The transmission of monetary policy in Morocco: From policy rate to commercial banks' lending rates

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

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Abstract

The main objective of this paper is to study 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
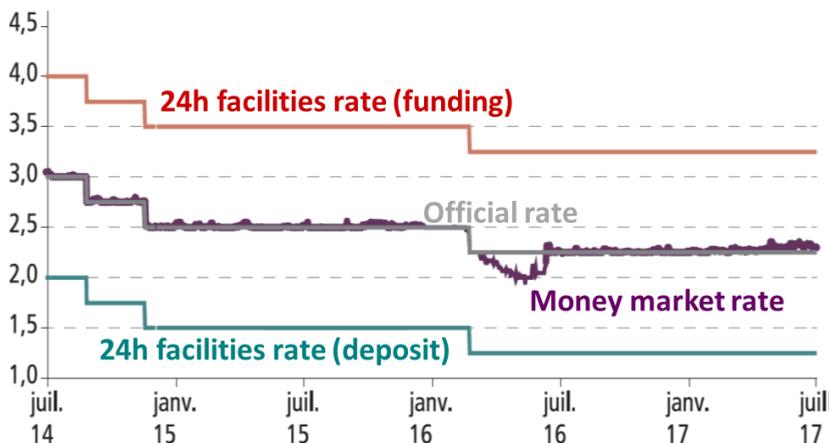
Source: quarterly report Bank Al-Maghrib

Once this operational objective is achieved, the question is to see if the targeted final[1] objectives are (or will be) reached. 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 follow:

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[1] Some central banks target intermediate objectives such as exchange rate or money growth rate, these indicators help the central bank to achieve its final objective of price stability.

Figure 1: Transmission channels for monetary policy
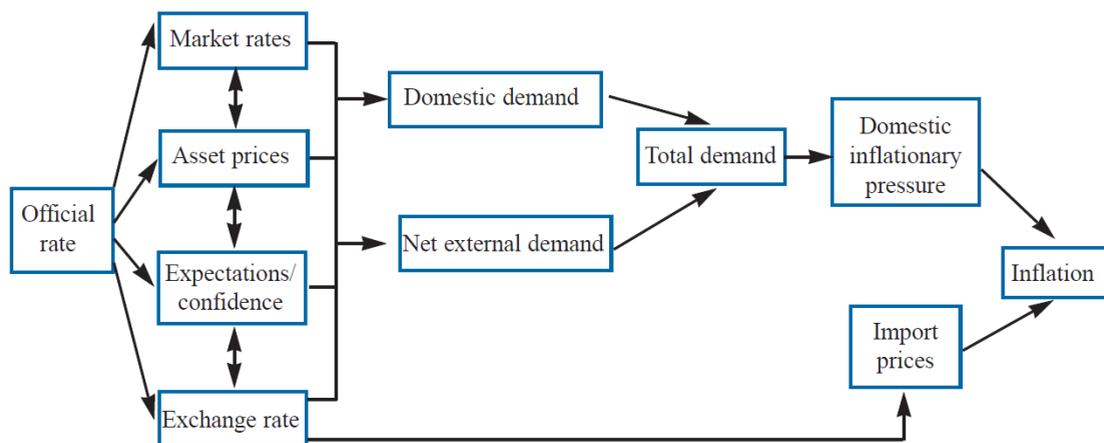
Source: Bank of England

