Systemic liquidity risk index for Moroccan banking sector

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Abstract

In this paper a new measure of the banking liquidity based on the liquid assets. On the basis of balance-sheet of the banks of the sample, we could detect the cycles of liquidity which characterize the Moroccan banking system and this between 2001 and 2010. The various results obtained made it possible to detect two cycles of liquidity, the first indicating one period of over liquidity, characterized by an abundance of the cushions of liquidities, the other testifying to a contraction in the mattress of liquidity of the banking system. While falling under a prudential macro approach, we were interested in the relation being able to link, the development of the liquidity and the various fluctuations of the macroeconomic framework. For this purpose, we identified several macroeconomic variables likely to influence the development of the banking liquidity, in particular, the economic growth, credit growth, exchange reserve, interbank interest rates, and return of stock market of Casablanca.

Keywords: systemic risk, macro prudential approach and liquidity risk.

JEL classification: C51, D58, E32.

Introduction

This paper is interested in the risk of liquidity in the financial system and particularly in the banking system. The crisis of Subprime showed that the problems of liquidity can lead to crises of systemic nature, able to involve banking panics and a stop of the transactions in the various compartments of the markets of capital. One followed rigorous of the development of the liquidity is essential from now on like a need with a view ensure the financial stability of the banking system.

In addition, the authorities with charge of financial stability obtained preventive tools aiming at preserving the continuity of the activities of intermediation. In fact, to thwart the probability of being in situation of illiquidity, the central banks and the authorities of supervision imposed on the banks the behavior of a reserve requirement in the form of depositions near the banks power station, a working capital ratio to be adhered to (new ratios of Basle II), a regular examination of the treasury liabilities and assets of the banks by maturity, the incentive of the banks to hold assets of quality like collateral and the introduction of a guarantee of the depositions to insure itself against banking panics.

Beyond these deployed preventive tools, which fall under a micro prudential approach, the macro prudential approach, makes it possible, in addition, to visualize the relation between the liquidity of the banking system (the level of the risk of liquidity) and the development of the macroeconomic framework and that of the systemic risk. Indeed, an individual problem of liquidity can be easily translated into systemic crisis with through the traditional channels of contagion. From this point of view, the risk of liquidity have the private interest because it most likely to be translated into systemic risk because of its implications and its negative externalities on the financial markets and especially on the interbank market (see Crockett, 1997 and Davis, 1999).

Admittedly, the risk of liquidity was marginally discussed at the level academic and empirical, however, the current evolutions adapt on the fact that this risk is also important on the level of the financial system as well as other typologies of risk. We can advance a central argument in favor of this negligence relating to the theoretical conviction according to which the prudential mechanisms microphone were considered satisfactory to reduce the probability of materialization of the risk of liquidity and this conviction emanates indeed from the theoretical corpus which dominated and which inspired of work of Diamond and Dibvig (1983).

In this direction, this work puts forward a measure of the banking liquidity based exclusively on the assets of the banks (cushions of liquidity) and making it possible to measure thereafter the systemic risk of liquidity in Morocco. The approach adopted in this paper is based on balance sheet, in the direction where it is interested only in the liquid assets held by the Moroccan banks. For this purpose, we limit ourselves to the risk of liquidity of refinancing to approach the systemic risk of liquidity of the Moroccan banking system.

The rest of this paper is structured as follows: in the first two sections we define the notion of the liquidity risk as well as the relation between these various forms. Thereafter, an analysis of the stylized facts of the banking system will be forwarded. Lastly, a presentation of the measure of the liquidity of the banking system and its relationship to the fluctuations of the macroeconomic framework is considered.

1 – Liquidity, risk of liquidity and systemic problem

The economic literature distinguishes several forms from liquidity available to the various actors of the financial system. In fact, one can quote the liquidity of the banking system, the

liquidity of the central bank and the liquidity of the market. The various forms, the liquidity thus accepts several definitions.

It acts in particular for the central bank, to be in the capacity to provide liquidity to the financial system and the whole of the economy. Remaining thus the force of the monetary authorities, to control interbank interest rate, it thus allows the transmission of the monetary policy the whole of the economic actors.

In the banking system, it is associated with the capacity of refinancing of the banks (liquidity of financing), and with the possibility of honoring their commitments in the fallen due term. The IMF in the G.F.S.R[1]. (2008) consider that it is closely related to the capacity of an institution to carry out the payments agreed upon in advance and in good time. The BIS (2008), as for it, stipulates that the banks which are able to honor their passive or to arrange their positions at the time of current liability of the debts are liquid banks. Brunnemeier and Pedersen (2007) advance that an institution is liquid as long as it remains able to raise funds on the financial markets.

The analysis of the liquidity of financing of the banks is thus correlated with the evaluation of the funding sources available to the banking system, in particular, the depositions of the customers, the markets of capital (gone of the assets and interbank market) and the market of the central bank. Generally, the finance companies choose the stable resources (for example, depositions of the customers), with a view maintain long-term their financial stability, while remaining, in parallel, exposed at the risk of transformation and banking panic (Diamond and Dibvig, 1983). Indeed, the dominating share of these financings is in the short term and are intended to finance investments of long life, the exhibitor thus at the risk of liquidity, in the event of an urgent request[2] of deposits[3].

For this purpose, the risk of liquidity of financing is thus an endogenous risk with the banking system, since it emanates from the traditional activities of transformation of the due dates. According to the IMF (2008) it is apprehended as being the incapacity of the financial intermediaries to be used their commitments for the moment of their current liabilities. This incapacity results either from an impossibility of raising funds on the financial markets or of an incapacity to liquidate assets at the convenient period. Drahmann and al. (2009) adopt a similar definition while introducing a temporal constraint. For the two authors, a financial institution is liquid so at each week it is able to honor the unit with its commitments. The BIS (2008), as for it, considers that the risk of liquidity is relating to the respect of the obligations and the due dates at a reasonable cost.

