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MONETARY TRANSMISSION MECHANISMS
IN MOROCCO AND TUNISIA

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Monetary Transmission Mechanisms in Morocco and Tunisia

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Abstract

Understanding the transmission mechanism of monetary policy, especially the time lag involved between a policy change and its impact on inflation and output, constitutes a prerequisite to the implementation of any sound monetary strategy. The uncertainties that might surround the transmission mechanisms weaken the effectiveness of the monetary policy. Despite its strategic importance, this issue has received very little interest in MENA countries in general and in Morocco and Tunisia in particular. This paper seeks to analyze, identify and compare the monetary transmission mechanisms through which the monetary policy shocks propagate in Morocco and Tunisia. The channels that have been considered in this study are the following: the exchange rate channel, the assets price channel, the traditional monetary channel, and the lending channel. The main empirical results of this paper are the following. First, neither the exchange rate channel nor the asset price channel is operative. Second, the lending channel is operative in Tunisia. More specifically, our results indicate that the lending channel is dominant in the sense that it is stronger than the traditional interest channel. Third, the lending channel is also operative in Morocco, but its effects are less pronounced than in Tunisia.

ملخص

يعد فهم آلية التحويل للسياسة النقدية، لا سيما السماح بمرور فترة زمنية بين إجراء تغيير السياسة وتقييم أثرها على التضخم والإنتاج، ضرورة لتنفيذ أي استراتيجية نقدية سليمة؛ حيث تضعف الشكوك التي قد تحوط آليات التحويل من فعالية السياسة النقدية. وعلى الرغم من الأهمية الاستراتيجية لهذا الموضوع فإنه لا يحظى إلا بأقل اهتمام من جانب دول منطقة الشرق الأوسط وشمال أفريقيا، لا سيما المغرب وتونس.

وتسعى هذه الورقة إلى تناول آليات التحويل النقدي بالتحليل والتحديد والمقارنة والتي من خلالها تنتشر هزات السياسة النقدية في المغرب وتونس.

وقد عالجت هذه الدراسة بعض القنوات هي: سعر الصرف و سعر الأصول والسياسة النقدية التقليدية والإقراض. كما خلصت من خلال نتائجها الخبروية إلى ما يلي: أولاً، يفتقر سعر الصرف وسعر الأصول إلى الفاعلية. ثانياً: تتمتع قناة الإقراض بالفاعلية في تونس. وبصورة أكثر تحديداً، تشير النتائج إلى أن قناة الإقراض لها السيادة أي أنها أشد تأثيراً من قناة الفائدة التقليدية. ثالثاً، قناة الإقراض فعالة في المغرب، ولكن أثارها أقل وضوحاً منها في تونس.

1. Introduction

There is by now a wide consensus among economists that monetary policy is neutral in the long run but it does affect real economic activity in the short run. These output effects have been shown to last, in some cases, for more than two years (Bernanke and Blinder, 1992). However, a considerable disagreement on how monetary policy is conveyed to the real economy exists. This is because not enough is known about the monetary transmission mechanisms (MTM), defined as the process by which changes in monetary policy decisions are transformed into changes in economic growth or inflation (Taylor, 1995). In most industrialized countries, central banks monetary policy is based on changes of the interest rates, and consequently monetary policy decisions are modeled as changes in the short-run interest rate by the central bank (Leeper, Sims, and Zha, 1996). These changes affect aggregate demand through large set of variables, including real cost of capital, credit availability exchange rate, income, wealth and monetary aggregates variables. These rather complex mechanisms operate through various channels and involve the behavior of all sectors of the economy. Understanding the transmission mechanism of monetary policy –especially the time lag involved between a policy change and its impact on inflation and output- is therefore crucial to the successful conduct of policy and constitutes a prerequisite to the implementation of monetary strategies (Romer and Romer, 1990), however, economists and central bankers have often claimed that among the serious obstacles they face when implementing their monetary policy is the uncertainty surrounding the transmission mechanism of the monetary policy. Such uncertainties weaken the effectiveness of the monetary policies and slow the credibility building process.

Despite its strategic importance, MTM, in MENA countries in general and in Morocco and Tunisia in particular, have received little interest. We still need to find out which channels are relevant and which is the most important one? Given the financial and monetary reforms the two countries have been implementing, the increase in trade and capital account liberalization, the volatility of capital inflows is likely to increase and the conduct of monetary policy is going to be more demanding in terms of knowledge about the MTM.

This paper aims to know more about Morocco's and Tunisia's MTM and ultimately to compare them. These two countries share many historical, cultural, political and economic similarities, without being identical. They are undertaking reforms of their financial sector as part of a broad macroeconomic adjustment program and structural reforms aiming mainly at liberalizing interest rates, improving banking supervision and introducing more market-based instruments of monetary policy. Their central banks¹ have been seeking to preserve their money value and to stabilize their exchange rates. Monetary policy is more price stability-oriented (Boughrara, 2001, 2002; Treichel, 1997), while the Moroccan monetary policy seems to favor more the exchange rate targeting (Tazi, 1999; Karam, 2001).

The remainder of the paper is organized as follows: section 2 gives the theoretical background of the transmission mechanism theory; the focus will be on the main channels. Section 3 provides a description of the data and discusses the monetary policy instrument; the econometric methodology is presented in section 4. Finally, section 5 summarizes the main findings, draws some policy implications and concluding remarks.

2. Channels of Monetary Transmission: Theoretical Background

There is a long list of comprehensive surveys of the monetary transmission process available in the literature. Mishkin (1996) is one of the main contributors. Four different channels are commonly considered.

¹ Central Bank of Tunisia (BCT) and Bank Al-Maghrib (BAM).

2.1. The Traditional Interest Rate Channel

More and more, monetary policy works through interest rates. A restrictive monetary policy is announced through an increase in interest rates, which in turn leads to a reduction in spending by interest sensitive sectors of the economy such as housing and consumer purchases of durable consumption. This is the so-called *interest rate channel or money view*. In this standard view of transmission mechanism there is nothing special about bank lending. The interest rate mechanism does not depend on what type of assets banks hold; the same reaction would happen regardless of the share of loans (or securities) held by banks (Bernanke & Blinder, 1988). The *interest rate channel* describes the effects of monetary policy on the attraction of investment and saving that prevail when financial markets are complete. Changes in monetary policy trigger changes in the cost of capital and yield on savings, which exert an influence on spending decisions and on demand for loans and other financial sources.

This class of models is characterized by the assumption that money and bonds are the only relevant financial assets. In sum, in this traditional money view, monetary policy works through income and substitution effects; the exchange rate provides additional leverage to the policy maker by strengthening the transmission on final demand. Bank loans supply has no special role; it is rather determined by demand and consequently tends to move with investment and output. In this case we can think of money causing both output and lending. For the interest rate channel to be effective, at least two conditions ought to be fulfilled. First, there are no perfect substitutes for base money such that the central bank can influence the development of the nominal money stock by increasing or decreasing the amount of base money. Second, the central bank is able to control not only the nominal short-term interest rate but also the real short-term interest rate. This latter condition can be considered as satisfied as long as prices do not react instantaneously when monetary policy actions are taken. Though all the theories of the MTM share the view that central banks can control money market real interest rates, there is less agreement on the process through which a change in the monetary policy stance affects households' and firms' behavior.

2.2. The Credit Channel

Monetary policy may constrain directly the ability of banks in making new loans, making therefore credit less available to borrowers that are more dependent on bank financing. This view states simply that restrictive monetary policy works not only through its impact on the demand for loans but also through the supply of loans. This is the so called credit channel or credit view. This idea dates back to the 1950s. The chief characteristic of this channel is that restrictive monetary policy could depress economic activity without large changes in interest rates. Such process takes place by reducing banks ability to supply loans, forcing businesses to cut back their spending. The *credit channel* emphasizes the importance of banks in propagating monetary policy impulses. Unlike, the interest rate channel, the credit channel relies on the notion that financial markets are incomplete. Although, these two channels depart in stressing the relevance of financial considerations they are none the less deemed complementary, and consequently, can coexist simultaneously.

The credit channel can be split into basic channels of monetary transmission as a result of information problems in credit markets: the bank lending channel and the balance sheet channel (Kashyao, 2000). When monetary authorities pursue an expansionary monetary policy, banks' reserves and deposits increase, which in turn brings about an increase of the quantity of bank loans available. Under such circumstances, the bank lending may be operative. This increase in loans will bring about investment (and possibly consumer) spending to rise. A chief implication of the credit view is that monetary policy will have a greater effect on expenditures of smaller firms that are more dependent on bank loans than on large firms that can get financed in the stock and bond markets directly.

As for the balance sheet channel, it arises from the presence of asymmetric information in credit markets, particularly with respect to adverse selection and moral hazard. The lower the net worth of business firms, the more severe the adverse selection and moral hazard problems are from lending to these firms. Lower net worth reduces the collateral for loans, and so losses from adverse selection are higher. A decline in net worth thus decreases the banks' willingness to lend and, hence, leads to less investment. Expansionary monetary policy, which causes a rise in equity prices, raises the net worth of firms and consequently of banks, and so leads to higher investment spending and aggregate.

Many economists, using aggregate time series data, have attempted to identify the credit channel by studying the behavior of the credit aggregate following a monetary tightening (Bernanke & Blinder, 1992; Kashyap & Stein, 1994; Ramey, 1993; Romer & Romer, 1990; King, 1986). They found, using the VAR methodology, that an unanticipated hike in the interest rate (the measure of stance of the monetary policy) is followed by a decline in loans. Does this signify that the credit channel is operative?

