FINANCIAL INNOVATIONS IN MOROCCO: EFFICIENCY OF MONETARY POLICY

Ángel García-Ortíz[*]

Associate Professor, University of Valencia (Spain)

Rafaela Pizarro-Barceló[♣]

Associate Professor, University of Valencia (Spain)

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Abstract

The recent literature about Morocco's structural adjustment and reforms shows up this process as "shining example among Arab countries" or even as "island of liberalism". However, the recent reality of economic, social, cultural and political elements hinders the acceptance of both, the existence of rational expectations in the Moroccan economic agents behaviour and the absence of obstacles in the process of structural reforms. Nevertheless, the second generation reforms that have been adopted most recently provide a strong economic environment for the nation, specially in the banking sector.

The banking sector, which holds a central position within the Moroccan financial system – like in many medium-income countries –, has the potential to contribute the most or to most severely retard economic development. Although the banking industry's performance has been constrained by both the monetary policies of the Central Bank and the government authorities, the deregulation financial sector process that Morocco has been undertaken since the ending of 1986, points up a strong banking system with a satisfactory performance by international standards. This strength is a result of an innovation and liberalization process in the banking sector since 90´s. In spite of this development, some imperfections of Moroccan financial systems still remain.. This paper addresses this question in three steps: firstly, it reviews some major factors favouring a strong banking industry that boots development, as well as the major obstacles that continue to face the industry and the economy; secondly, it examines the link between monetary policy and financial structure, specially the lending channel, which emphasizes the role of the banking system in the monetary policy transmission; and, finally, the paper estimates the effects of monetary policy on macroeconomic variables, using a Vector Autoregresive (VAR) model, highlighting the importance of the lending channel in the strength of monetary transmission mechanism.

Keywords Banking, Monetary Policy Transmission Mechanism, VAR modelling.

JEL Classification: E5.

[*] Corresponding author: Departamento de Economía Aplicada, Facultad de Derecho, Campus dels Tarongers, Avda. dels Tarongers, s/n, 46022 Valencia, Spain. E-mail: Angel.Garcia-Ortiz@uv.es.

[♣] Corresponding author: Departamento de Análisis Económico, Facultad de Economía, Campus dels Tarongers, Avda. dels Tarongers, s/n, 46022 Valencia, Spain. E-mail: Rafaela.Pizarro@uv.es.

1- INTRODUCTION

The monetary policy has always created a great interest, not only because it is a powerful instrument for controlling the main macroeconomic variables, but, also for the debates and explanations that are given for understanding the mechanism from which, monetary fluctuations, are transmitted to the real economy. Whilst there exists a generalised consensus that a monetary expansion produces an initial expansion of the real output and, later an increase in the prices, the knowledge of monetary effects on real output in short term is still an unresolved topic. Therefore, if monetary authorities want to be successful designing the monetary policy, they need to know their effects and lags, in other words, the mechanism of transmission of the monetary disturbances[1].

After the Moroccan structural adjustment program[2] (in 1980s and 1990s), which principal goal was the reabsorption of the excess of global demand and on the stabilization of the main macroeconomic equilibriums[3], now the need is to instigate supply, to improve potential growth and to set up the foundations of a real development process. This "second generation" reforms has in fact the main goal of completing the diffusion of market mechanisms by setting up the institutional framework required. These reforms, unlike the first one, affect directly not only to the economic system, but also the very way of functioning of the societies as a whole, and concern a high number of agents (Lavialle, 2007).

One of these second generation reforms have been undertaken since 1990 with the aim of putting in place a viable modern financial system that can ensure efficient mobilization and allocation of savings through economic channels. Approaches include reforming the banking sector, financial markets as well as monetary and exchange rate policies.

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This paper focuses on the relationship between monetary policy and financial structure through the bank credit channel, which emphasizes the role of the banking system in the monetary policy transmission. Since banks are deposit taking institutions, and rarely fund themselves with non-reservable forms of finance, a monetary contraction that decreases reserves will lead banks to cut back on the loan supply. Those borrowers that rely on bank lending – because they do not have access to public bond markets – will be led to cut back on investment, and ultimately, on aggregate economic activity. As we argue below, this

[1] Mishkin (1995) and Meltzer (1995) do a revision of the different ways of transmission of the monetary shocks.
[2] See Bolbol (1998) and Conway (1994) for a widening about the structural adjustment concept.
[3] One of the earliest approaches on the Structural Adjustment Program (PAS).

channel might influence the potency of monetary policy. If a financial system is well-developed, banks are healthy, and the bank concentration ratio is high, then bank credit will play no role in the transmission of monetary impulses and output responses will coincide with those that predict the interest rate channel or money view. In the opposite sense, the lending channel is to be stronger and aggregate money channel effect will be amplified.

Following on form (Kashyap and Stein, 1997a) and (Cecchetti, 1999), who focus on the importance of the banking system in explaining the distributional effects of monetary policy changes, the goal of this paper is twofold. Firstly, to identify the most notable characteristics in financial structure for Morocco, and then, to demonstrate the grade of effectiveness of monetary policy on output and prices– size and timing –, highlighting the role that the bank credit channel plays in explaining these effects of Moroccan monetary policy.