The advent of a problem on the level of the liquidity of financing of an individual bank, can easily gain a systemic dimension, by affecting the liquidity of the market. We saw, before, that the structure of financing of the banks is based, inter alia, on the sources emanating of the markets of capital, like alternative to the depositions of the customers. This contributes to strengthen the links between the risk of liquidity of financing and the risk of liquidity of the market[4] who can interact simultaneously, in situation of instability, by affecting the various components of the financial system (contagion negotiable instrument). Indeed, in situations of financial instability, rather than to ensure a redistribution of the liquidity, the banks and the

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[1] Global Financial Stability Report.
[2] The countries which have the guarantee funds of the depositions are exposed to this type of risk.
[3] Several reasons can lead to banking races, in particular; the loss of confidence, the deterioration of the quality of the banking assets and the failure of a systemic bank.
[4] The market risk liquidity can be apprehended as being the incapacity to discuss or swap quickly assets at a competitive price (kliopatra, 2009). This risk is of systemic nature since it affects the whole of the economic agents present on the market. In addition, according to the modern financial theory, it can be approximate via the concept of allowance for risk (Spread). So that the market is preserved against this type of risk it must be, initially, narrow, in the direction or the difference between the selling prices and of purchase is tiny. Then, deep, insofar as a big number of transactions does not impact effective manner the price. Lastly, cancel, which makes it possible a market to maintain its stability after shock.

financial markets, the transmission of the crisis and the propagation of uncertainties as for the future prospects facilitate, via in particular the channel of the balance-sheets and off-balance-sheets of the banks. Being in the obligation to maintain their liquidities of financing, the financial institutions are forced, sometimes, to sale no liquid assets[5] in the short run to satisfy the needs for the depositors or the shareholders, thus leading to a general fall of the assets prices and a rupture in the combined interbank operations of a generalized loss of confidence (Flannery, 1996). This sequence accelerates even more when the valuation of assets and of passive banking is done with the fair amount and when one is in the presence of activities of securitization exposing even more the banks to the fluctuations of the markets of the capital (Adrian and Shin (2008)).

2 – Literature review

The risk of liquidity is due, in fact, with the bad coordination between the depositors, the banks and the actors of the financial markets. This defect of collaboration is stimulated on the one hand by the incomplete credit markets and assets and on the other hand by informational asymmetry reigning around the quality of the banking assets. While utilizing several components of the financial system, the risk of liquidity remains difficult to evaluate at the systemic level. In addition, work which is referred to it seems limited compared to those being interested in the systemic risks of credit and interest rate. Indeed, the majority, of this work were elaborate after the crisis of Subprime, where the liquidity became a major concern for the whole of the economic actors. In the same way, the lines of thinking discussing of the question are varied and are interested in several components of the liquidity. Among this work there are those which were devoted to the study of action leverage, by analyzing the capital structure of the banks and the choice between the debts and the financing by equities and quasi equities. In addition, others were directed towards an analysis of the behaviors of the banks within the interbank markets, their strategies of hoarding and the problems of informational asymmetry. Recent work initially privileged the analysis of the relation between the liquidity of financing and that of the market, then, the installation of macroeconomic models with microeconomic bases with a view evaluate the reactions of the banks as for the endogenous and exogenous shocks and finally, the modeling of the negotiable instruments of contagion between the banks and with the financial markets (Network model).

Adrian and Al (2008), affirm that the banks answer actively any development of the assets prices on the financial market and this in the objective to stabilize their financial lever while remaining aligned with the financial regulations in force. This attitude involves an exhibition raised to the risk of liquidity of financing and market, since the liquid assets remain connected to the fluctuations of the financial markets. Kobayashi and Al (2008) analyze crisis situations of liquidity in the markets and confirm that the banks in excess of liquidity often choose a rationing of the credit within the interbank market by fear of being affected by the negative externalities of the other banks. While choosing to ration the liquidity on the market, they transform the not liquid banks into insolvent banks[6] causing thereafter successive failures of the banks.

In parallel, Eisnshchmidt and Al (2009) and Acharya and Al (2008) advance that the banks which are likely to carry out this type of strategy, carry out it for two reasons, on the one hand uncertainty as for the future trends of the market and on the other hand because of the

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[5] The banks often choose to invest their resources in risky assets and with long maturity. This is explained primarily by the search for more important remuneration. The assets at the risk and of which the duration is important get of important returns on investment and make it possible the banks to honor their depositor and their shareholders.

[6] One should not confuse the concept of insolvency and not liquidity. A bank can be not liquid but always solvent. For the central banks this distinction is paramount, since the injections of liquidity at the time them financial crises must make some profit the insolvent banks not liquid and not banks. To generally distinguish between the two situations one has recourse to the nature of the assets held by the banks. Those which hold assets with higher quality are regarded as not liquid while those which have rotted assets are regarded as insolvent.

continuous depreciation of the value of the held guarantees. Brunnermeir and Al (2009) while being interested in the relations between the liquidity of the banks and that of the markets manage to confirm that at the time of crisis or financial tensions burning the links between the liquidity of financing and the liquidity of the market are strengthened to form a spiral of liquidity and a movement of contagion. Heider and Al (2009) by analyzing the reasons of the collapse of the interbank market confirm that the credit risk is the leading cause. In their models, the rise of the credit risk and counterpart leads to an overvaluation of interest rates in the money markets, combined with an informational asymmetry as for the quality of the assets, it generates an adverse selection which involves a collapse of the market.