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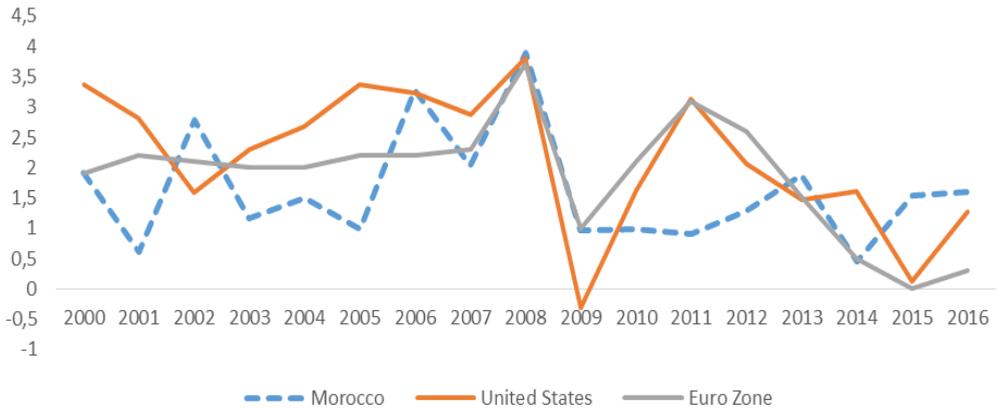
Source: IMF (WEO) and Eurostat, author's calculations

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
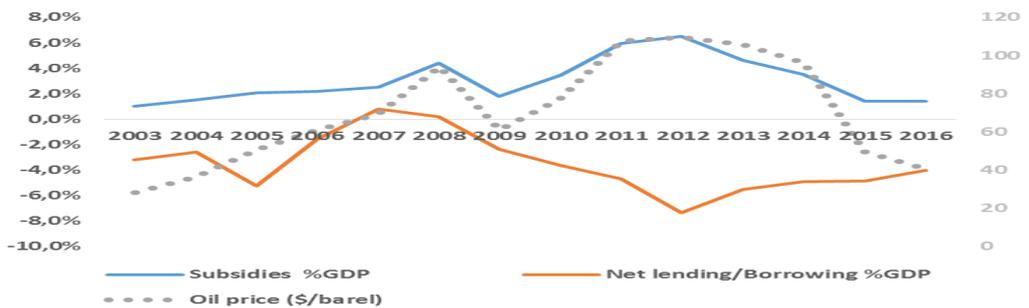
Source: ministry of finance, author's calculation

As it's shown by the chinn-Ito index, the morrocan capital account is almost closed. This charcterestic 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
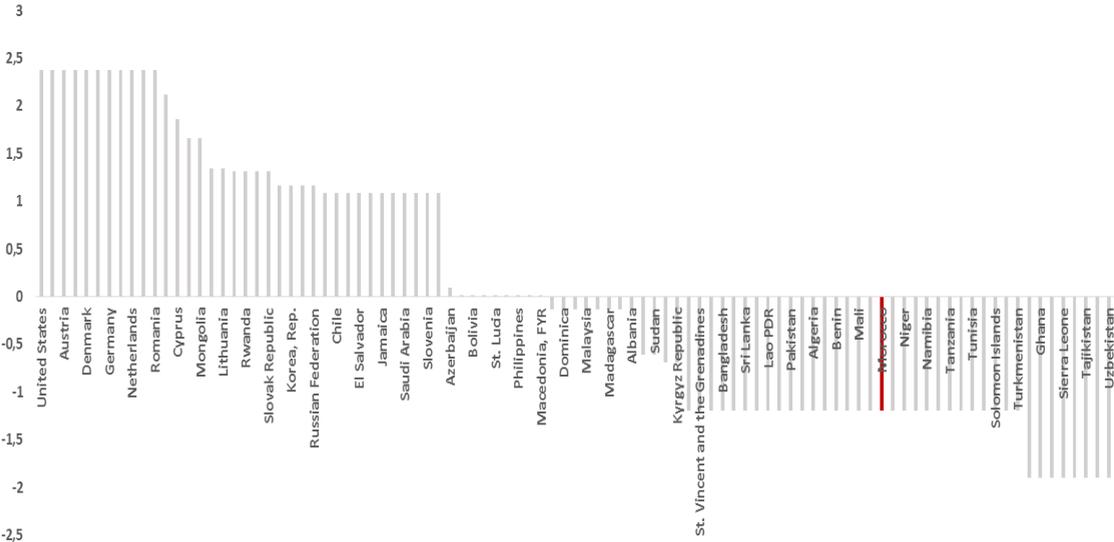
Source: Chinn-Ito data base, author's calculations

