | (0.14268) | (0.30526) | (0.15200) |
| | [ 3.03019] | [ 1.25021] | [ 1.62192] | [-0.72796] | [ 1.85262] |
| C | -0.044215 | -0.008118 | -0.022680 | -0.010557 | 0.028327 |
| | (0.01982) | (0.06184) | (0.03075) | (0.06579) | (0.03276) |
| | [-2.23109] | [-0.13128] | [-0.73751] | [-0.16046] | [ 0.86465] |
| R-squared | 0.743965 | 0.684874 | 0.773641 | 0.609778 | 0.702577 |
| Adj. R-squared | 0.576986 | 0.479358 | 0.626016 | 0.355285 | 0.508605 |
| Sum sq. resids | 0.212510 | 2.069386 | 0.511712 | 2.342362 | 0.580751 |
| S.E. equation | 0.096123 | 0.299955 | 0.149159 | 0.319127 | 0.158903 |
| F-statistic | 4.455432 | 3.332451 | 5.240575 | 2.396051 | 3.622060 |
| Log likelihood | 46.30176 | 1.919438 | 29.16570 | -0.496767 | 26.69778 |
| Akaike AIC | -1.553936 | 0.722080 | -0.675164 | 0.845988 | -0.548604 |
| Schwarz SC | -0.871449 | 1.404567 | 0.007322 | 1.528475 | 0.133883 |
| Mean dependent | -0.018487 | -0.023439 | -0.047956 | -0.044373 | -0.012582 |
| S.D. dependent | 0.147791 | 0.415707 | 0.243906 | 0.397447 | 0.226681 |

| | |
|---|---|
| Determinant resid covariance (dof adj.) | 3.13E-08 |
| Determinant resid covariance | 2.23E-09 |
| Log likelihood | 111.7451 |
| Akaike information criterion | -1.627954 |
| Schwarz criterion | 1.784480 |