Goodhart and Al (2006) on the basis of model with microeconomic bases manage to reproduce the endogenous reactions of the banks. In this type of model, the liquidity of the banks, in fact, is approximated by the offer of credit. Aikman and Al (2009) sometimes happen at set up a model of risk of liquidity of financing on the basis of Probit model with a view to quantify the relation between the notation of an institution and its level of liquidity and solvency. This made it possible to extract the capacity from the institutions of intermediation to raising funds on the markets and to preserve their quality of loan. The work of Drahmann and Al (2009) forwards a simple and intuitive measure, risk of liquidity of financing based on the data of the operations open market. The method chosen by the authors consists of the calculation of a Proxy aggregate of the liquidity, on the basis of interest rate offered on the money market and the volume of liquidity allotted by the central bank.

Van den hand (2008) and De Simone and Al (2010), forward a model taking account of the feed-back effects on the assets prices following the decisions taken by the banks after exogenous shocks. The impact on the risk of liquidity is carried out by Monte Carlo simulations making it possible to generate distributions of liquidity and probabilities of shortage of liquidity for each scenarii thus considered. Van den hand and Al (2009) in a more recent work manages to work out a prudential macro index confirming the cyclic reactions pro of the banks lasting the crisis of 2008. In addition, their individual behaviors contributed to vulnerability more the financial system. Valla and Al (2008 and 2006) work out a measure of liquidity of the banking system based on the assets of the banks, which makes it possible to trace the expansions and the contractions of them. Using an aggregative index, extracted work on the job market, they manage to evaluate the financial stability of the French banking system.

3 – Stylized fact of Moroccan banking system

Several macroeconomic aggregates confirm the contraction of the banking liquidity and the increase in the risk of liquidity in the Moroccan banking system. Before the development of a measure making it possible to quantify this official report, it is convenient to forward some stylized facts of the banking system, in particular, the development of the ratio of transformation of the depositions, the funding sources of the banks, the injections of liquidity of the central bank and the development of interbank interest rate.

The tensions recorded on the level of the liquidity of the Moroccan banking system are closely related to the structure of financing of the banks of the place. Indeed, the level reached by the depositions of the customers and the appropriations with the economy, testify to a need for liquidity. Thus, the ratio of transformation of the depositions with exceeded, for the first time, the 100% during 2010 and this because, mainly, of the contraction of the appropriations to the economy and the depositions as well as the growth of the fiduciary currency (graphic 1).
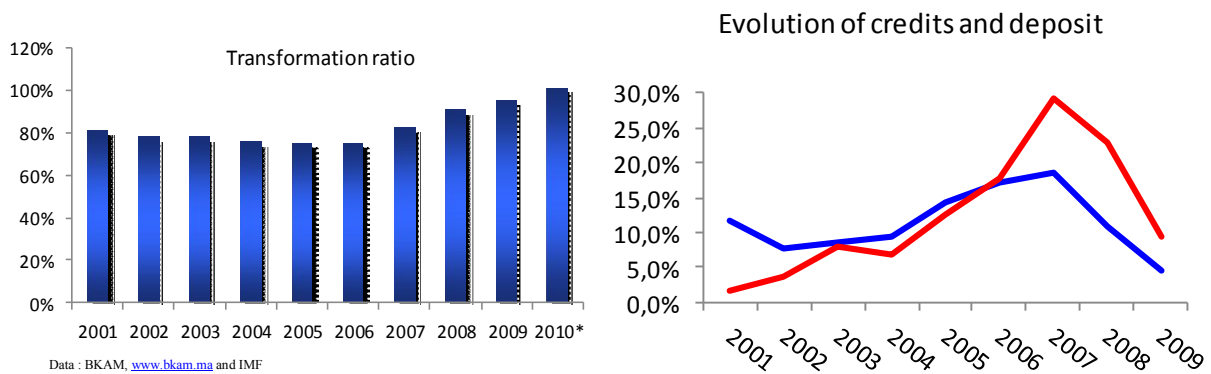
Figure 1: evolution of transformation ratio and credits versus deposits

All in all, the financial structure of banking dominated by the depositions of the customers, which were monopolized more than 72% of the liabilities of the banking system in 2009, this preponderance can be explained primarily by the sustained high growth of incur appropriations, as well as confidence in the solidity of the Moroccan banking system, enabling him to enjoy a stability of the resources. However, this concentration of the resources around the caused depositions of concern as for the regular confrontation of the banks to the risk of liquidity. In parallel, the funding sources alternative and emanating from the market of the assets remain very weak and their shares are neighborly the 2.5%. However, the recourse to the interbank market remains constant, since more than 7% of the funding sources come from it (see graphic 2).
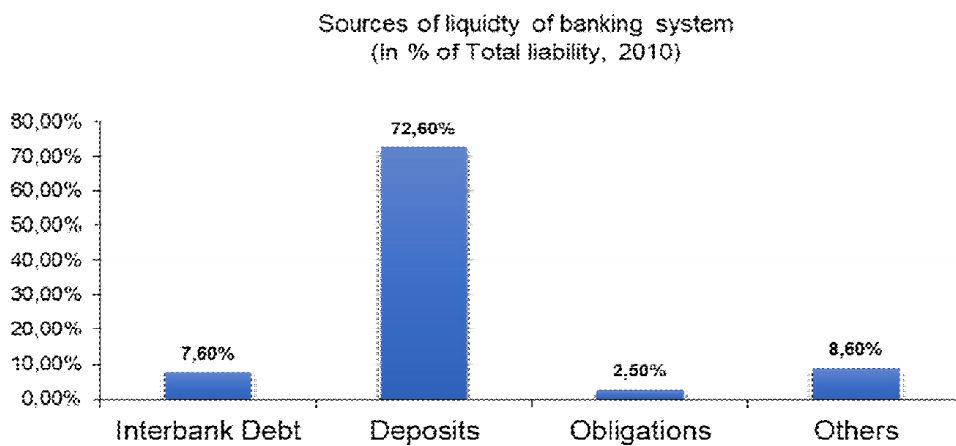