The remainder of this paper is divided as follows. In section 2, we review some major factors favouring a strong banking industry that boots development, as well as the major obstacles that continue to face the industry and the economy. Section 3 establishes the importance of financial structure in the monetary policy mechanism trough the role of the bank credit channel. Section 4 identifies the most notable differences in Moroccan financial system, and reports estimates of the differential impact of an interest rates increase on output and bank loans, consistent with the bank credit view, and finally, section 5 presents the conclusions drawn from this.

2- THE DEREGULATION FINANCIAL SECTOR PROCESS IN MOROCCO.

The Moroccan financial sector was strictly regulated through administered interest rates and direct credit until the 80s decade. Its role was to collect savings and channel them to government and public enterprises as well as priority sectors at subsidized rates. During that period the monetary authorities relied heavily on credit containment, selective credit instruments and administratively deposit and lending rates. These measures led to distortions, inefficiencies, resource misallocations and weakened the incentives for banks to attract private savings (Zouhar and Kacemi, 2008).

The Moroccan financial system has been thoroughly reformed since the early 90s, around multiple axes, including the deregulation of capital markets by transforming the relationships between the various components of the financial system, financial liberalization and reform the regulatory framework for banks and financial market. So were introduced under the Banking Act of 1993 and the attached texts, the elimination of credit, the phasing out of mandatory jobs, liberalization of interest rates debtors in 1996 and that same year, the launch of an interbank foreign exchange market (Hammes, 2006).

The Moroccan Banking Act 1993 in its first article defined as a credit institution, any corporation engaged, as usual occupation, one of the three following operations: collecting funds from agents, the distribution of credit, the provision of clientele means of payment and management. This law distinguishes both banks and finance companies previously abolished the distinction between banks and specialized financial institutions (SFO). Indeed, until 1986, the SFO were distinguished banks by the nature of their assets that could not be established as endowments and state funds or bond issues on international and national financial markets, but these organizations could not receive funds from the public. The lifting of this restriction has enabled them to develop their activities and their branch networks. The Banking Act of 1993 has just endorsed the approximation of the roles of banks and SFO (Femise, 2004).

Before of the beginning of the reforms, the Moroccan financial system had a segmented structure where the state was bureaucratically ubiquitous through specialized financial entities and a monetary policy based on techniques of quantitative ruling. This was at a time when financial markets were marginally scaled and not sufficiently equipped with diverse instruments that could otherwise enable them to finance the economy in an adequate manner.

To face up with these inadequacies, significant reforms have been undertaken since 1990 with the aim of putting in place a viable modern financial system that can ensure efficient mobilization and allocation of savings through economic channels. Approaches include reforming the banking sector, financial markets as well as monetary policy and exchange. These reforms are aimed at making interventions more consistent and Morocco’s financial system more competitive.

Three axis have been introduced in the banking sector: a) the restructuring of the legal framework governing these institutions (principle of universal bank, protection of depositors, surveillance of the banking system), b) consolidation of prudential regulation in

compliance with international norms (solvency, liquidity, risk management, etc.) and c) deregulation of banking activity (rate decontrol and mandatory job reduction). These reforms are geared towards a further consolidation of the jurisdiction of the central bank and securing its independence as well as extending its control to all banking activities and setting a close coordination with all the controlling authorities of the financial system.

Reform of financial markets has been implemented gradually. For the year 1993, this reform involved the modernization of the Casablanca Stock Exchange and the setting up of stock trading firms and real estate investment organizations as well as a control entity, called the CDVM, the securities market watchdog. In 1996, the stock exchange reform was stepped up further through the computerization of the quotation system, the dematerialization of securities, and the setting up of a central depository as well as a customers' guarantee fund. For the years 2006 and 2007, the initiated reforms aimed at upgrading the security system of transactions.

As to the insurance sector, a gradual liberalization of tariffs relating to certain lines of business has been undertaken and some extensive reforms have been initiated. These reforms aimed at developing institutional savings and ensuring the sector's compliance with the content of ratified free trade agreements. Alongside these ongoing reform projects, measures have been taken at the level of monetary policy. These measures include the recourse to indirect instruments of regulation (Open Market, resumption of liquidity, advance on calls for tenders, etc.) and the implementation of new Bank Al-Maghrib charters that allow more autonomy to monetary authorities and inhibit clashes of interest involving budgetary policy and monetary policy.

In line with the increasing opening up and the gradual integration of the national economy in its regional and international context, significant progress has been made in the process of exchange liberalization initiated in 1993. Additionally to setting up an exchange market in 1996, a gradual liberalization of capital account was initiated and new measures were adopted in 2007. These measures particularly included easing the terms of investment for Moroccan banks operating abroad. The duration of this investment has been increased to five years and their liberalization has been brought up to 10 percent for the OPCVM portfolios. Foreign Direct Investment could amount to 30 million dirham. Insurance companies no longer need prior authorization for foreign investment that account for 5 percent of their assets.

The prospect of these reforms are promising overall. The volume of credit granted by the banking sector has remarkably increased to rest at 72 percent of the GDP (Gross Domestic Product) against 51 percent in 2001. This is indicative of a further consolidation of this sector's leverage in financing the Moroccan economy. Besides, the banking sector has contributed to the birth of large- scale financial conglomerates comprising the entire range of financial services and increased the number of international transactions. The capitalization of an already modernized stock exchange market has significantly gone up over the last few years, from 24.5 percent of the GDP in 2001 to 97 percent in 2007.