The answer to the above question is far from easy. Indeed, at first glance, the decline in bank loans seems to be consistent with the credit view. From the credit proponents' view, a restrictive policy shifts the bank curve supply left pushing down the quantity of loans supplied by banks. As surprisingly as it may appear, the same result would occur (loans will decline) even though the credit channel is not operative, a restrictive monetary policy could leftward bank curve demand causing the decline of bank loans; this process is fully consistent with the interest rate channel (the money view). In fact, subsequent to a monetary tightening, money demand declines, and bank loans contract because of the high correlation between monetary and credit aggregations. As soon as bank loans contract, deposits are also likely to contract. Therefore, different scheduled movements give rise to the same phenomenon — namely loans contraction; this is a supply-demand puzzle, which implies that bank loans contraction is consistent with both lending and interest rate channels.

How do we identify each of them? To check whether the credit lending channel is operative or not, one may attempt to identify whether bank loans contraction corresponds to a leftward supply curve or rather to a leftward demand curve. If the lending channel is operative, a monetary tightening will shift the supply schedule of bank loans. It is worth noting that such monetary policy could trigger a parallel move in supply as well demand curves. Such a situation would reflect the coexistence of both lending channel (lending view) and interest rate channel (money view). It goes without saying that bank loans contraction, of itself, is not necessarily a consequence of a leftward shift in the supply schedule.

2.3. The Exchange Rate Channel

With the growing internationalization of economies throughout the world and the advent of flexible exchange rates, more attention has been paid to monetary policy transmission operating through exchange rate effects on net exports. The exchange rate is the relative price of domestic and foreign money, so it depends on both domestic and foreign monetary conditions. The precise impact on exchange rates of an official interest rate change is uncertain, as depends on expectations about domestic and foreign interest rates and inflation, which may themselves be affected by a policy change. However, other things being equal, an unexpected rise in the official rate will probably lead to an immediate appreciation of the domestic currency in foreign exchange markets, and *vice versa* for a similar rate fall. The exchange channel involves interest rate effects because when domestic real interest rates fall, domestic currency deposits become less attractive relative to deposits denominated in foreign currencies, leading to a fall in the value of local currency deposits relative to other currency deposits, that is a depreciation of the local currency. The lower value of the domestic currency makes domestic goods cheaper than foreign goods, thereby causing a rise in net exports and hence in aggregate output.

A loose monetary policy (a monetary expansion) should result in a nominal depreciation of the local currency. Theoretically, changes in the nominal exchange rates in itself, only leads to a corresponding changes in prices without affecting real activity. However, in practice, because prices are sluggish to adjust, changes in nominal exchange rates can affect real exchange rates in the short run (and causing deviation from PPP)². It is worth noting that nominal depreciation does not usually lead to a real depreciation. Indeed, subsequent to a nominal depreciation caused by an expansionary monetary policy, one of the following two situations would happen: either the real exchange rate depreciates or it appreciates. In principal, a nominal depreciation brought on by monetary easing, combined with rigid prices, results in a depreciation of the real exchange rate in the short run and consequently boosts real GDP. In the first case, prices are supposed to be sluggish or rigid enough whereas the second case situation could happen under the picture that domestic prices increase more rapidly than those of the main partners. The depreciation is expected to bring about a decline in output and prices. However, when a significant share of debt in the economy is foreign currency denominated, a substantial (real) depreciation of the currency can actually reduce the output. Disyat (2001) presents a model which highlights this trade-off and relates the output effects of depreciation to the health of the banking system.

2.4. The Assets Price Channel

Another potential conduit of monetary policy shocks is fluctuations in asset price. An expansionary monetary policy can boost equity prices by making equity relatively more attractive to bonds. This monetary easing can also as improve the earnings outlook for firms. When the prices of equity rise, they can propagate monetary impulses according to two ways: First, higher equity prices increases the market value of firms relative to the replacement cost of capital (the Tobin's q). Secondly, increases in stock prices translate into higher financial wealth of households and therefore higher consumption. In addition, to the extent that higher equity prices raises the net worth of firms and households and improve their access to funds, the effects captured would partly reflect the 'balance sheet channel' of monetary policy as well. It should be noted that the notion of equity here could also be expanded to include a broader range of assets, such as real estate. However, due to data limitations we will limit our attention only to stock market equity, keeping in mind that these may serve as a proxy for a broader range of assets as well.

3. The Methodological Framework

It is useful to recall that monetary policy may be separated into two parts: anticipated policy and unanticipated policy. The anticipated component reflects the response of policy to economic conditions at least to the extent that is in keeping with past policies. The unanticipated component reflects how policy has deviated from the usual path (Cochrane, 1995). This distinction between these two component types of monetary policy is drawn using a structural model that can be expressed in the VAR framework popularized by Sims (1980). These dynamic systems of equations examine the interrelationships between economic variables by imposing minimal assumptions about the underlying structure of the economy which given the limited knowledge and lack of consensus about MTM in Morocco and Tunisia, is a distinct advantage.

VAR models aim at determining the impact of unanticipated changes in monetary policy. However, these changes cannot be directly detected. Reduced-form innovations of VAR models cannot be interpreted as structural or deep shocks (Green, 2005). Thus, the challenge here is to identify policy shocks (structural shocks) in endogenous variables. The starting point for the analysis of a structural VAR is the estimation of a reduced form VAR including sufficient lags in order to describe the underlying dynamics.

² Besides, since on the one hand our analysis focuses the short run, and seeing on the other hand, that we are not interested in the exchange rate puzzle, we do believe that it does make more sense to use real exchange rate than nominal exchange rate in the VAR model.

$$D(L)X_t = \varepsilon_t \quad \text{var}(\varepsilon_t) = \Omega \quad (1)$$

where $D(L)$ is an $(N \times N)$ -polynomial Lag such that $D(L) = D_0 + D_1L + D_2L^2 + \dots + D_pL^p$, and L is the lag-operator with $L^i X_t = X_{t-i}$. As Eq.(1) represents a reduced form then $D_0 = \text{Id}$. The p th order VAR process in Eq.(1) can be taken to be the true data generating process for X_t or a finite order linear approximation to an underlying infinite order linear or non-linear model. The covariance matrix of the residuals ε_t (Ω) is, in general, non-diagonal. Therefore, the shocks in ε_t cannot be the structural innovations which are assumed to be uncorrelated with each other. If the matrix polynomial $D(L)$ has all its roots greater than one in modulus, it is invertible and there exists an infinite order MA-representation. This Wold representation will be written as:

$$X_t = C(L)\varepsilon_t \quad \text{avec} \quad C(L) = D^{-1}(L) \quad \text{et} \quad C_0 = \text{Id} \quad (2)$$

Where $C(L) = D(L)^{-1}$. Now suppose that the VAR representation of the structural form can be written as:

$$B(L)X_t = \eta_t \quad \text{avec} \quad E(\eta_t \eta_t') = \sigma \cdot \text{Id} \quad (3)$$

Without loss of generality, the covariance matrix of the structural shocks η_t is normalized to Id. If the matrix polynomial $D(L)$ is invertible, so is the matrix polynomial $B(L)$ and one can write the structural MA(∞) representation as:

$$X_t = A(L)\eta_t \quad (4)$$

Note that $A(L) = B(L)^{-1}$. The structural MA representation in Eq.(4) is also called the final form of an economic model because the endogenous variables X_t are expressed as distributed lags of the exogenous variables, given by the elements of η_t . However, the exogenous structural shocks η_t are not directly observed. Rather, the elements of η_t are indirectly observed through their effects on the elements of X_t . We can obtain the structural shocks η_t by first estimating the reduced form VAR (Eq.1) and transforming the reduced form residuals. From Eq.(2) and Eq.(4) we have:

$$A(L)\eta_t = C(L)\varepsilon_t \quad (5)$$

Let subscripts indicate the matrix of coefficients at the corresponding lag. As $C_0 = \text{Id}$ and Eq.(5) must hold for all t , we have:

$$A_0 \eta_t = \varepsilon_t \Rightarrow \eta_t = A_0^{-1} \varepsilon_t \quad (6)$$

Squaring both sides and taking expectations yields:

$$A_0 \Sigma_{\eta} A_0' = \Sigma_{\varepsilon} \quad (7)$$

Combining Eq.(5) and Eq.(6) we find:

$$A(L)\eta_t = C(L)A_0 \eta_t \quad (8)$$

which implies:

$$A_i = A_0 C_i \quad (9)$$

Note that knowledge of A_0 is sufficient for the full identification of the structural system: All structural coefficients of the lag polynomial $A(L)$ and the structural innovations η_t are easily calculated from the estimated reduced form VAR using Eq.(6) and Eq.(9).

The identification of the structural VAR is achieved through two sets of restrictions. First, Eq.(7) places $n(n+1)/2$ restrictions on the elements of A_0 . Second, additional $n(n-1)/2$ additional restrictions are needed to fully determine A_0 . In the structural VAR literature these restrictions are usually taken from economic theory and are intended to represent some meaningful short-run or long-run relationship between the variables and the structural shocks. For a meaningful interpretation of the dynamics of the system, Eq.(1) has to be identified. That is, the reduced form model with correlated innovations has to be transformed into a structural form with uncorrelated, economically interpretable shocks. Much of the discussion in the literature that examines the impact of monetary policy deals with the issue of how to best identify monetary policy shocks. VAR models are used to determine the impact of unanticipated changes in monetary policy. None the less, the problem they pose is that the innovations they produce cannot be interpreted as structural shocks because the reduced-form errors are typically correlated. The challenge here is to distinguish policy changes from endogenous changes in monetary variables³.