Figure 2: Sources of liquidity

These various sources of liquidity, contribute to the financing of the banking assets and primarily the appropriations to the economy. The uses of the banks, indeed, consist of two types of assets: not liquid assets which cannot be swapped quickly of the currency against, such as the appropriations granted the customers, and of the liquid and exchangeable assets with very short term. The choice between these two types of investment passes by an arbitration between the liquidity and profitability. Indeed, the financing of the investment counts on an important future profitability and is in strong correlation with the economic growth and this to the detriment of the liquidity. In fact, each increase in investments results

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in a significant decrease of the banking liquidity, since the banks reduce their mattresses of liquid assets to satisfy the additional requests for appropriations. However, to preserve a minimal level of liquidity, the banks in their risk management of liquidity, are held to place a fraction of their funds in liquid assets, even with poor yield, to satisfy, where necessary the depositors whose movement of the withdrawals is random.

The liquid assets thus remain the mattress of liquidity available to the banks with very short term to face the fallen due commitments in the term. On the level of the Moroccan banking system these assets are; bonds of transaction, placement, of investment, operations with the central bank and other banks, operations of pension and commitments of financing Nets. Indeed, the investments in bond of transaction, placement and investment were neighborly 3,4 and 6% of the active total respectively. Moreover, the cash transactions and with the central bank thus the other financial institutions exceeded the 16% of the active total during the second quarters of 2010. In addition, the activities of pension recorded an important rise by posting a rate of 10% of the active total, testifying to the rise of the activities on the interbank market.

The growth of the liquid assets makes it possible, if necessary, to confirm the increasing liquidity in the banking system and its capacity to thwart the requests for liquidity which are addressed to him. While a contraction of these assets testifies to an intense need for liquidity which must be filled by other resources such as the recourse to the central bank and the interbank market. To tell the truth, the current location records a rise in the injections of liquidity on behalf of the central bank, indicating a contraction of the liquidity, this in is confirmed more by the developments of interbank interest rate. Indeed, each increase in advanced central bank coincides with a rise of interbank interest rate. This can be explained by an intense need for liquidity on the interbank market or by a lack of confidence expressed by the rise of the TMP.
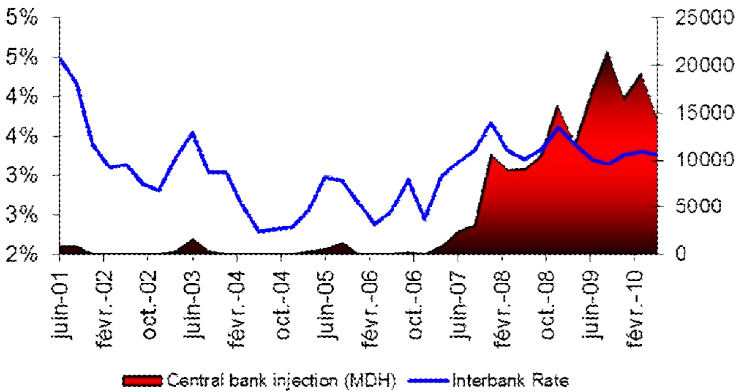

Figure 3: injection of central bank and evolution of funding cost

In parallel, the indicator of the liquidity of the banking system[7] used by the authorities of supervision a fall during the period 2007-2009 reflects well, making it possible to corroborate the retreat of the banking liquidity. After having reached thresholds of 130% in 2006, the relationship between the liquid assets and liabilities contracted to stabilize itself on a level of 107% in 2009 (see the report on banking system www.bkam.ma).

For evaluate the liquidity of the Moroccan banks, we planned to work out a measure of the liquidity of the banking system and this while taking as a starting point the work by Valla and

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[7] For details of this approach to see the circular of BAM N°31-G-2006

Al (2008 and 2006) and those of Haubrich and Al (2000). This step fall under a prudential macro approach, allowing to quantify the development of the liquidity of the banking system and to connect the cycles of banking liquidity to the macroeconomic developments. It is based on the liquid assets and makes it possible to evaluate the contractions (risk) of liquidity and the situations of over liquidity.

5 – Liquidity of the Moroccan banking system

In a prospect for evaluation of the liquidity of the banking system and level of the systemic risk of liquidity, we based ourselves on the liquid assets held by eight Moroccan banks, which are monopolized more than 90% of the market. These assets are: bonds of transaction, placement, of investment, commitments of financing Nets (difference between commitments given and receipts), securities received in pension and operations with the central bank and interbank. It should be noted that the taking into account of the bonds of investment in the liquid securities is argued by the fact that they are with high quality and that they are in majority made up of liquid obligations.

Our step is structured in two stages:

- Firstly, the calculation of the balanced rates of variation of the liquid assets held by the banks of the sample in quarterly frequency;

- Secondly, development of three measure of the liquidity: one recalling the growth of the liquidity, the other it's contractions and last its overall or clear development.