3- THE MONETARY POLICY MECHANISM: THE BANK CREDIT CHANNEL AND FINANCIAL STRUCTURE.

3.1- An empirical literature review.

Why do the effects of monetary shocks on economic activity differ, in magnitude and in timing, across countries? According to the body of empirical literature there are at least three justifications. Firstly, ***wage-price structure*** determines that wages (prices) rigidity leads to a great reduction of output after monetary contraction because the aggregate demand decreases more than if the wages (prices) setting is flexible – (See Guiso *et al.*, 1999, for European countries analysis) –. For the Moroccan case are available the studies of Agénor and El Aynaoui (2003) and Said (2009).

Secondly, Central Banks' ***reaction functions*** vary considerably across countries, because the official interest rates responses to different shocks depend on the authorities' preferences with respect to inflation and output targeting – (See Clements *et al.*, 2001; Dornbusch *et al.*, 1998; and Mihov, 2001, for European countries analysis) –. The short-run impact of monetary policy is also related to the "credibility" of the Central Bank. For example, in a country with "noncredible" monetary policy, the optimal behaviour for agents who know that the monetary contraction will not last for very long, would be to avoid any adjustment, thus having no effect on GDP.

And thirdly, ***transmission mechanism of monetary policy*** can differ across countries[4]. The Femise Research Programme (nº FEM31-25R) presents an exhaustive analysis of the transmission of monetary policies in Morocco, Tunisia and Egypt; and points up that the efficiency of the central bank depends on the degree of development of the country's financial markets and its stability. On the other hand, Agénor and El Aynaoui (2007) design a theoretical macro model including characteristics of the monetary policy framework, of the Moroccan financial system and of the central bank's response. Also be consulted the work of Achy and Boughrara (2008).

Monetary transmission channels can be divided mainly into three different channels[5]. The *interest rate* (or *money*) *channel* which is based on the monetary authorities modifying the official interest rates, which determine the interest rates on the monetary market. Given a contractionary monetary policy, the real interest rates increase, affecting the aggregate spending in three ways: a) the higher costs of capital as a result of higher interest rates leads to an investment expenditures contraction; b) consumption spending decreases because of the substitution effect, since higher rates change consumer preferences in favour of future consumption over current consumption; c) spending also depends on income effect positively –interest rates affect disposable income through dividends and interests payments–, but the sign and magnitude of the income effect depend on the net asset

[4] See (Britton and Whitley, 1997), (Kieler and Saarenheimo, 1998), and (Guiso *et al.*, 1999) for a survey of the empirical evidence on the five major European countries monetary transmission mechanisms.

[5] See (Mishkin, 1995), (Meltzer, 1995), and (De Bondt, 1997) for a survey of the different transmission channels of the monetary shocks.

position of firms and households[6]. Boughrara (2009b) finds that after a monetary contraction in Morocco the output declines quickly in the first quarter but increases after four months. Contrary to real activity, the fall of prices seems to be quite important and persistent.

The *exchange rate channel* determines that a monetary contraction will raise domestic interest rates relative to foreign rates and, consequently, domestic currency will be appreciated, reducing net exports and then aggregate output. The magnitude of this channel depends on the country's openness – (Dornbusch *et al.*, 1998) –. Boughrara (2009a, 2009b) finds that this channel is not operative in Morocco, because a restrictive monetary policy has not impact on the effective nominal exchange rate.

And lastly, the *credit channel* that focuses on financial market imperfections as an important factor of propagation and amplification of the money channel effects. It operates in two ways: a) the *balance sheet channel* points up how the problems of informational asymmetries between lenders and borrowers determine a cost spread between the external finance and self-financing – called the external finance premium –, which increases after a monetary contraction, reducing access to credit markets for firms (specially medium and small sized firms) and households – (Bernanke, Gertler and Gilchrist, 1994), (Bernanke and Gertler, 1995), and (Hubbard, 1994) –; b) the *bank credit channel* emphasizes the role of banking sector in the transmission of monetary policy. Since banks are deposit taking institutions and rarely fund themselves with non-reservable forms of finance, a monetary tightening that decreases reserves will lead banks to cut back on loan supply and those borrowers that rely on bank lending – because they do not have access to public bond markets – will be led to cut back on investment, and ultimately, on aggregate economic activity – (Bernanke and Blinder, 1988, 1992), (Romer and Romer, 1990), and (Kashyap and Stein, 1994, 1997) –.

The advantage of this last sub-channel is that it identifies as a principal cause of the asymmetric effects of a common monetary shock the cross-country differences in financial structure. If financial system is well-developed, banks are healthy, and the bank concentration ratio is high, then bank credit will play no role in the transmission of monetary impulses and output responses will be in line with those that predict the interest rate channel or money view; in the opposite sense, the lending channel is to be stronger and aggregate money channel effect will be amplified.

The empirical evidence on the impact on output and prices of monetary policy across the countries in the union adopt the VAR methodology, which presents some advantages: it estimates the dynamic economic effects of monetary policy and permits to adopt different schemes identifying monetary shocks according to the monetary authorities' reaction functions. However, this approach has been criticised at least in two ways: a) the estimated parameters can not capture the economic structure in each country and then the model does not indicate what economic structures cause the differences across countries; b) since the

[6] Some empirical studies focuses on this channel as a source of significant asymmetries of monetary shocks in Europe– Mihov (2001), Guiso *et al.* (1999), Dedola and Lippi (2000), Clements *et al.* (2001), and Carlino and DeFina (1998) –.