The most common solution to this problem is to diagonalize the variance-covariance matrix of the VAR system using a triangular orthogonalization scheme (the Choleski scheme). While this approach has the advantage that shocks to the VAR system can be identified as shocks to the endogenous variables, it relies on particular ordering of variables. When the off-diagonal elements of the variance-covariance matrix of innovations are large, this approach is obviously restrictive. Three solutions have been put forward. First, one may run additional tests to determine the variables that ought to be placed first in the VAR. Second, one may impose more structure on the VAR by assuming two-way contemporaneous feedback between some elements. This could be done by imposing short-run and/or long-run restrictions⁴. Third, one might use different ordering of the variables in the VAR (see for instance, Christiano et al., 1996). As for the first solution, we do believe that it is totally inappropriate in the case of Morocco and Tunisia since it depends heavily on the institutional set-up and on the monetary policy operating procedures about which viable information is missing. As for the second solution, it is not devoid of caveats. The results it furnishes depend on the specific set of identifying restrictions. As for the third solution, at first glance, it appears to be very costly since for a system comprising n variables, $n!$ models need to be estimated (for $n=4$, we need 24 models for each country). But, if the contemporaneously correlations are low among at least the relevant innovations for the empirical fact analyzed, then the ordering will have little or no effect, and the results will be robust to the ordering of the variables.

In order to identify A_0 , two identifying restrictions are made. The covariance matrix of the structural disturbances is assumed to be diagonal, implying that the structural shocks are orthogonal, and the matrix A_0 is lower triangular. These two assumptions are also known as the Choleski factorization of the VAR. For the empirical analysis at hand, the assumption that A_0 is lower triangular is critical. This assumption imposes a recursive form on the contemporaneous correlations in the system. This implies that the first variable responds only to its own shock, the

³ This issue has been discussed more widely and formally by other authors (Sims, 1988; Bernanke and Blinder, 1992; Christiano and Eichenbaum, 1992), we only provide informal information.

⁴ This could be done by imposing short-term restrictions (Sims, 1986; Bernanke, 1986) or long-run restrictions (Blanchard and Quah, 1989) or a combination of these two types of restrictions (Gali, 1992).

second variable responds to the first variable plus to a shock to the second variable, and so on. Finally, the last variable in the system reacts without delay to all shocks, but disturbances to this variable have no contemporaneous effect on the other variables. This recursive scheme entails that the ordering of the variables has important implications for the identification of the shocks. In this paper, the ordering was chosen on the basis of the speed with which the variables respond to shocks. The output is assumed to be the least responsive (that is the most exogenous), followed respectively by the prices, then by the transmission variables; at the end, we put the interest rate variable. By putting the interest rate in the last position, we implicitly suppose that the monetary authorities respond to all other variables contemporaneously. The central bank reaction function includes all the contemporaneously variables. This may be a logical hypothesis when working with annual or quarterly data. In contrast, the interest rate has no immediate impact on the other variables. Its impact is perceptible with a time lag. Concretely, the order chosen is: $Y \rightarrow P \rightarrow T \rightarrow R$. Consequently, the model we use has the following form:

$$Y_t = E_{t-1}(Y_t) + \varepsilon_t^y$$

$$P_t = E_{t-1}(P_t) + \rho \varepsilon_t + \varepsilon_t^{yp}$$

$$T_t = E_{t-1}(T_t) + \lambda_1 \varepsilon_t^y + \lambda_2 \varepsilon_t^p + \varepsilon_t^T$$

$$R_t = E_{t-1}(R_t) + \gamma_1 \varepsilon_t^y + \gamma_2 \varepsilon_t^p + \gamma_3 \varepsilon_t^T + \varepsilon_t^R$$

Where the $\{\varepsilon_{j,t}; j=Y,P,T,R\}$ are the structural shocks; $E_{t-1}(\cdot)$ is the expectation of a variable based on the information set at the end of period $t-1$; and the T variable stands for a transmission

variable, $T \in \{S, E, L\}$. According to this picture, the monetary policy does not have any

contemporaneous effect, which may be rationalized by assuming the existence of time dependent rules, convex adjustment costs, menu costs or building and delivery lags.

4. The Empirical Results

4.1. Data

The set of variables we use includes three types of variables: the first type is the policy variables represented by the short-run money market rate. In the case of Morocco the inter-bank money rate (MMR) is considered whereas the money market rate (TMM) is deemed the appropriate measure in the case of Tunisia. The second one consists in the transmission variables, which are the nominal effective exchange rate (E), loans quantity (LQ) and a measure of the stock market dynamics (S). Regarding this latter variable, it is measured by the MASI index in case of Morocco and by BVMT index in case of Tunisia. Bank loans variable (LQ) is proxied by claims on private sector (Loans). This measure seems to be the most suitable since we are concerned with all types of loans and no specific type is targeted. Finally, the industrial production index or real GDP (Y) and the consumer price index (P) are included as goal variables (output and price). All the variables are taken in logs except the interest rate variables. We refer to the three-variable model that includes the short-term interest rate, the output and the price variables by the basic VAR model. It comprises a minimum set of variables needed to characterize the MTM. The short rate is supposed to represent the monetary policy instrument whereas prices and output are presumably the target variables of the monetary authorities. These variables are available from the

International Monetary Fund (International financial statistics, IMF CD-ROM-February 2006) and from the central bank of Tunisia and Bank Al-Maghrib data bases. Data are quarterly covering the period 1990:Q1-2005:Q4 for Morocco and 1989:1-2005:Q4 for Tunisia unless otherwise specified.

4.2. VAR Estimation

The first important issue that arises in studying the monetary transmission mechanism is how to measure the stance of monetary policy in Morocco and Tunisia. The econometric literature relating to the theme of monetary transmission mechanism has showed that two main variables are often used in the empirical studies: a short interest rate and the base money variable. Generally, the ideal instrument to use as a measure of the stance of the monetary policy would be the official interest rate at which marginal financing is provided to the banking system. However, monetary authorities in Tunisia as well as in Morocco did not give up providing financing using a number of different interest rates (usually preferential interest rates). Therefore, to check whether quantities could be considered as indicators of the monetary switches, VAR models have been estimated in the case of both countries with interest rates and reserve money as instruments. It has been found that the contribution of the interest rate in explaining the output variability is more important than that of reserve money in the case of Morocco (see Tables 1.a and 1.b). As for the Tunisian case, the two instruments contribute equally in explaining the dynamics of the output. Besides, the Tunisian monetary authority states that the interest rate is its main instruments. Consequently, we preferred to use the interest rates as measures of the monetary policy stance in both countries.

The above results indicate that the interest rate is a more appropriate measure of the Tunisian monetary policy than reserve money. This finding confirms the different media releases of the BCT in which they state that their main instrument is the interest rate rather than any monetary aggregate. It goes without saying that the overall impact of the interest rate is moderate when compared to other countries.

4.3. Channels Identification

In order to improve our knowledge of MTM in Morocco and Tunisia, we proceed by gauging the strength of each channel. To this end, we add to the basic VAR model in levels the transmission variable corresponding to the channel we intend to evaluate. The assessment of any channel is done by having recourse to the powerful VAR tools, namely the impulse function responses (IRFs) and the forecast error variance decomposition (FEVD). These tools help to gather a lot of information on the potential transmission channel. Another test to which we refer by exogeneity test is also used (Ramey, 1993; Bayoumi and Morsnik, 2001). It allows us to appraise the relative importance of each channel when the IRFs analysis reveals that it would exist. The basic idea of this test is the following: when focusing on a particular channel, say the exchange rate channel, we first run the basic VAR model to which the transmission variable is added (in this case the exchange rate variable), and we calculate the IRFs of the target variable (the real output). Then, we exogenize the transmission variable, and we rerun once again the VAR model to get a second set of IRFs. The second VAR constructed with the transmission variable exogenized is identical to the first one except that it effectively blocks off any response within the VAR that passes through the transmission variable. The comparison of the output responses of the two models provides therefore a measure of the importance of that particular channel as a conduit for the monetary policy to the real economy.

4.3.1. The Exchange Rate Channel

The precise impact on the exchange rates of an official rate change is uncertain, as it will depend on expectations about domestic and foreign interest rates and inflation, which may themselves be affected by a policy change. However, other things being equal, an unexpected rise in the official

rate will probably lead to an immediate (nominal) appreciation of the domestic currency in foreign exchange markets, and vice versa for a similar rate fall. The exchange channel involves interest rate effects because when domestic real interest rates fall, domestic currency deposits become less attractive relative to deposits dominated in foreign currencies, leading to a fall in the value of local currency deposits relative to other currency deposits, that is a depreciation of the local currency. The lower value of the domestic currency makes domestic goods cheaper than foreign goods, thereby causing a rise in net exports and hence in aggregate output.

The importance of the exchange rate channel depends, among other things, on the exchange regime. When the exchange regime is of the fixed type, the exchange rate channel cannot be operative. On the other hand, when the exchange rate is fully flexible, the transmission of interest rate movements to exchange rate and to activity in the tradable goods sector is highest. The short-run behavior of the exchange rate is the result of the asset market equilibrium. When domestic real interest rates rise subsequent to a monetary contraction, deposits in domestic currency and credit in foreign currency become more attractive, inducing an appreciation of the exchange rate, reducing net exports, and lowering domestic output. The exchange regime in Tunisia is neither fully flexible nor fixed. The monetary authorities have followed a CRERR, which resembles to a crawling peg regime. The Moroccan monetary authorities have pegged the Dirham to basket currencies where the (nominal) exchange rate fluctuates within a narrow margin around a central rate. Although one suspect that under the exchange rate regimes followed by Morocco and Tunisia the strength of the exchange channel would be negligible if not absent, it is nonetheless sensible to verify this intuition. Consequently, to the basic VAR model was added the nominal effective exchange rate, E , as a potential transmission variable⁵.