The growth rate of the liquidity by bank is calculated on the basis of following relation:

$$C_{l(i,t)} = \frac{\Delta l_{i,t}}{\frac{(l_{i,t-1} + l_{i,t})}{2}}$$

With;

$l_{i,t}$: Value of liquid Assets of bank i at the moment t;

$\Delta l_{i,t}$: Growth of the liquid assets of bank i between two periods (T and T-1);

$C_{l(i,t)}$: Growth rate of the liquid assets of bank i at the moment T.

This growth rate of the liquid assets can be either negative or positive. Of a positive value, it indicates, in fact, a growth in liquidated banks combined of an increase in assets value liquids and operations of catches of pension. However, a negative value describes a situation of contraction of the banking liquidity, resulting from a fall of the value of assets on the market, or a rupture of the operations of pension.

With growth rate we chose to dissociate negative positive developments and this with the purpose of recalling the cycles of growth and contraction of the liquidity in the Moroccan banking system:

We note that:

$$C_{lt}^{\,n} = \sum_{i/c_{it} \geq 0}^{N} |C_{i,t}| \left(\frac{\frac{(l_{i,t-1} + l_{i,t})}{2}}{\sum_{i=1}^{N} l_{i,t-1}} \right) \qquad C_{lt}^{\,p} = \sum_{i/c_{it} \geq 0}^{N} C_{i,t} \left(\frac{\frac{(l_{i,t-1} + l_{i,t})}{2}}{\sum_{i=1}^{N} l_{i,t-1}} \right)$$

C_{lt}^{p} : Positive development of the liquidity of the banking system;

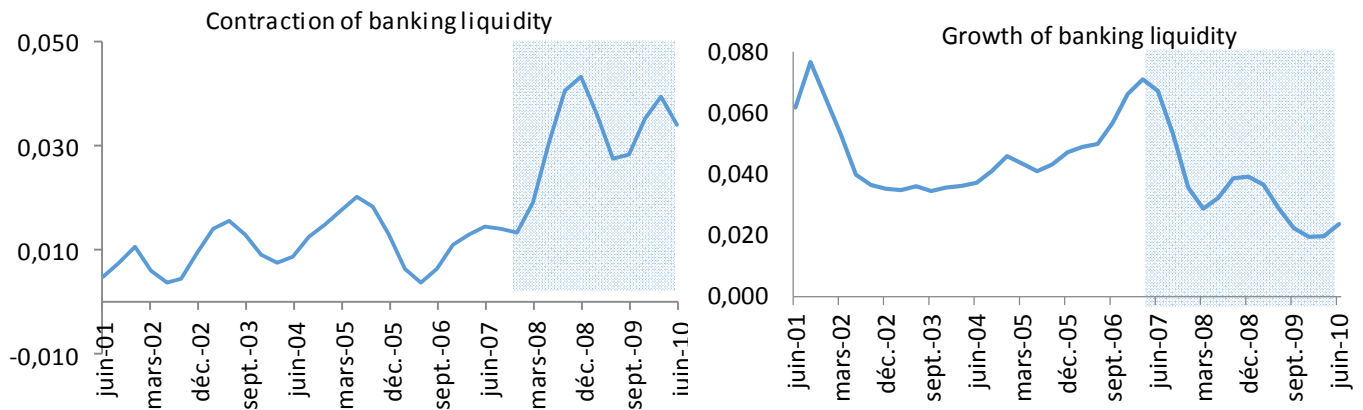C_{lt}^{n} : Negative development of the liquidity of the banking system.

Figure 4: cycles of liquidity

The results of calculations of the two indicators were convincing and made it possible to emphasize two phases of liquidity in the Moroccan banking system. First is characterized by a over liquidity where the positive growth of the liquidity oscillates around a rate from 4 to 6% per quarter. However and starting from 2007 this growth rates started to contract to reach for the first time a level of 2%. The same tendencies were noted on the level of the second indicator of the contractions of liquidity, which recorded on average a negative rate of 1.5%, until the beginning of 2007, where one recorded an expansion of the losses which led this rate to an extreme level to reach 5% of negative growth in quarterly frequency.

Beyond the cyclic analysis that they allow, these two indicators of the liquidity of the banking system also make it possible to build a dynamic measure of the clear liquidity of the Moroccan banking system, which one definite as follows:

$$L_{B} = \left[C_{lt}^{P} - C_{lt}^{n} \right]$$

With;

L_{B} : Liquidity of banking system

Measuring the difference between positive developments and negative of the banking liquidity, this measure amongst other things makes it possible to visualize the state of the liquidity of the Moroccan banking system and to make the follow-up of it. The liquidity increased in a positive way between 2001 and at the beginning of 2006, with variable growth rates between 3 and 7%, however, it changed and the growth of the liquidity records from now on negative rates putting the banking system in situation of need for liquidity. Indeed, during the three last years, she testifies to a real contraction following the draining of liquidity which appeared on the level of the banks.
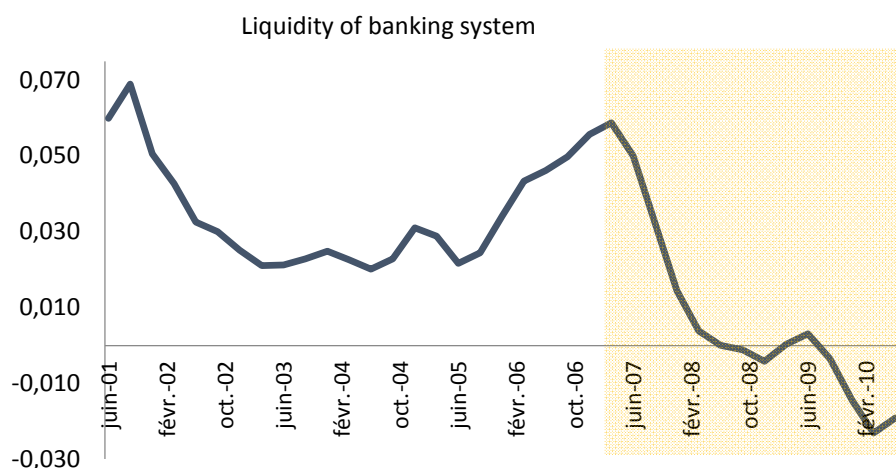
Figure 5: liquidity index