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

Fixed exchange rates

Free movement
of capital

Independent
monetary policy
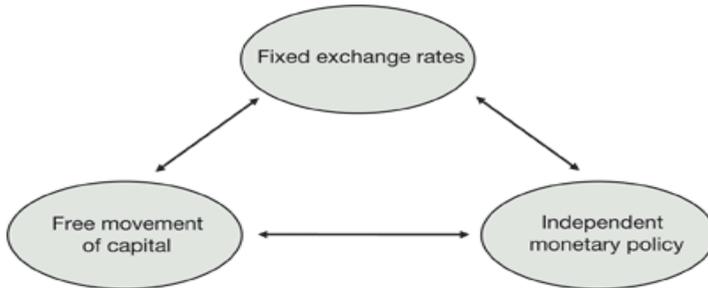
Source: Mundell, R. (1962)

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)
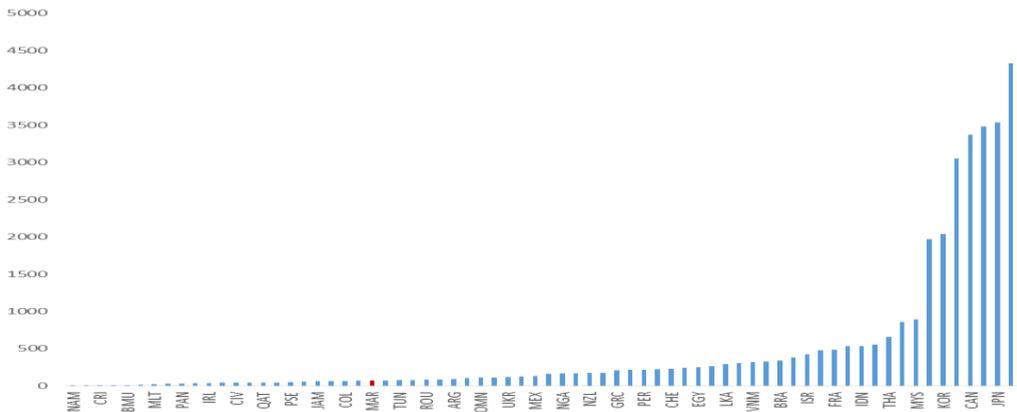
Source: The World Bank

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)
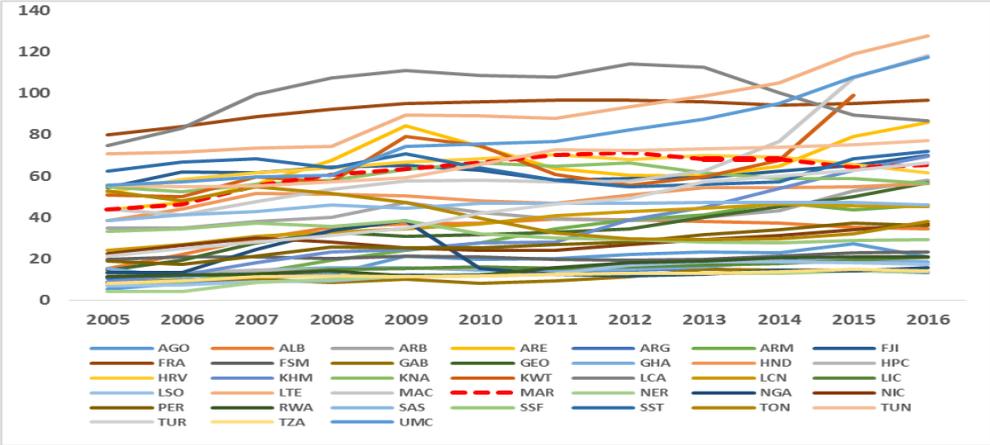
Source: The World Bank