The IRFs results of the VAR simulations related to the exchange rate channel indicate that in the case of both countries a restrictive monetary policy (as measured by one standard deviation hike) is insufficient to impact significantly the effective nominal exchange rate (see Figures 1.a and 1.b). On the other hand, the depreciation of the currency seems to have significant effects on real activity in Tunisia and in Morocco. Indeed, in both countries the depreciation of the currency depresses real output. Again the effect is more pronounced in the case of Tunisia. The IRFs analysis indicates that the depreciation has an asymmetric impact on prices. It generates a significant decline in prices in case of Tunisia whereas in case of Morocco prices seem to go up. Overall, these findings corroborate to some extent the a priori belief we have about the strength of the exchange channel in the two countries. At best, the contribution of the exchange channel in propagating the impulses of the monetary policy in Morocco and Tunisia is negligible. Again, the FEVD analysis (not reported) indicates that the exchange channel does not function either in Morocco or in Tunisia.

To corroborate this conclusion, we exogenized the assumed transmission variable (the exchange rate variable), and we compared the two impulse responses of the real output. It stands out from this exercise (see Figures A1 and A2) that when the assumed channel is blocked off, the real activity remains roughly the same indicating that the exchange real channel might not be an active channel in both countries, supporting by the same way the previous intuition. To some extent, this finding is not surprising seeing the nature of the exchange rate regimes followed in the two countries. However, this channel may gain more importance as these countries move to a more flexible exchange rate regime.

4.3.2. The Asset Price Channel

Another potential conduit of monetary policy shocks is fluctuations in asset price. An expansionary monetary policy can boost equity prices by making equity relatively more attractive to bonds. This monetary easing can also as improve the earnings outlook for firms. When the

⁵ In case of Morocco, the VAR model comprises therefore (Y, P, E, MMR), whereas in case of Tunisia it comprises (Y, P, E, TMM).

prices of equity rise, they can propagate monetary impulses according to two ways: First, higher equity prices increases the market value of firms relative to the replacement cost of capital (the Tobin's q). Secondly, increases in stock prices translate into higher financial wealth of households and therefore higher consumption. In addition, to the extent that higher equity prices raises the net worth of firms and households and improve their access to funds, the effects captured would partly reflect the 'balance sheet channel' of monetary policy as well. It should be noted that the notion of equity here could also be expanded to include a broader range of assets, such as real estate. However, due to data limitations we will limit our attention only to stock market equity, keeping in mind that these may serve as a proxy for a broader range of assets as well.

To assess the importance of asset price in propagating the impulses of monetary policy in Morocco and Tunisia, we add the log of the BVMT index (and log of MASI index) to the basic VAR model. As it stands from the IRFs profiles, a monetary tightening appears to have no significant impact on equity prices in the two countries. The innovations in asset prices do not exhibit any effect on real activity. Not surprisingly, exogenizing the stock index does not dampen in any way the response of the Y variable (see Figures B1 and B2). Comparing the accumulated responses indicates that movements in equity prices accounts for less than 0.1% of the total impact on output after 2 years. The absence of role of asset prices in transmitting monetary shocks is not surprising given that share ownership is far from being pervasive in the two countries, and that firms' reliance on equity financing has not been very significant if not negligible compared to bank credit. The role of asset prices in the transmission mechanism might increase in the future in line with the continued developments in capital markets that both increases investment opportunities for households, as well as financing options for firms.

4.3.3. The Lending Channel

The existence of this channel relies on two basic conditions. On the one hand, the monetary authorities should be able to affect the supply of bank loans through open market operations or other monetary instruments. On the other hand, there should be no perfect substitutes to bank loans for, at least, some types of borrowers. Obviously, these conditions clearly depend on the structure of the financial system and its regulation. The key point here is that the real effects of higher interest rates may be amplified through the lending channel beyond what would be predicted where policy transmitted solely through the traditional interest rate (cost of capital) channel. As market interest rates rise subsequent to monetary tightening, business investments fall not only because the cost of capital is higher, but also because the supply of bank loans, mostly to small and medium sized firms, is reduced. Firms in Tunisia have relied heavily on bank lending. The bias towards bank debt financing not only makes firms more dependent on bank lending, but also increases the sensitivity of firms' balance sheets to interest rate movements.

To examine the role of bank loans in the transmission mechanism, we append the basic VAR model with real loans variable (L). Thus, the VAR models for the two countries comprise the following variables (Y, P, LQ, MMR) and (Y, P, LQ, TMM). These VAR models have been estimated and then bank loans have been exogenized in the calculation of the IRFs. The output responses to the interest rate shocks with and without loans exogenized appears to be quite similar (see Figures C1 and C2). The absence of similarities between the response of the output when the channel is blocked off and when it is not may indicate that the lending channel may be operative in both countries. To shed more light on this issue, it is important to investigate this issue more deeply.

Many economists, using aggregate time series data, have attempted to identify the credit channel by studying the behavior of the credit aggregate following a monetary tightening (Bernanke & Blinder, 1992; Kashyap & Stein, 1994; Ramey, 1993; Romer & Romer, 1990). They found, using the VAR methodology, that an unanticipated hike in the interest rate (the measure of stance of the monetary policy) is followed by a decline in loans. Does this signify that the credit channel is operative?

The answer to the above question is far from being easy. Indeed, at first glance, the decline in bank loans seems to be consistent with the credit view. From the credit proponents' view, a restrictive policy shifts the bank curve supply left pushing down the quantity of loans supplied by banks. As surprisingly as it may appear, the same result would occur (loans will decline) even though the credit channel is not operative: a restrictive monetary policy could leftward bank curve demand causing the decline of bank loans; this process is fully consistent with the interest rate channel (the money view). In fact, subsequent to a monetary tightening, money demand declines, and bank loans contract because of the high correlation between monetary and credit aggregations. As soon as bank loans contract, deposits are also likely to contract. Therefore, different schedules movements give rise to the same phenomenon, namely loans contraction; this is a supply-demand puzzle, which implies that bank loans contraction is consistent with both lending and interest rate channels.

How to identify each of them? To check whether the credit lending channel is operative or not, one may attempt to identify whether bank loans contraction corresponds to a leftward supply curve or rather to a leftward demand curve. If the lending channel is operative, a monetary tightening will shift the supply schedule of bank loans. It is worth noting that such monetary policy could trigger a parallel move in supply as well demand curves; such a situation would reflect the coexistence of both lending channel (lending view) and interest rate channel (money view). It goes without saying that bank loans contraction, of itself, is not necessarily a consequence of a leftward shift in the supply schedule. Another solution would consist in studying and testing the long-run implication of the model describing the lending channel.

Several studies have explored the timing patterns of financial and real aggregates following a monetary tightening. Using VAR analysis, Bernanke and Blinder (1992) and that bank loans and real output decline by degrees roughly contemporaneously after a monetary policy shock. This finding is consistent with the credit channel, as banks appear to decrease their loan activities in response to a monetary tightening, and when bank lending drops this curtails real activity. Romer and Romer (1990) report a similar result, but relate it to the interest rate channel, because of the sluggish decline in bank loans that coincides with the decline in real output. King (1986) and Ramey (1993) observe that bank loans perform badly in predicting real activity, which prompts the conclusion that bank lending has an inferior impact on spending; whereas, Morgan (1998) shows that the sluggish adjustment of bank loans can be explained by loan commitments, which suggests that the loan level may not drop immediately when monetary policy tightens.

As Cecchetti (1995) and Hubbard (1995) point out, the different interpretation of the observable decline in bank loans after a monetary contraction reflects a serious identification problem (the so called demand-supply puzzle identification). While the credit channel emphasizes a shift in loan supply, the interest rate channel postulates a shift in loan demand, which stems from a drop in real activity due to higher interest rates. Distinguishing between these predictions is a difficult task: *"It is not possible using reduced-form estimates based on aggregate data alone, to identify whether bank balance sheet contractions are caused by shifts in loan supply or loan demand,"* (Cecchetti, 1995).

In what follows, we shall provide an alternative approach to resolve the supply-versus-demand puzzle. An important assumption is that an observable quantity of bank loans is the equilibrium value given by the intersection of the demand and supply curves in the bank loan market. In principle, a change in the quantity may be associated with a shift of the demand curve, a shift of the supply curve, or both. A decline in the quantity, for example, is not necessarily caused by a leftward shift of the supply curve. It could be also brought about by a shift of the demand curve. Having an eye on the price will make it easier to identify the shifts of the supply and demand curves behind the change in the quantity. The approach can be well understood using a simple demand-supply model. Following an exogenous shock, the supply curve and/or the demand curve

will shift, so that the price (P) and/or the quantity (Q) will move. Four cases could be envisaged (see appendix D):

Case A: Q decreases, while P does not rise (as long as D lies between D' and D'').

Case B: Q increases, while P does not fall (as long as D lies between D' and D'').

Case C: P rises, while Q does not increase (as long as S lies between S' and S'').

Case D: P falls, while Q does not decrease (as long as S lies between S' and S'').

In the context of testing the lending channel, case A needs to be focused on. If it is found statistically significant in the loan market following a monetary tightening, then the lending view is supported. If however case B is found to be significant, then the lending view could be rejected. In the remaining two cases, nothing can be inferred about the position of the supply curve. If the lending channel of monetary policy is dominant, a leftward shift of the supply schedule must be clearly observed following a monetary tightening. A rise of the loan price detects a leftward shift of the supply schedule of bank loans unless the quantity of bank loans increases. For the study of the lending channel to be meaningful, it might be also worthwhile to test the effectiveness of monetary policy. Thus, the lending view will be accepted if:

H1: the quantity of bank loans (LQ) does not increase,

H2: the price of bank loans (LP) rises, and

H3: real output (Y) decreases, following a monetary tightening.