VAR model focuses on the effects of monetary shocks – when monetary decisions deviate form their normal reaction function – it does not give any information about the consequences of a systematic monetary policy. See again Achy and Boughrara (2008).

Boughrara (2009a, 2009b) estimate a VAR model – including prices, output, money, short interest rate, bank loans and loan price –, and shows that a tight monetary policy induces quickly an increase in price loan beside with a decrease in output, but the banks loans response is weak, it does not react during the first year, it declines slightly around the sixth and the seven quarter. In sum, he concludes that the lending channel is operative in the long run in Morocco.

3.2- The bank credit channel and the financial structure.

As (Bernanke and Blinder, 1988) have shown, in order for the bank credit channel to work and have a real effect due solely to a modification in bond interest rates, ***two conditions are necessary***: 1) that the agents who depend on the banks to finance them cannot obtain other sources of finance; 2) that the banks do not have another source to attract funds that is a perfect substitute for reserve deposits.

Just how well both hypotheses can be fulfilled depends on the workings and development of the financial system. The ***first condition*** is much more likely to be fulfilled even though a tendency exists nowadays towards financing through the securities market instead of using banking intermediaries; however, on an aggregate level, the banking system still plays a crucial role in financing businesses, especially small and medium sized ones.

As far as the ***second condition*** is concerned, the following question would have to be answered in the affirmative: Can the monetary authority affect the bank credit supply by manipulating the amount of reserves available for the banking sector? At least four factors exist that weaken or can break the relationship between reserves and the credit supply:

i) *the importance of the non-banking intermediaries*: if the volume of credit provided by these agents were considerable, and these institutions did not need to finance themselves via deposits subject to reserve requirements, then the relationship between the Central Bank and the aggregate credit supply would be very weak;

ii) *the maintenance of bonds as a buffer against reserves shocks*: what would be the reaction of a bank in the case of a reduction in its deposits after a monetary contraction? The bank would have at least three alternatives: reduce its offer of credit, sell some bonds to obtain liquidity or, increase alternative sources of finance (Certificates of deposit (CDs), shares, short and long term bonds,...). In order to complete the second condition some type of adjustment in the credit supply would be necessary. This would require (with regard to the second alternative since the third one will be analysed in the next factor) that the proportion of bonds to total assets low in relation to the proportion of credit;

iii) *the bank's ability to use non-reservable forms of finance*: Using the size, the concentration and bank health as proxy variables for the ability of the banks to access

other forms of finance which are not subject to reserve requirements, it can be shown that where there are healthy banking systems with a high concentration of only a few banks in the marketplace, problems of asymmetric information between investors and the banks issuing new instruments to capture funds can be reduced, it being easier to get them and, thus, compensating for a reduction in deposits without changing the credit supply;

iv) *the impact of capital requirements*: if the banks must maintain an amount of capital as a percentage of its risk assets, and if the issue of new shares is costly for a bank (due to the information problems that accompany the issue of new shares), then the banks will prefer to hold more bonds that are not subject to these requirements rather than invest in new credits (risk assets). Under these circumstances, the higher the regulation on the volume of capital, the lower will be the impact of monetary policy on output due the bank credit channel not being able to fully operate.

4- MEASURING THE ROLE OF BANK LENDING IN THE MONETARY POLICY TRANSMISSION MECHANISM.

4.1- Characteristics of financial structure and their implications for the importance of bank credit in the transmission of monetary impulses.

This section will present data concerning those characteristics of the Moroccan financial system which are relevant in order to determine how much of the 2 necessary conditions need be fulfilled for the bank credit channel to exist.

First condition: ***Can the economic agents who are bank-dependent access to other forms of finance?***

Looking at **Table 1** one can appreciate the high degree of dependency that government and private sector have on bank financing – 84,14% and 95,82% in 1997 and 2009, respectively –, being growing for households and non-financial enterprises – 60,73% and 84,452% in 1997 and 2009, respectively –, but decreasing for public sector – 23,41% and 11,37% in 1997 and 2009, respectively –.

Table 1. Bank Credit for Government and Private Sector, 1997-2009.

	1997		1999		2002		2005		2009	
	Millions of MAD	%	Millions of MAD	%	Millions of MAD	%	Millions of MAD	%	Millions of MAD	%
Total Domestic Lending	**250.346**	**100,00**	**274.851**	**100,00**	**314.959**	**100,00**	**380.076**	**100,00**	**685.914**	**100,00**
Government	*86.369*	*34,50*	*76.033*	*27,66*	*80.707*	*25,62*	*77.475*	*20,38*	*85.582*	*12,48*
By Banks	58.616	23,41	54.917	19,98	76.933	24,43	75.391	19,84	78.008	11,37
Private sector	*159.424*	*63,68*	*193.097*	*70,26*	*227.016*	*72,08*	*292.029*	*76,83*	*585.253*	*85,32*
By Bank Al-Maghrib	7.395	2,95	7.192	2,62	9.747	3,09	7.696	2,02	6.032	0,88
By Banks	152.029	60,73	185.905	67,64	227.016	72,08	284.333	74,81	579.221	84,45
Nationale Savings Bank	*4.553*	*1,82*	*5.721*	*2,08*	*7.236*	*2,30*	*10.572*	*2,78*	*15.079*	*2,20*

Source: Bank Al-Maghrib.