6 – Banking liquidity and macroeconomic development

The liquid assets held by the banks are regarded as being availabilities at the disposal of the banks intended to satisfy the needs for the depositors and backers and to preserve the banks against movements of panic. These cushions of liquidities depend primarily on the banking behaviors and their risk aversion. Indeed, the financial institutions can carry out procyclic strategies, while choosing to reduce their mattress of liquidity when the business cycle is bull and it to support even more the economic growth and to be able released more profitability. However, they can also consider contra-cyclical behaviors while trying to preserve liquidity in phases of growth and this with the purpose of thwarting the perverse effects of a future contraction.

From this point of view, the liquidity held by the banks is according to macroeconomic variables characterizing the business cycle to know; economic growth, the level of interest rates, strategies adopted by the central bank, growth of the appropriations and the rate of return of the financial assets. Aizenman and Al (2004) confirm that the accumulation of the liquidity of the banks at the time of the Asian crisis was initially due to the contractions affecting the offer of the credit. In fact, uncertainty surrounding the future trend of the economic conjuncture leads the banks to carry out strategies of rationing of appropriations with the purpose of preserving their liquidity. On the other hand, Driemeier (2000), considers that the detention of the liquid assets by the banks is in particular the result of a contraction of the loan application, which is itself in relation to the fall in overall demand accompanying a crisis. In the same way, Wyplosz (2005) argues that uncertainties as for the growth prospects encourage the banks to hold liquidity in an environment where the loans are sullied with inefficiency, even if interest rates in force record a fall. Work of Baltensperger (1980) on the liquidity of the banks confirms that there is a relation between the detention of the availabilities and the development of the economic growth and the level of the reserve requirements imposed by the central bank. In addition, work of Repullo (2003) and Ganzalez (2003) argue that the policy of the central bank as regards injection of the liquidity affects the strategies of detention of the banking liquidity. Almeida and Al (2004), as them, affirm that the level of the benefit released by the finance companies significantly impact the level of the liquidity which they hold. Lastly, other institutional factors, such as the structure of the interbank market contribute to the development of the liquidity of the banks. In fact, interbank

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markets under developed and less liquids can lead the finance companies to strategies of hoarding of liquidity, like answer to the obstacles surrounding the lifting of the funds on these markets.

Consequently, several macroeconomic aggregates can explain a priori the development of the liquidity of the banks. Indeed, we confronted four macroeconomic variables, with the development of the liquidity of the banking system and this by using our measure forwarded above, in particular the GDP growth, interbank interest rate, the rate of return of the Moroccan stock market and the growth of the appropriations to the economy. From this point of view, we were interested only in the positive growth of the liquidity and the overall liquidity of the banking system which indicates the development of the liquidity in an aggregate way. It should be noted, also that all the variables were corrected seasonal negotiable instruments.

The preliminary results obtained during the analysis of the relation between the liquidity of the Moroccan banking system and the macroeconomic framework confirm the existence of significant relations between the economic growth, the interbank rate, the growth of the appropriations and the level of rate of return on the financial market. The table below indicates the various correlations obtained after having tested the possible combinations.

	GDP		Credit growth	Interbank rate	Stock market index	
	Lag =3	Lag =0	Lag =4	Lag =4	Lag =3	Lag =2
Growth of bankig liquidity	0,32	-	-0,21	-0,49	0,51	-
Banking liquidity	-	0,19	-0,40	-0,35	-	0,43

The coefficients obtained indicate the existence of a positive correlation between the economic growth (GDP) and the detention of the liquid assets from the banking system. Indeed, an economic growth encourages the economic agents to strengthen their policies of depositions and also contributes to the growth of the appropriations making note the margins of interest of the banks which are inter alia the sources of the most important liquidities. This positive correlation indicates that the banks adopt contra-cyclical behaviors with respect to the economic growth. Indeed, they choose to strengthen their mattresses of liquidity during the rise of the business cycle and that of which the objective to guard themselves against a future economic contraction and also with a view bear fruit their availability in the short run.

The negative correlation thus noted with interbank interest rate confirms that in the event of rise of the liquidity, the rates on the interbank market tend to contract testifying to an increased abundance of the liquidity. All in all, interest rate is conversely related to the liquidity in the interbank market.

As for the growth of the appropriations to the economy, it is negatively related to the growth of the liquidity of the banking system. The banks are generally encouraged to hold liquidity to make demand side additional of the investors. However, an extension of the appropriations to the economy obliges the banks to continue to grant appropriations the economic agents, to ensure the durability of the cycle of the credit and to strengthen their market shares. In this respect, the banks, in situations of boom of appropriations, are encouraged to have cyclic strategies pro aiming to strengthen the cycle of the credit and to maintain it long-term. This results in a significant decrease of the banking liquidity.

Concerning the profitability of the stock market, it is positively related to the growth of the banking liquidity, since the detention of the liquid assets on the level of the banking balance-sheets contributes to strengthen the volume of the transactions on the stock market, especially

when the gone wallet of the banks is composed of quoted on the stock exchange assets. Otherwise, a market evolution stock-broker with the rise can encouraged, in parallel, the banks to drain part of their resources to the investments in the stock market and this from the point of view of profitability and short-term gain.