To shed light on the existence of the lending channel in Morocco and Tunisia, we have recourse to the VAR models. The ordering of the variables is chosen on the basis of the speed with which the variables respond to shocks like in the case of the channel considered above. We remind the order used in this section because we make use of a relatively different set of variables. Thus, prices variable is assumed to be the least responsive (that is the most exogenous) because of its assumed sluggish, followed respectively by real output, then by money and short interest rate (monetary instrument). Real output (Y) is placed before money (M) and central bank short interest rates, which implies that these variables can affect real output with lags, under the assumption that 'fine tuning' is a difficult task. The position of money aggregate (M) before short interest rate reflects the prior that the central bank takes into account the current demand for money when it determines the targeted level of the short interest rate. Bank loans (LQ) and price loan (LP) are placed after the short interest rate (R); this seems to be sensible in the context of the Moroccan and Tunisian economies; central banks in these two countries cannot afford to conduct a survey of enterprises about the financial conditions, and consequently are not able to obtain information on the bank loan market in a very short time. Concretely, the order chosen is such as ($P_t, Y_t, M_t, R_t, LQ_t, LP_t$)⁶.

It worth noting that the main point we focus on in this section is the identification puzzle (the supply-versus-demand puzzle). A contraction of bank loans for itself is not necessarily a consequence of leftward shift of the supply schedule. Thus, testing the lending view requires identifying the supply and demand schedule of bank loans. If the lending channel of monetary policy is dominant, a leftward shift of the supply schedule must be clearly observed following a monetary tightening. For the study of the lending channel to be meaningful, it might be also worthwhile to test the effectiveness of monetary policy. Thus, the lending view will be accepted if and only if:

⁶ In addition to the variables used in the previous sections, we use other variables, loans price or monetary aggregates. As a measure of money (M), the reserve money (noted B) variable has been selected; other money aggregates such as M1 or M2 might be correlated with bank loans. As for the loans price (LP), it is measured by the maximum rate on export credit (MaxExpo) for Morocco, and by the maximum rate of banking uncovered balance (TMD) for Tunisia.

H1: the quantity of bank loans LQ does not increase, or $\partial E(LQ_{t+i} | \Lambda_t) / \partial u \leq 0$ for $i=0,1,\dots, t^R$

H2: the price of bank loans LP rises or similarly $\partial E(LP_{t+i} | \Lambda_t) / \partial u > 0$ for $i=0,1,\dots,$ and t^R

H3: real output Y decreases, that is $\partial E(Y_{t+i} | \Lambda_t) / \partial u \leq 0$ for $i=0,1,\dots,$ following a monetary tightening.

For the purpose of testing H1 to H3 statistically, the VAR is estimated to stimulate impacts of monetary policy on the economy. Simulating the dynamic responses of macroeconomic variables to monetary policy shocks is equivalent to calculating the impulse response functions (IRFs) of those variables to an innovation to the measure of the stance of the monetary policy.

From Figure 5.a relative to Morocco, one can notice that the reactions of the output (as measured by the industrial production) and loans are far from being similar. The response of the output to monetary tightening appears to be compatible with the standard macroeconomic theory. It depresses following an unexpected rise in the interest rate. It should be stressed however that the decline of the output is only statistically significant in the second, fourth, sixth, eighth quarter. Overall, the response of the output to a monetary tightening is negligible. This could be considered as an evidence supporting H1. The bank loans response is somewhat weak; it does not react during the first year, then it declines slightly around the sixth and the seventh quarter ($\partial E(LQ_{t+i} | \Lambda_t) / \partial u < 0$, for $i=6,7$). In all cases, the point estimates are not anomalous. The response of price loan is not more pronounced than that of bank loans. During the first two years, the loan price does not appear to exhibit any significant reaction to a monetary tightening; then it depicts a slight upward increase, albeit still non statistically significant; the loan price response becomes more pronounced and significant after three years: $\partial E(LP_{t+i}^R | \Lambda_t) / \partial u = 0$ for $i=1,\dots,12$; and $\partial E(LP_{t+i}^R | \Lambda_t) / \partial u > 0$ for $i=12,\dots,16$. At first glance, one can interpret the reactions of the two t^R variables during the first two years by stating that Moroccan banks have been more or less reluctant to accommodate the temporary increase in the demand for loans. Indeed, the price loan depicts first a short increase and then a short decrease just before starting its long-run tendency to go up (see the 2 upper graphics of Figure 5.a). The first responses are more in accordance with leftward movement of the supply curve, which is synonym of an increase in both banks loans and loan price. This shift is followed by a slight shift of the demand curve to the right. Nonetheless, seeing that the bank loans upward movement is not significant, the pattern co-movements of these two variables rather reflects a shift of the loan supply curve to the left (P increases whereas Q does not); this shift becomes more pronounced after 12 quarters. Overall, one can argue that H2 is accepted over this period. Besides, the tight monetary policy seems to depress significantly the output; its impact starts to be felt just after one year; so, H3 is not rejected. In sum, the lending channel seems to be operative in the long-run. Besides, the responses of money reserve and prices are reported as an indicator of a possible misspecification. Their respective IRFs do not exhibit any sign of a misspecification. Thus, neither H3 nor H2 hypotheses can be rejected. In sum, despite that it does not function effectively in the short run, the lending channel is operative in the long run in Morocco.

As for the Tunisian case, it appears from Figure 3.b that a tight monetary policy induces a decrease in the quantity of bank loans after six quarters. The upper left graph of Figure 3.b depicts the response of the industrial production to a change in the central bank interest rate. This graph provides a statistical test for H3 (the effectiveness of the monetary policy). As it stands from the pattern of this graph, the industrial production declines following a contractionary monetary policy; and this decline appears to be significantly different from zero at 5 percent significance

level: $\partial E(Y_{t+i}|\Lambda_t)/\partial u=0$ for $i=1,2$ and $\partial E(Y_{t+i}^R|\Lambda_t)/\partial u<0$ for $i=3,4,\dots,16$. The middle right graph depicts the response of reserve money to unexpected interest rate hike of one standard deviation. This response becomes statistically significant only after 2 years. The reserve money reaction seems compatible to what is predicted by the theory, albeit it takes eight quarters to become felt. This graph, as well as that of the prices, has been added for the purpose of detecting possible misspecification. The pattern of prices IRFs seems to discard the so-called price puzzle (Sims, 1992). Although the response of prices as measured by the logarithm of consumer price index is not significantly different from zero, the point estimates are not anomalous.

As for testing the lending view, left lower two IRFs of Figure 3a provide the necessary information. The response of price loans depicts a clear tendency to increase subsequent to a tight monetary policy. This reaction is immediate and statistically significant at 5 percent level. In other words, the response of price loan is such that $\partial E(LP_{t+i}|\Lambda_t)/\partial u>0$ for $i=1,2,\dots,16$ implying that H2 cannot be rejected. Furthermore, bank loans IRFs show that loans quantity does not increase. Rather, it exhibits a clear downward tendency, which thought non statistically significant for the eight first quarters becomes significant at the latest: $\partial E(LQ_{t+i}^R|\Lambda_t)/\partial u=0$ for $i=1,2,\dots,8$ and $\partial E(LQ_{t+i}^R|\Lambda_t)/\partial u<0$ for $i=9,10,\dots,16$. Therefore, H3 cannot be rejected. Seeing that the hypotheses H1, H2 and H3 cannot be rejected, one may conclude that the lending channel is operative in Tunisia. Better still, when considered together the patterns of price loan and bank loans IRFs indicate implies that the supply schedule for bank loans shifts left following a monetary tightening. Thus, data do support the lending view in the case of Tunisia. It is worth nothing that this finding does not imply the rejection of the money view. All that we can state is that the lending channel is not only operative but also dominant.

5. Concluding Remarks

This paper has put forward some clearings up about the MTM issue in Morocco and Tunisia. It has been found that neither the exchange rate channel nor the asset price one was operative in the two countries. The inaction of the first channel does not surprise seeing the nature of the exchange regimes carried out. On the one hand, the CRERR prevents the nominal rate from serving as an anchor implying by the same way that the exchange rate channel might be operative. It seems that two obstacles have precluded this channel from functioning. The first one is that the “fear of floating” constrains the CBT to smooth the rate dynamics, weakening therefore the channel. The second one is that the devaluation was not enough, due almost certainly to an insufficient monetary policy shock, to boost the output.

As for the asset price channel, its unimportance in propagating the monetary policy impulses is well expected. The share of ownership is not pervasive at all in Tunisia, and the reliance of firms on equity financing has not been significant compared to bank credit. However, it remains to be seen whether the role of asset prices in the transmission mechanism would increase into the future along with the developments in capital markets or not. Seeing the importance of small firms in the Tunisian economy, it seems really hard that this channel will be enhanced in the near future.

As far as the lending channel is concerned, the empirical investigation has shown that this channel is functioning in Tunisia. More specifically, the results has pointed out that the lending channel is dominant; that is co-exists with the traditional interest channel, but its effect is more pronounced. This has been confirmed by the leftward shift by the loan supply curve. As for Morocco, this paper results that the lending channel is operative too, albeit its effects are less pronounced when compared to the Tunisian case.

The policy implications of these findings are very important for policymakers. Seeing that the lending channel is operative, the monetary policy prescriptions that should be suggested have to take into account this finding. More specifically, if bank capital sink into recession, then the lending channel will be weaker. In this case it would be fruitless to adopt traditional prescriptions that consist in adopting an expansionary monetary policy. Such a policy will be fruitless, and will also bring about inflationary pressure without boosting real activity. A more rational and effective policy would consist in injecting capital into banking sector to help it to stand on fit.