On the other hand, Morocco has undergone a significant development in non-banking means of finance. Table 2 shows other financial instruments such as shares (stock market capitalisation) and securities (negotiable debt). It is worth noting that firms can substitute bank financing by these new means of finance, especially in the stock market – being the securities the most-used by government –, it would suppose that the impact of monetary policy could be reduced, as enterprises would substitute bank credit for these other financing forms following a monetary contraction.

Table 2. Banking and Non-Banking Means of Finance, 1996-2008.

	1996		1999		2002		2005		2008	
	Millions of MAD	% PIB	Millions of MAD	% PIB	Millions of MAD	% PIB	Millions of MAD	% PIB	Millions of MAD	% PIB
Total Domestic Credit	237.608	**74,41**	274.851	**80,10**	314.959	**79,18**	380.076	**83,05**	630.639	**93,70**
Stock Market Capitalisation	75.583	**23,67**	138.051	**40,23**	87.175	**21,92**	252.326	**55,14**	531.750	**79,01**
Negotiable Debt	56.243	**17,61**	114.619	**33,40**	185.270	**46,58**	261.000	**57,03**	284.499	**42,27**

Source: Bulletin Trimestriel, Bank Al-Maghrib.

One can conclude, although the data provided shows a greater access to other sources of finance, these sources are not enough to substitute the bank lending, for both, non-financial enterprises and public sector.

Second condition: ***Can the monetary authority affect the bank credit supply?***

The importance of the non-banking intermediaries.

The percentage of credit available by Other Financial Institutions (OFIs) – consumer credit companies and leasing companies – is very low in all periods (**Table 3**), which would make one expect that following a reduction in reserves, ceteris paribus, one could expect a contraction in credit availability at the aggregate level.

Table 3. Banks loans and other financial intermediaries, 2000-2008.

	2000	2002	2005	2008
Percentage of Total Domestic Loans by:				
Banks	92,03	91,57	92,91	95,17
OFIs	7,97	8,43	7,09	4,83

Source: Bank Al-Maghrib.

Holdings of bonds as a buffer against reserves shocks.

The proportion of liquid assets to total is decreasing in relation to the proportion of loans, except in 2002. This composition of the asset portfolio supposes that banks in Morocco find it more difficult to compensate for a reduction in reserves through the sale of liquid assets, being obliged to reduce their credit supply.

Table 4. Banking structure (%), 2000-2008.

	2000	2002	2005	2008
Number of Banks	42	40	34	33
Liquid assets/Total assets	23,85	25,67	21,18	14,23
Loans/Total assets	54,99	49,46	49,04	58,16
Deposits/Total assets	70,55	76,33	81,40	75,01
Debt securities & other liabilities/Total assets	9,61	8,03	3,62	6,76
Capital and Reserves/Total assets	9,07	9,16	8,67	8,70

Source: Bank Al-Maghrib.

The ability of banks to use alternative forms of finance rather than deposits.

Using the size, the concentration and bank health as proxy variables for the ability of the banks to access other forms of finance which are not subject to reserve requirements, it can be shown that where there are healthy banking systems with a high concentration of only a

few banks in the marketplace, problems of asymmetric information between investors and the banks issuing new instruments to capture funds can be reduced, it being easier to get them and, thus, compensating for a reduction in deposits without changing the credit supply.

Looking at **Table 5**, Morocco has a high concentrated banking system, with a small number of banks and decreasing (see **Table 4).** The State's presence in the banking sector has decreased but still remains relatively important. The bank concentration ratio has increase slightly in 2008 for both, the 5 and 10 largest banks.

Table 5. Size and bank concentration, 2002-2008.

	2002	2005	2008
Number of Banks	**17**	**27**	**22**
Percentage of assets in 5 largest banks	**53,30**	**47,49**	**54,07**
Bank Al-Maghrib	17,67	11,63	13,36
Banks	35,63	35,86	40,71
Percentage of assets in 10 largest banks	**83,90**	**74,73**	**80,65**
Bank Al-Maghrib	17,67	11,63	13,36
Banks	66,23	63,10	67,29

Source: *Bankscope.*

With respect to the bank health data – **Table 6** –, the Moroccan banks present high profitability ratios, but the amount of non-performing loans (NPLs) to total assets is very high, especially over the period 2000-2005, because a significant part of NPLs in the banking sector in Morocco have been accumulated over the nineties, period during which economic growth was slow and extremely volatile, and credit risk assessment practices were not rigorous. NPLs were also the legacy of directed credit policies implemented in the eighties and continued provision of credits to unprofitable public enterprises.

On the other hand, the upward trend in provisions reflects to a large extent the tightening of classification and provisioning rules introduced in 2002 and for which banks were required to comply with. Therefore, we can suppose that the Moroccan banks will find it very difficult to obtain other types of funds – the percentage of debt securities and other liabilities to total assets is low and decreasing (**Table 4)** –, and, consequently the banks will not be able to compensate a reduction in their deposits after a monetary contraction, via other forms of finance, being forcing to reduce their credit supply.

Table 6. Bank health (%), 2000-2008.