Growth off banking liquidity and
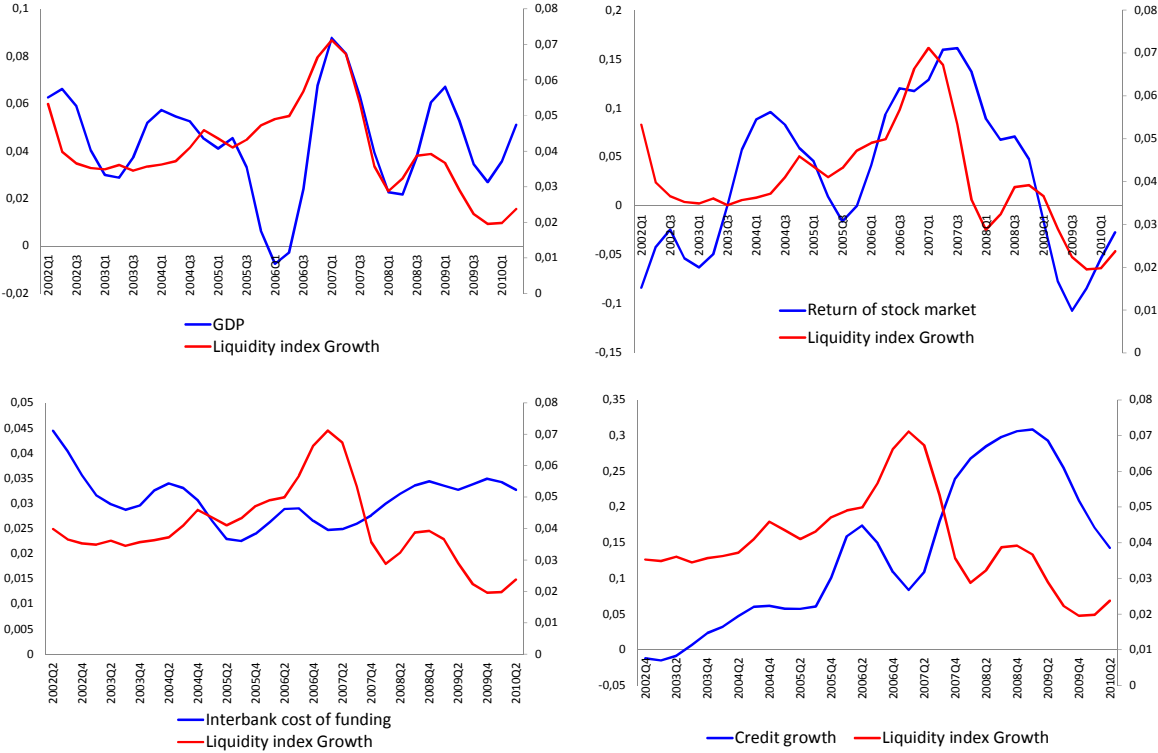macroeconomic aggregates

Figure 1: relation between liquidity index and macroeconomics variables

The various relations thus identified between the banking liquidity and the macroeconomic aggregates will make it possible to measure the interactions between the banking sphere and the development of the macroeconomic framework. In addition, the development of an econometric model linking the various variables will make it possible to design a tool able to quantify this relation.

A model VAR was developed to make it possible to affirm the negotiable instruments of the macroeconomic developments on the banking liquidity. In this direction, the VAR of reduced form was estimated on the various series. The variables which were considered are in growth rate and the unit tests of roots confirm that the whole of the variables are stationary (ADF-test (65.5)).

$$y_t = c + A_1 y_{t-1} + \dots A_p y_{t-p} + \varepsilon_t$$

With, y the variables, and A are the matrix of coefficients.

The number of delays stopped on the level of the model reduced VAR is of 1, because of the temporal weakness of the sample and also after validation with the criteria of information (Hannan and Al (27.87)). The test of stability of the model affirms that the various relations are constant in time.

Inverse Roots of AR Characteristic Polynomial
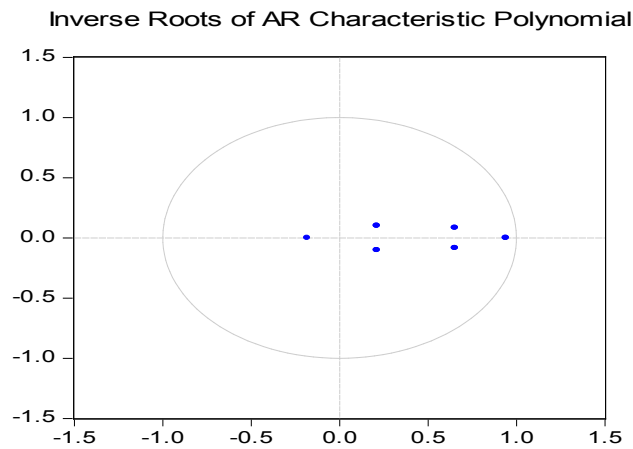
The impulse responses obtained using the small-scale model indicate relevant results. Indeed, a positive shock of the growth affects the level of the liquidity significantly. This can be easily explained by the fact why the creation of the added-value makes it possible to stimulate the appropriations and also to give place to new depositions. In addition, an increase in the price index of the assets (MASI index), results in a fall of the banking liquidity indicating a change of the nature of the financial intermediation, in this direction the economic agents use more the markets of capital to the detriment of the banking system.