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Figure 1.a: The IRFs of the Main Variables (Case of Morocco)

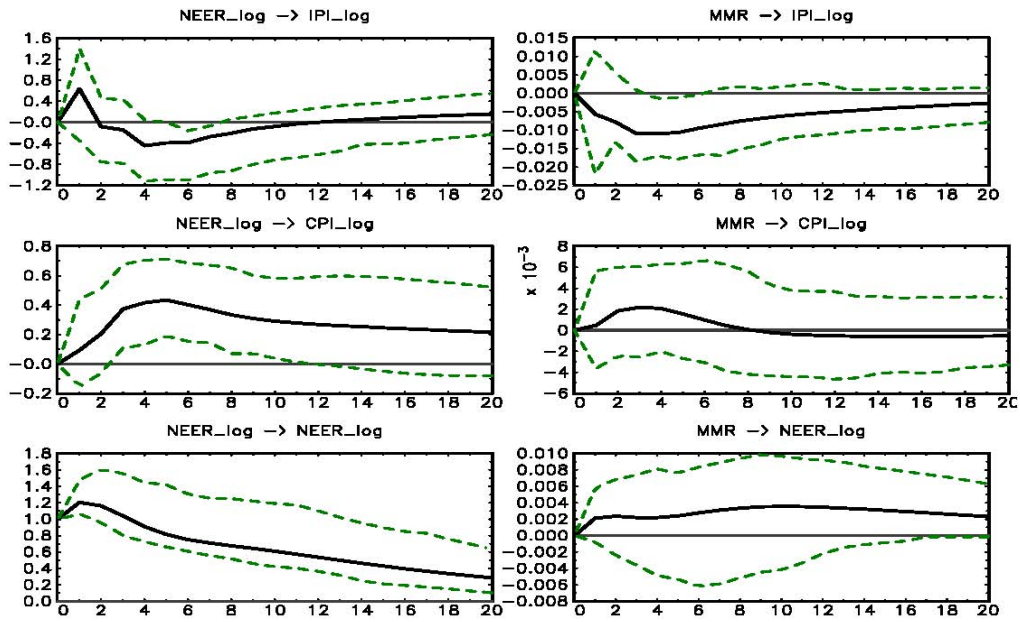


Figure 1.b: The IRFs of the Main Variables (Case of Tunisia).

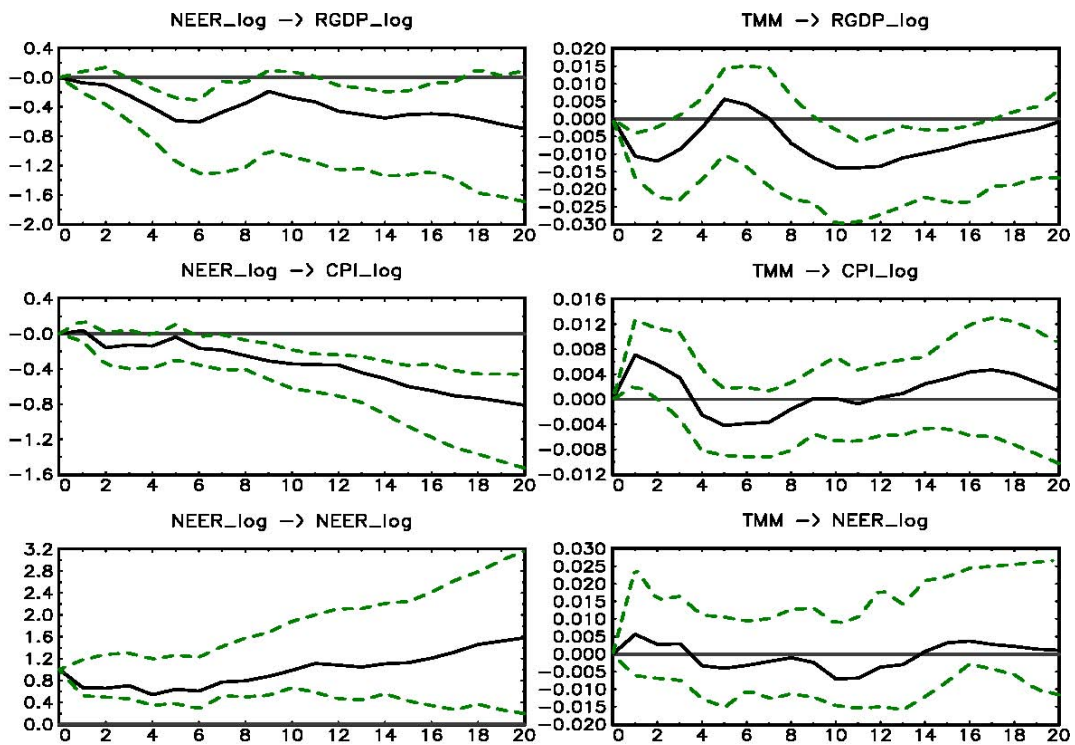


Figure 2.a: IRFs of the Main Variables (Morocco)

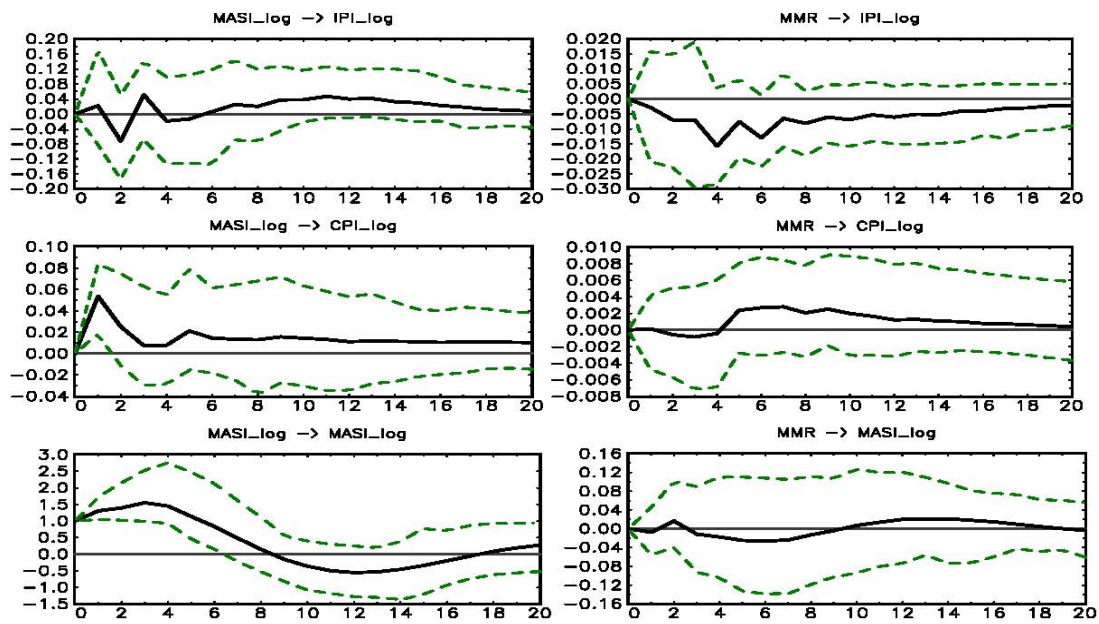


Figure 2.b: IRFs of the Main Variables (Tunisia)

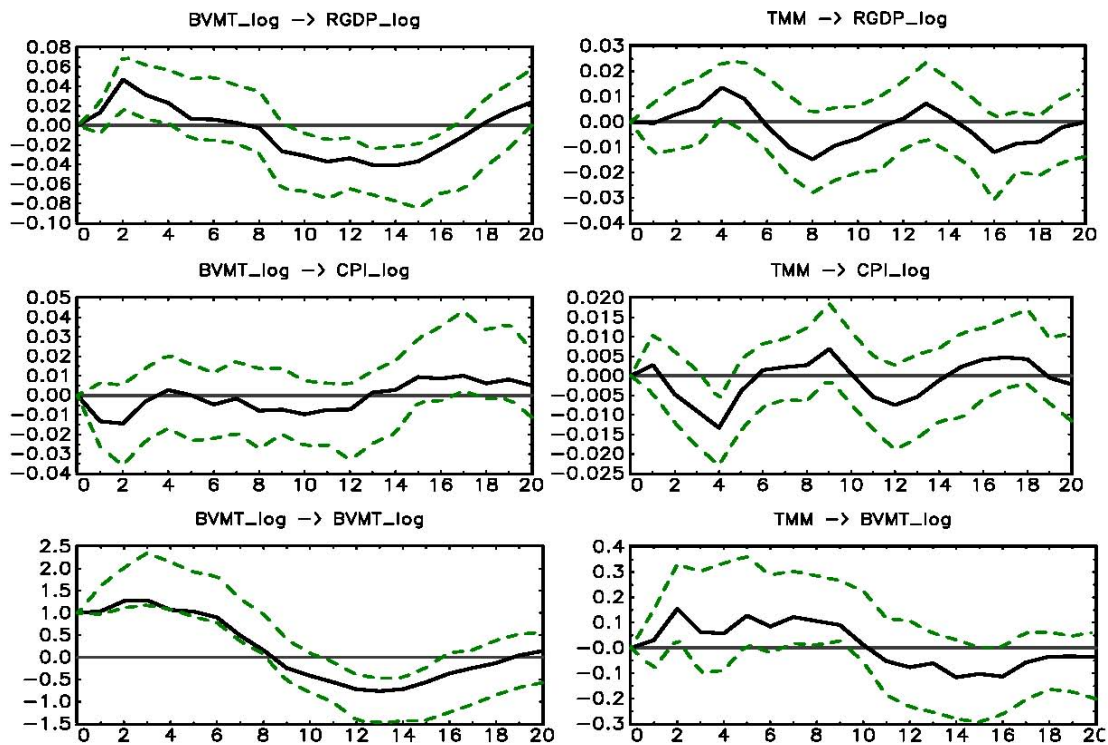


Figure 3a: The Lending Channel (Morocco)