	2000	2002	2005	2008
ROA	2,27	2,07	2,34	1,90
ROE	25,06	22,59	27,04	21,89
Profit before tax/Total Assets	1,17	0,73	1,45	1,67
Non-Performing Loans/Total Assets	17,50	17,40	15,70	7,9(1)
Provisions/Non-Performing Loans	47,80	54,70	58,60	75,2(1)

Notes: (1) data referred to 2007. *Source:* Bank Al-Maghrib; FMI.

Capital requirements

Banks in Morocco have a very high level of capitalisation – **Table 4** –, then the impact of monetary policy on output and prices will be lower due to the capital requirements is a factor which weakens the bank credit reaction after a monetary contraction.

Conclusion

To conclude, it is possible to determine the grade of effectiveness of monetary policy, taking into account how far the 2 conditions necessary for the bank credit channel to be operative are met. Thus, establishing a scale from least to most fulfilling (1 to 3) of every determining factor – **Table 7** –, the credit offer will play an important role in the transmission of monetary impulses, amplified the money effects on macroeeconomic variables.

Table 7. Summary of determinants of bank credit channel and effectiveness of monetary policy.

Country	1st Condition	2nd Condition				Effectiveness of Monetary Policy (a)
	Availability of Non Bank Financing	Importance of Non-Bank Intermediaries	Importance of Bonds	Availability of Alternative Finance	Capital Ratio	
Morocco	3	3	2.5	2.5	1	**2.6**

(a) Average of five previous columns.

4.2- Measuring the impact of monetary policy on output and bank credit.

Using the VAR methodology, we estimate the impact on output, prices, monetary aggregate and bank credit following a monetary contraction. The model used is the following:

$$Y_t = \sum_{i=1}^{k} A_i Y_{t-i} + \sum_{i=0}^{k} B_i X_{t-i} + C\varepsilon_t$$

Where vector Y represents the main macroeconomics variables – production (LGDP), inflation (CPI) and interest rate (INT_RATE) –, while vector X encompasses a monetary aggregate (LM), the exchange rate (REER) and bank credit (LLOANS). Adopting the Cholesky's triangular decomposition in matrix C, the order introducing the variables in VAR is: production, prices, interest rates, monetary aggregate, bank credit and exchange rate, so the last three will be affected simultaneously by a monetary impulse[7].

Estimating the process VAR (2), the Impulse-Response Function – **Figure 1** – computes and represents the responses to all the variables to *shocks* of a standard deviation for each one of them during 24 periods, where each column represents the impact of an *innovation* of each one of six system variables over one of them. For example, the third column shows the response of all variables to *shocks* in the interest rate.

The principal results can be divided between those that determine what the best indicator for the monetary policy is and those that show evidence of the transmission mechanism of the monetary disturbances, emphasising in the bank credit role.

Monetary Policy Instrument

Analysing the output and prices responses to monetary *shocks*, it obtains, in first place, that the output responses to *shocks* in the interest rate and in the money shows the same pattern: an increase in the interest rate reduces the output only after 6 months and it has persistent effects during 24, whilst an increase in the monetary aggregate has a positive impact on the output in the first month and after 6 months with persistent effects during the period. This fact seems to indicate that both, the interest rate and the money supply are good indicator of the monetary policy.

In second place, the prices responses to *shocks* in the money supply confirm the *"price puzzle"* phenomenon: while we would expect for an increase in the prices after a monetary expansion, the opposite happen in the first months. Nevertheless, it doesn't happen with the interest rate, because the prices decrease after an increase in interest rate.

[7] **Database:** *International Financial Statistics.* **Sample and Lags:** 1994:1 – 2008:4; Lags:2 (because the sample is very short). **Variables:** LGDP: logarithm of Gross Domestic Product, in nominal terms; CPI: Consumer Price Index, INT_RATE: the money market interest rate; LM: logarithm of M2; LLOANS: logarithm of domestic credit on private sector; REER: the real effective exchange rate. The variables are in billion of mad.

And, finally, the interest rate will be a good indicator of the monetary policy if it only responds to *shocks* on money supply and it shows insensibility to changes in the money demand in the same month in which it produces itself the mentioned alteration (Bernanke and Blinder (1992)). Actually, analysing the interest rate's response in the same month in which a *shock* on money is produced (fourth cell of the third row), there is a null reaction, therefore, it can be utilised as a monetary disturbance indicator.

Analysis of the monetary transmission mechanism

The study of the dynamic effects of the monetary policy actions – through *shocks* in the interest rate – over all the banks balances and over the economy, distinguishes between the *money channel* and the *bank credit channel.*

To demonstrate the existence of the *money channel* or *liquidity effect* the monetary aggregates must present a negative relation with the interest rate and besides, the disturbances in the interest rate must go accompanied with alterations in the prices and output. The second question has been analysed before and, with respect to the first one, after an increase in the interest rate, the money reduces persistent during 2 years; confirming that the *money channel* is operative.

As far as the existence of *the bank credit channel* the following evidence can be found according to Bernanke and Blinder (1992):

(i) In the short term, the monetary aggregate responds faster than the bank credits to *shocks* in the interest rate, but after one or two years, the bank credits reduce more than the monetary aggregate.