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)
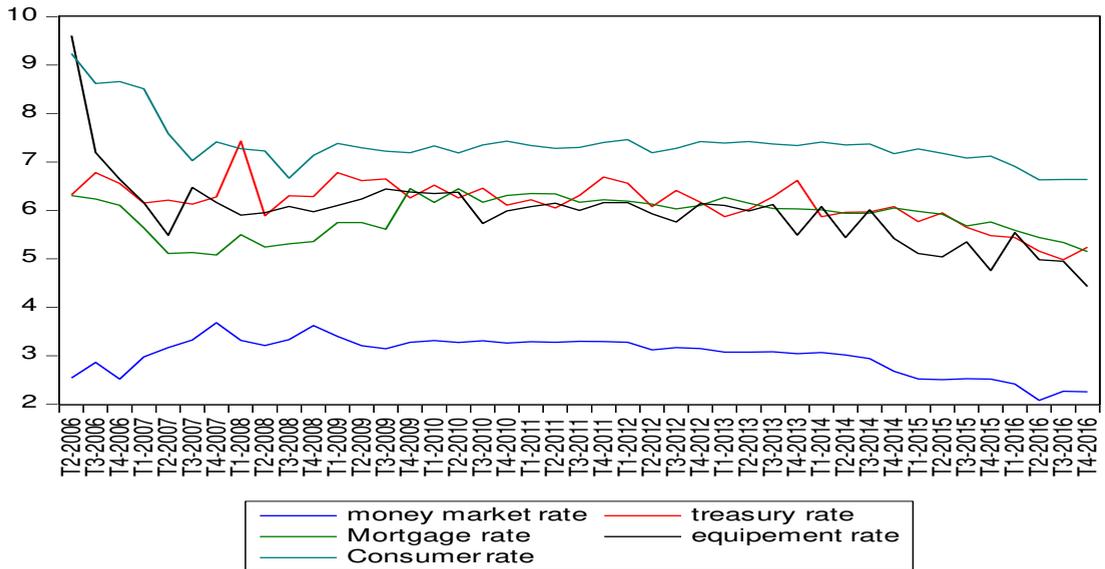
Source: Bank Al-Maghrib

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).

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

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.

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.

ESTIMATIONS 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)