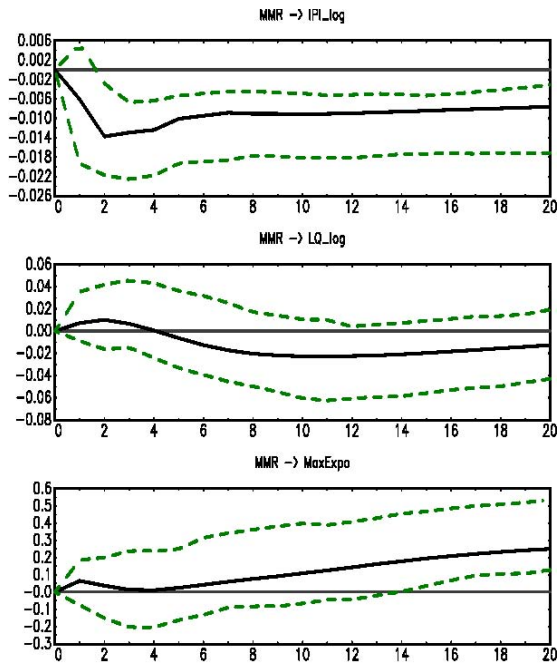


Figure 3b: The Lending Channel (Tunisia)

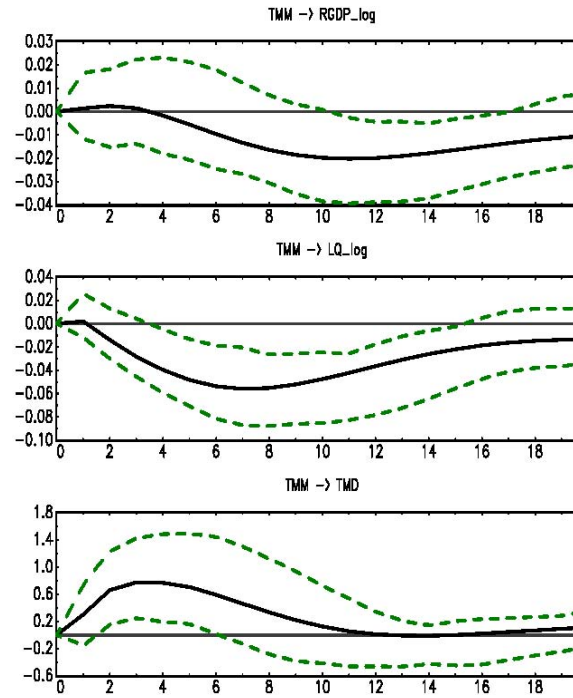


Table 1.a: VAR Forecast Error Variance Decomposition (in percentage)

| horizon | Y | P | TMM | Y | P | Base |
|---------|----|----|-----|----|---|------|
| 4 | 94 | 1 | 5 | 93 | 2 | 6 |
| 8 | 81 | 5 | 14 | 86 | 5 | 9 |
| 12 | 74 | 10 | 16 | 83 | 7 | 11 |
| 16 | 70 | 15 | 15 | 80 | 8 | 12 |

Notes: The numerical values reported on the table stand for the proportion of forecast error in the Moroccan Output accounted for by each variable.

Table 1.b : VAR Forecast Error Variance Decomposition (in percentage)

| horizon | RGDP | CPI | TMM | RGDP | CPI | Base |
|---------|------|-----|-----|------|-----|------|
| 4 | 97 | 2 | 1 | 97 | 1 | 2 |
| 8 | 90 | 4 | 6 | 93 | 2 | 5 |
| 12 | 80 | 8 | 12 | 88 | 3 | 9 |
| 16 | 75 | 13 | 12 | 80 | 8 | 12 |

Notes: The numerical values reported on the table stand for the proportion of forecast error in the Tunisian Output accounted for by each variable of the basic VAR.

Appendix A: Exchange Rate Channel (The Exogeneity Test)

Figure A.1: Response of Output (Morocco)

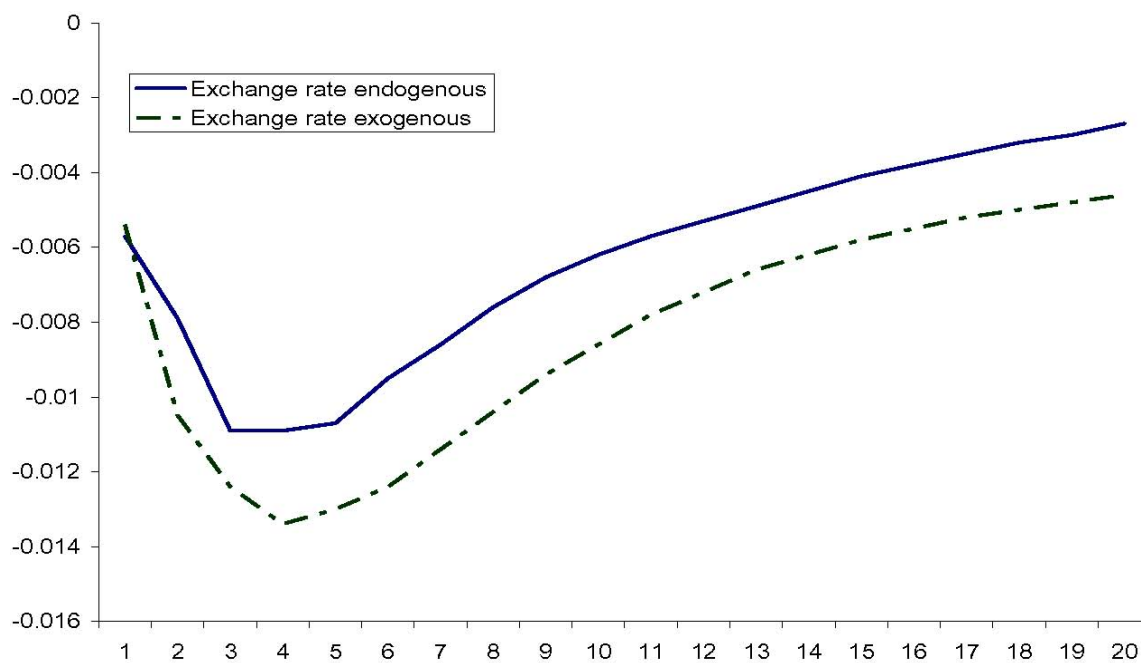
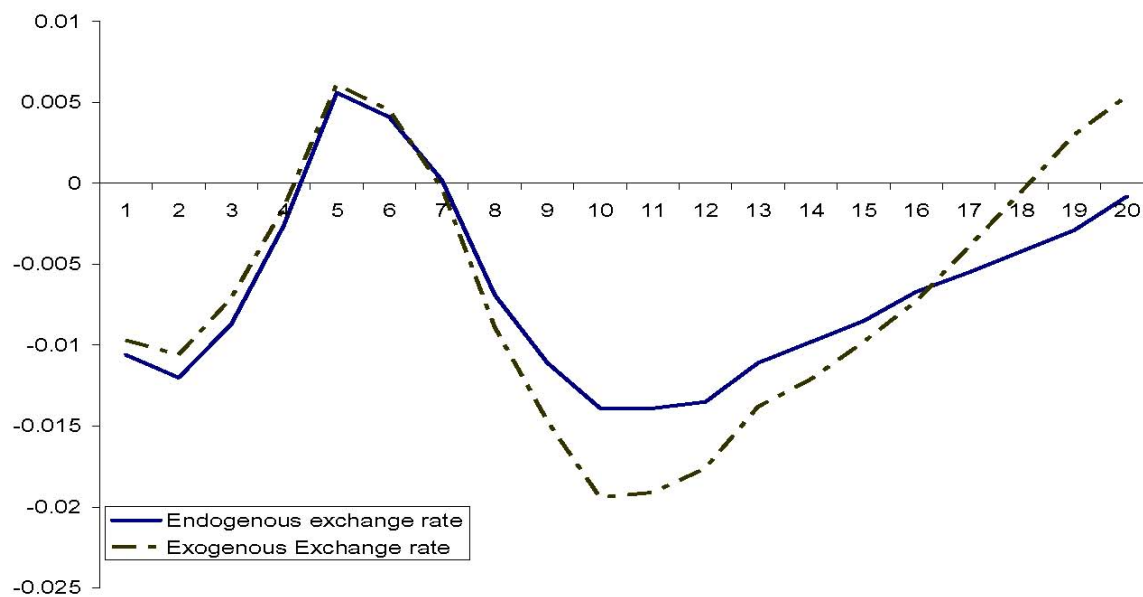


Figure A.2: Response of Output (Tunisia)



Appendix B: The Stock Market Channel (The Exogeneity Test)

Figure B.1: Response of Output (Morocco)