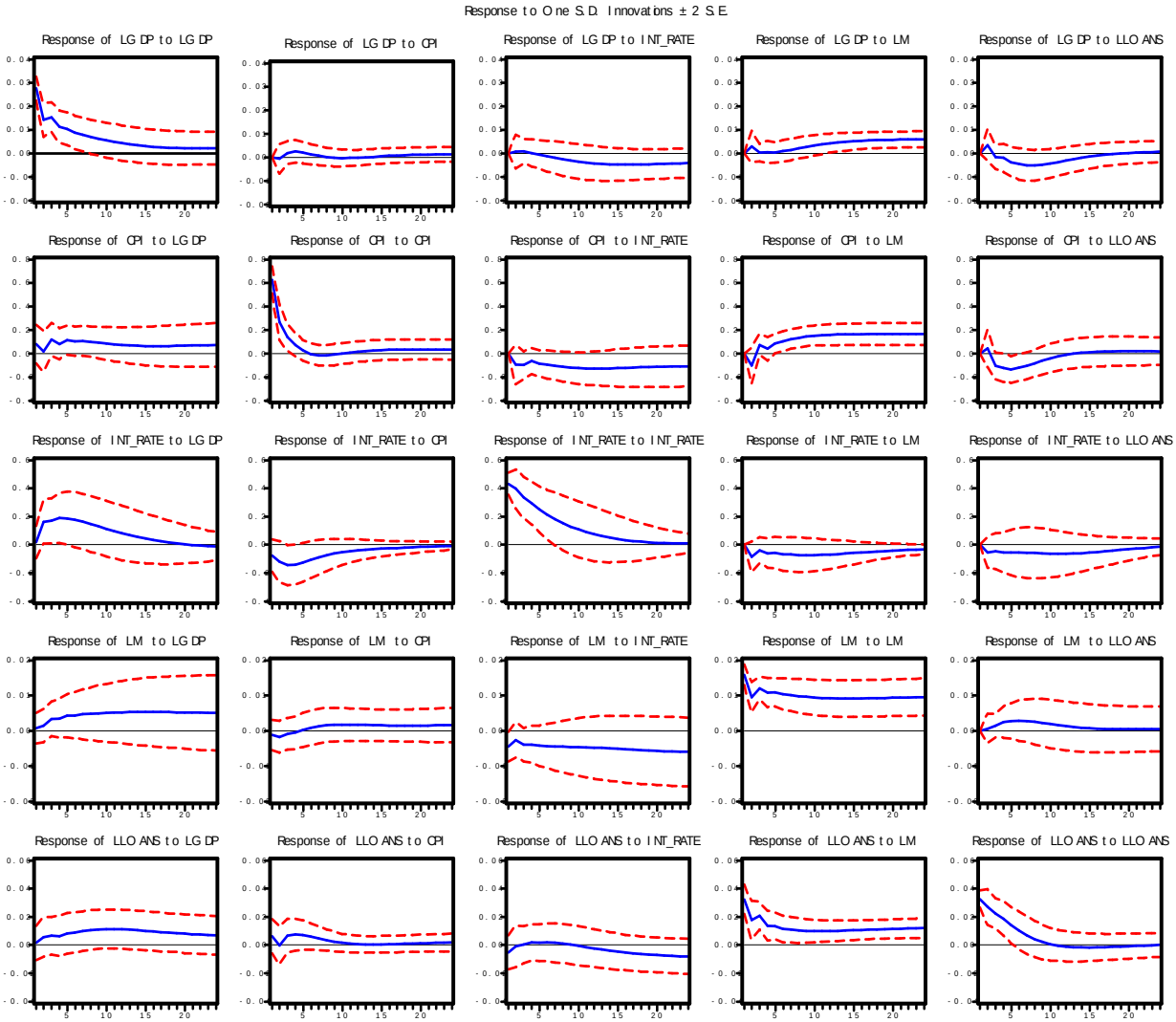
(ii) The evolution of output coincides more with the bank credits response than with the money in medium term.

With respect to the first point, just after a monetary contraction, banks cut back more their deposits than their credits due to the contractual duties between banks and consumers and companies, which can not be altered in short term. Looking at the fourth and fifth cells in the third column, the monetary aggregate drops immediately, while the bank loans do not react until one year. This fact can be justified in two ways: (a) because the fall in the credits is in synchrony with that one in output, we can consider that the diminishing in credits is explained through the decrease in firms demands – the negative monetary *shock* decreases the company sales and his financial banking funds –; therefore this fact is consistent with *the money channel*; (b) because banks can find it very difficult to obtain other types of funds with not reserves requirements after a deposit contraction, they have to reduce their credit supply to compensate such reduction in their reserves, being consistent with the existence of *the bank credit channel*.

With respect to the second evidence, comparing the output, money and loans responses to an increase in interest rate (the first, fourth and fifth cells in the third column), the evolution of output corresponds with that one of the credits, although the fall is more intense in the production. This result can be justified through the role played by the bank credits as

amplifiers of the effects produced by the *shocks* in the interest rate. This evidence is in favour of *the bank credit channel*. This evidence agrees with those presenting by Boughrara (2009b)

Figure 1. Impulse-Responses Function.



Other way to synthesise the principal channel of influences of the monetary policy is to compute which proportion of the variance of each variables is due to disturbances within the rest of the system variables. A variable that is strictly exogenous should have 1.00 in its column and zeros in the rest of the cells. The exogeneity of a variable is equivalent to the condition that their own innovations explain their variance.

Table 9 reproduces the variance proportions of the errors of prediction of each variable due to each of one of the system disturbances during 24 periods.