On another register, the rise of the rate of inflation is related to a rise of the liquidity. Generally this is related to a phenomenon characterizing the savings in debt. In this respect a rise of the rate of the inflation is capable to stimulate the request of the credit while counting on an arbitration between the real rate and nominal rate.

As regards the interbank rate, a shock with the rise on this last implies a fall of the banking liquidities because of the rise in the cost of refinancing on the level of the interbank market. From this point of view, a rise in this cost makes it possible to restrict one of the fundamental sources of financing of the banks which is the money market.

Lastly, monetary reserves also have a negotiable instrument on the banking liquidity. Indeed, monetary reserves constitute a funding source of the banks what is generally translated by the level of the depositions and the transfers of Morrocan resident abroad. Thus, a rise of monetary reserves is suitable for affect the liquidity of the banking system positively.

Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of liquidity index to GDP

Response of liquidity index to stock market index

Response of liquidity index to inflation rate

Response of liquidity index to exchange reserve
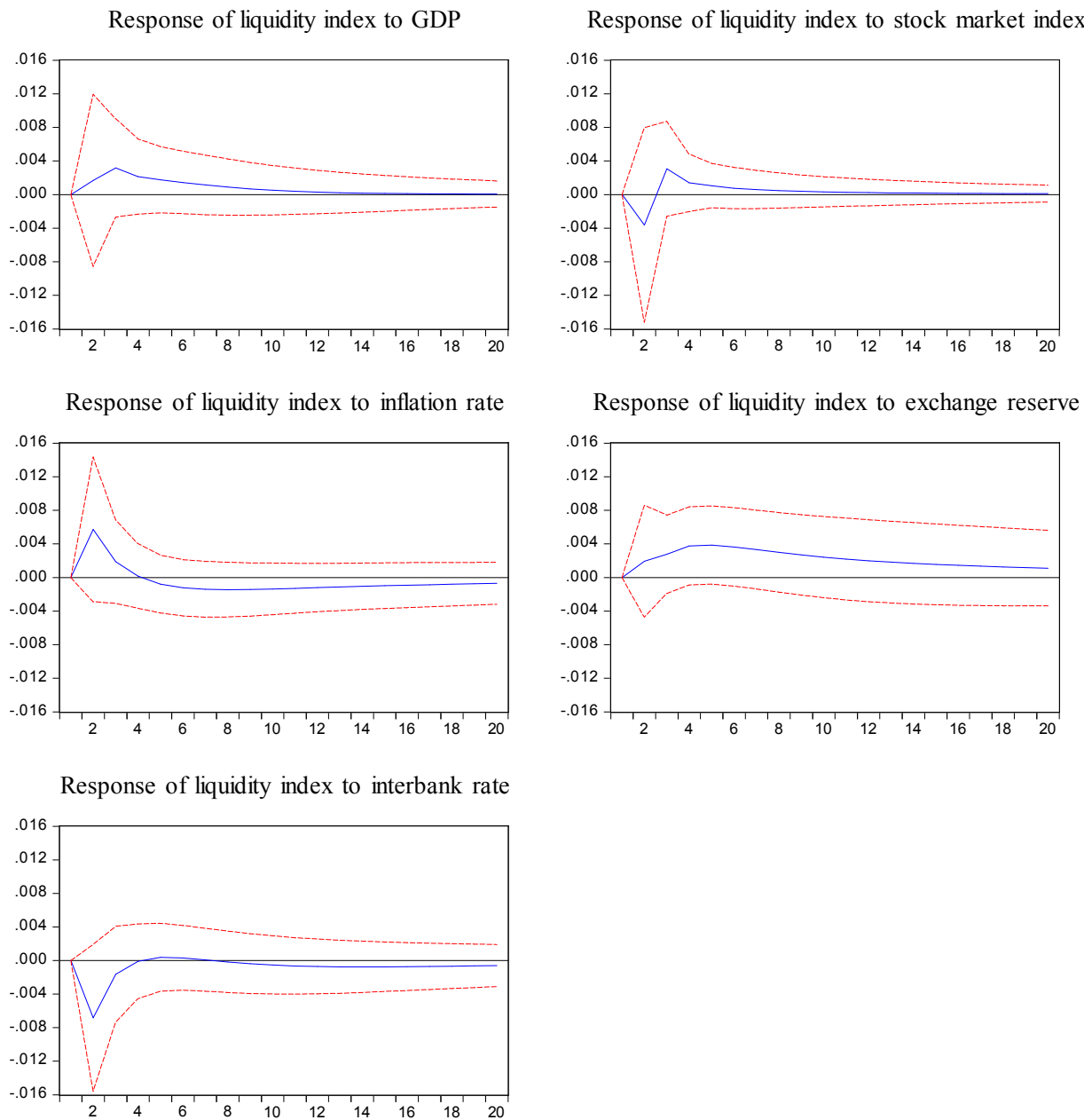
Response of liquidity index to interbank rate

Figure 1: impulsion responses (VAR model)

Conclusion

In this paper, we proposed an indicator of the liquidity of financing of the Moroccan banking system. This last makes it possible to follow continuously the risk of liquidity of the Moroccan banking system. Based on accounting data (extracted the summary statements of the banks Morrocan woman), it transcribes positive developments and negative banking liquidity. Two indicators were derived from this last to describe the cycles of liquidity on the level of Morocco.

Moreover this document proposed an econometric model making it possible to check the relation which can exist between the index of liquidity and the principal Moroccan macroeconomic aggregates. This model has to validate the fact that the liquidity is mainly

related to the economic growth, with the developments of monetary reserves, the rate of inflation, the growth rate of the bank credits and the interbank cost of refinancing.

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