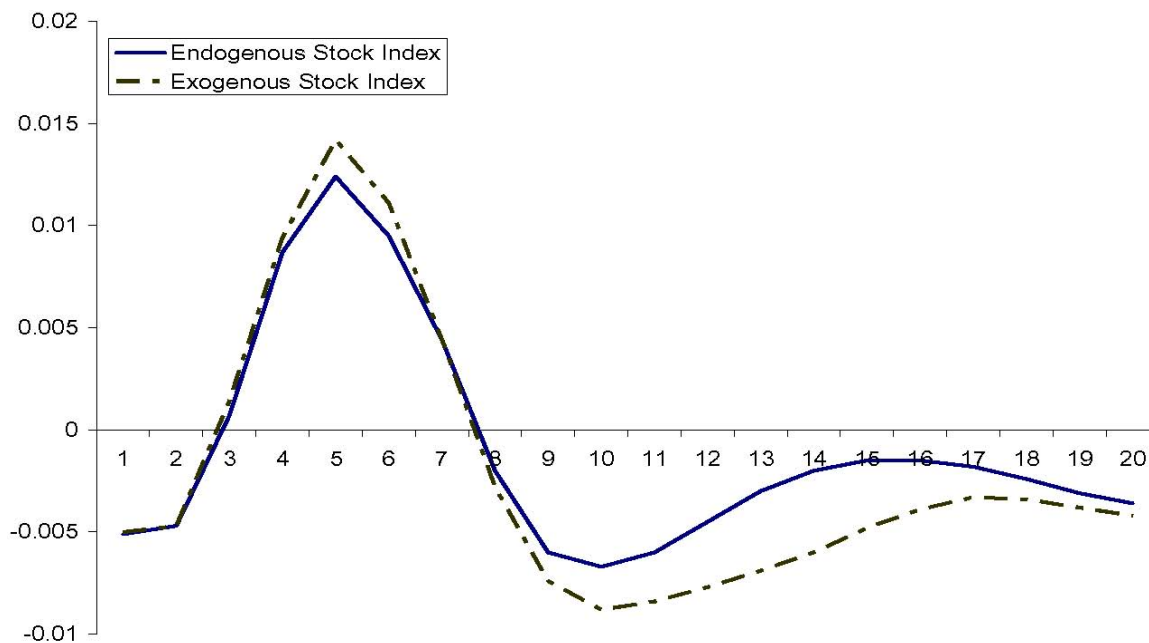
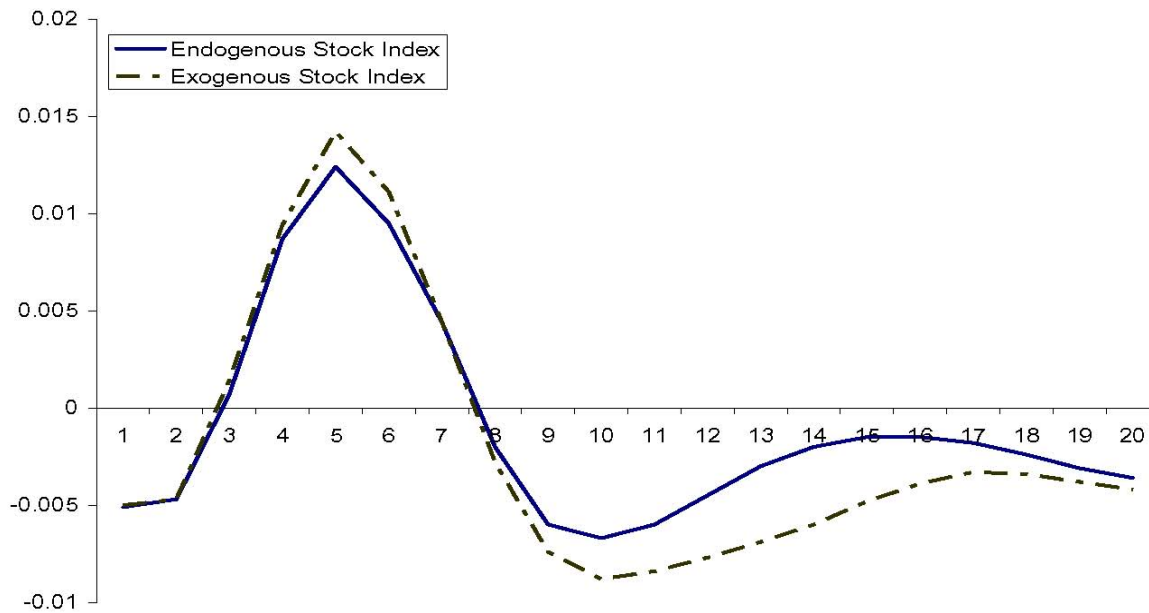


Figure B.2: Response of Output (Tunisia)



Appendix C: The Lending Channel (The Exogeneity Test)

Figure C.1: Response of Output (Morocco)

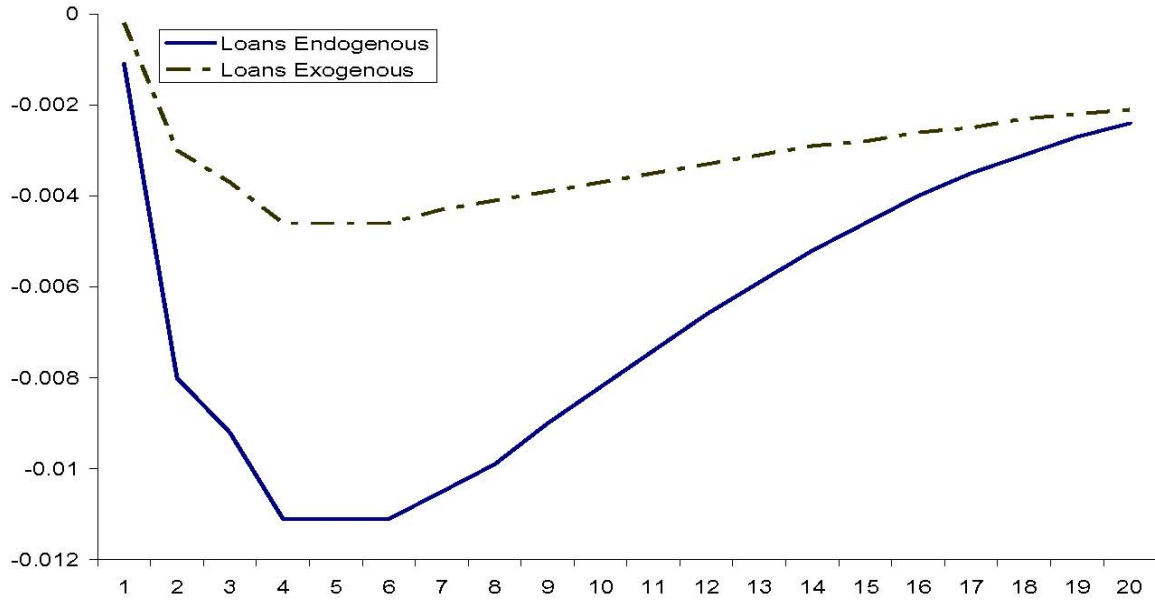
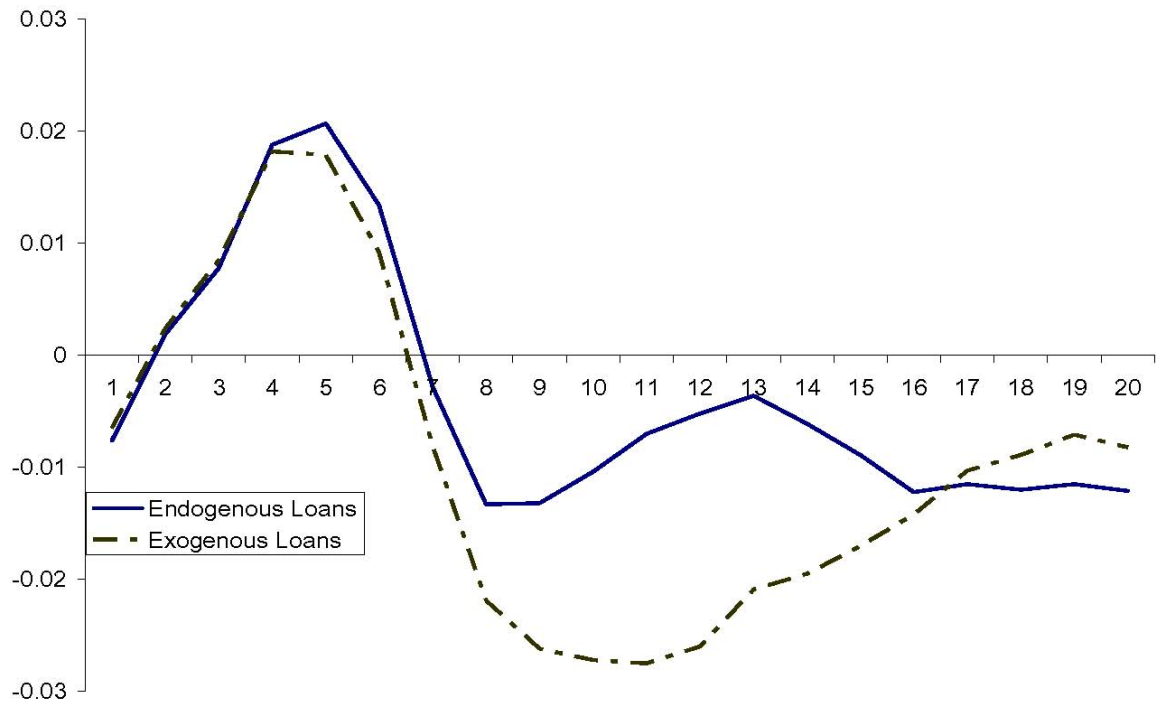


Figure C.2: Response of Output (Tunisia)



Appendix D: Loans Supply/Demand Curves Shifts