The disturbances in the interest rates have more prediction value on the credits variance than on the money after the first 4 quarters, consistent with the first evidence of the *bank credit channel* points out by Bernanke and Blinder (1992).

The variation in the production is explained, mainly, for their own innovations and for credits disturbances in the short term – until the second quarter –; only after the third quarter, the interest rate and money innovations contribute to output responses, but being lower to the predictive capacity of the credits.

With respect to the prices, they respond to own innovations and output disturbances in short term; but after 6 months the percentage of prices variance due to interest rate, money and loans increase, emphasising the credits role in the second year, which are the main source of prices fluctuations.

Finally, as the innovations in the output are the principal source of variations for the credits and the *shocks* in the interest rate are null in the first year, we can conclude that there is more evidence of *the money channel* in short term, since an increase in the interest rate would reduce the output and, in consequence, the demand for bank credits. Nevertheless, in the medium term, the loans respond more to interest rate and monetary aggregate innovations, in other words, a monetary contraction that decreases reserves will lead banks to cut back on loan supply, consistent with the *bank credit view*.

As conclusion, these evidences support the operative of both, the *money* and *credit channels*, being more relevant the *money channel* in the short term and the *bank credit channel* after one year. This result coincides with whose analysed in the above section: the effectiveness of the monetary policy in Morocco is high because the output and prices reactions to monetary shocks are amplified due to the bank credit role in the transmission of the monetary impulses.

Table 9. Forecast Error Variance Decomposition of the VAR(2).

Forecast error	Forecast horizon	Proportions of forecast error variance *h* periods ahead by innovations in				
in	*h*	LGDP	CPI	INT_Rate	LM	LLOANS
LGDP	1	100,00	0,00	0,00	0,00	0,00
	3	89,02	0,00	0,00	0,00	10,98
	6	68,53	7,25	0,00	0,00	24,22
	9	48,85	0,00	6,28	7,48	37,39
	12	36,19	0,00	13,93	14,71	35,17
	18	22,61	0,00	24,95	29,62	22,82
	24	41,42	0,00	7,15	10,03	41,40
CPI	1	14,56	85,44	0,00	0,00	0,00
	3	18,02	41,38	15,81	13,69	11,10
	6	22,04	20,80	16,38	14,93	25,85
	9	36,36	21,83	34,19	3,97	3,65
	12	5,83	28,51	7,27	9,42	48,97
	18	6,23	24,62	10,68	16,08	42,39
	24	6,67	21,72	12,45	21,20	37,96
INT_Rate	1	0,00	23,58	76,42	0,00	0,00
	3	36,60	27,20	30,24	5,96	0,00
	6	7,75	43,44	31,96	9,96	6,90
	9	8,58	40,54	27,80	13,69	9,39
	12	8,43	37,32	25,03	17,02	12,21
	18	7,72	33,93	22,17	20,53	15,66
	24	7,42	32,86	21,32	22,20	16,20
LM	1	0,00	0,00	44,56	55,44	0,00
	3	13,60	0,00	40,56	45,84	0,00
	6	24,01	0,00	35,73	31,10	9,15
	9	43,70	0,00	5,11	36,79	14,40
	12	8,32	8,68	8,66	54,03	20,33
	18	10,68	10,32	10,67	52,84	15,48
	24	11,70	11,09	12,59	52,34	12,29
LLOANS	1	0,00	14,10	9,46	37,85	38,58
	3	13,55	14,31	0,00	31,61	40,54
	6	25,75	22,04	0,00	22,81	29,40
	9	41,58	18,54	0,00	18,48	21,40
	12	10,09	27,83	0,00	30,41	31,67
	18	12,08	20,96	15,35	27,90	23,71
	24	10,84	16,21	30,36	25,16	17,43

5- CONCLUSIONS.

This paper has focused on the importance of the different financial structures in the transmission of monetary impulses – through the different level of effectiveness of bank credit channel – as a possible justification of the strength of monetary policy, since if this channel exists then effects on output will be greater than those only due to changes in interest rates.

The characteristics of the financial systems, that are relevant in order to determine the fulfilment of the two conditions necessary for the bank credit channel to exist have been analysed: 1) the economic agents who depend on the banks for financing can not access other sources of finance, and 2) the banks do not have another source to attract funds that are a perfect substitute for deposits. The characteristics looked at were the composition of the debts of non-financial enterprises and households, the importance of non-banking intermediaries, the structure of the banks' balance sheet, the size and bank concentration, and the banks' solvency. The conclusion that has been drawn, along with the evidence of the Moroccan financial system, is a high grade of effectiveness of credit channel and, therefore, the strength of monetary policy.

To corroborate this conclusion, an estimation has been made of the reaction of output, prices and bank credit after an increase in official interest rates, using the VAR methodology and it has been found that: i) in the short term, the monetary aggregate responds faster than the bank credits to *shocks* in the interest rate, but after one or two years, the bank credits reduce more than the monetary aggregate; ii) the evolution of output coincides more with the bank credits response than with the money in medium term.

This result points up the role played by the bank credits as amplifiers of the effects produced by the *shocks* in the interest rate. This evidence is in favour of *the bank credit channel*.

However, future investigation should use disaggregate data from the Moroccan banking system, in order to determine the role of banks in the transmission of monetary policy, and therefore, to measure more precise the magnitude of the bank lending channel in Morocco.

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