Accumulated Response of DCT to DTMP

Accumulated Response of DCC to DTMP

Accumulated Response of DCE to DTMP

Accumulated Response of DCM to DTMP
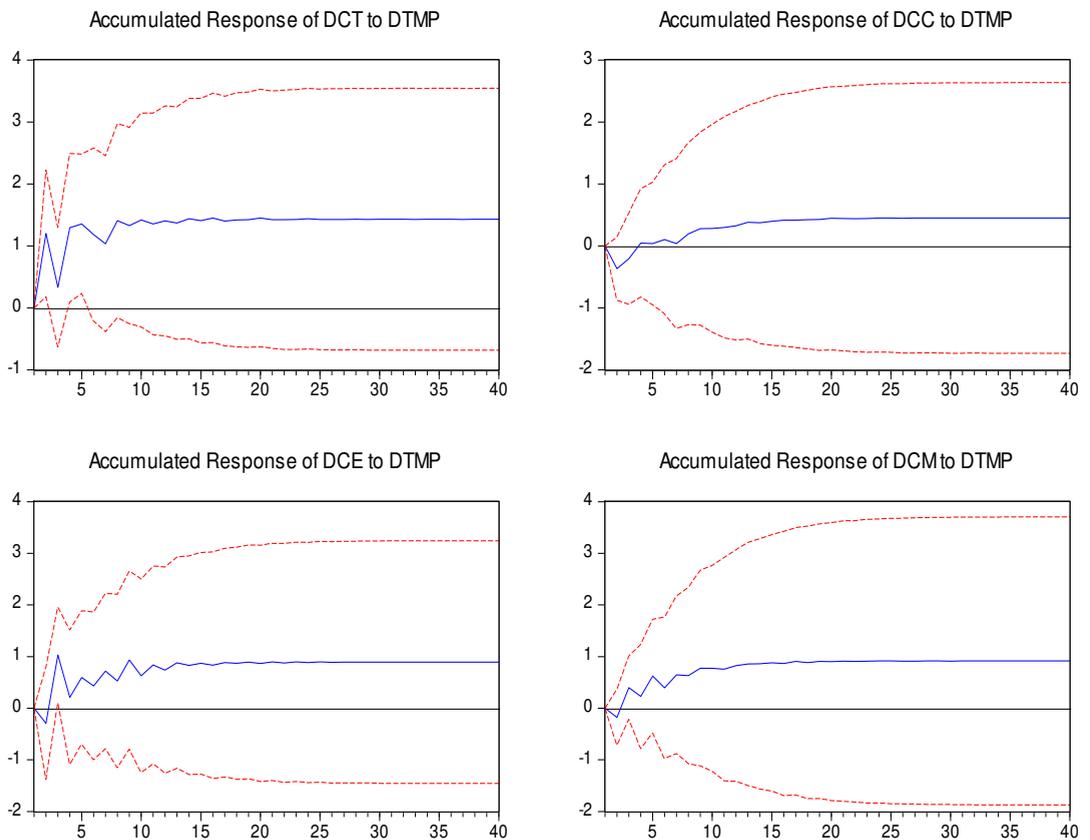
Source: author's calculation

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.

Graph9: Banking concentration according to Herfindahl-Hirschman Index
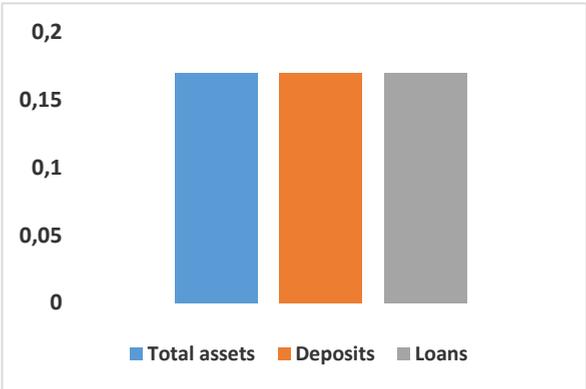
Source: Bank Al-Maghrib

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.

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APPENDIX

VAR stability test:

Inverse Roots of AR Characteristic Polynomial
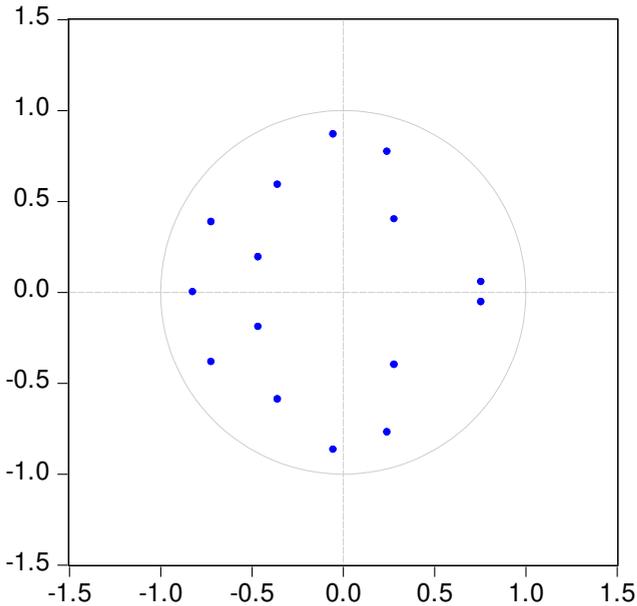
Normality test of residuals:

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