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# US Monetary Policy Surprises and Foreign Interest Rates: Evidence from a Set of MENA Countries

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# US Monetary Policy Surprises and Foreign Interest Rates: Evidence from a Set of MENA Countries

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## Abstract

This paper assesses the response of a set of emerging markets' domestic interest rates to the US monetary policy surprises within a dynamic framework. Monthly data from Algeria, Bahrain, Israel, Jordan, Kuwait, Tunisia and Turkey for the 1989:03 to 2005:12 period reveal positive effects of the unanticipated Federal Funds target changes on the short-term interest rates of these countries. When we look at the effect of US monetary policy surprises for different Turkish interest rates, the evidence is robust for the 3 and 12-month rates, but government controlled interbank and treasury auction rates have reverse positions.

**KEYWORDS:** MENA countries, federal funds rate, monetary policy, VAR analysis

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## 1. Introduction

With the increasing effect of globalization, cross-border spillover effects on domestic economies have become the central focus of international macroeconomics. Understanding the nature of this relationship is important, especially for emerging markets, as they need international capital inflows but are unable to affect world financial markets. Recent literature claims that the fluctuations in emerging markets stem, for the most part, from external factors. For example, Calvo and Mendoza (1998), Del Negro and Obiols-Hums (2000) and Calvo et al. (1993) argue that a considerable percentage of the forecast error variance of the real exchange rate can be accounted for by external factors. Policy makers, especially in emerging markets or developing markets, pay attention to the macroeconomic developments of large countries. There is extensive evidence that the monetary policy making of developed markets affects emerging markets.[1] For example, Borensztein et al. (2001) examined the effects of US monetary policy shocks on the interest rates of various countries, including emerging markets. Regarding the emerging markets, a one-unit shock to US interest rates had a positive and statistically significant effect on the interest rates of Argentina, Chile and Singapore but an insignificant effect on the interest rate of Mexico. Using the innovations to the Federal Funds interest rate, Parrado (2001) also examined the effects of US monetary policy shocks on the macroeconomic variables of Chile; this study reported very short-lived effects on domestic interest rates and mentioned no major influence over other macroeconomic variables. In another work, Al-Jasser and Banafe (2005) considered the financial market integration of Saudi Arabia with external financial markets, in particular with the US market, mentioning US interest rates as the dominant factor in the determination of riyal interest rates. Taylor and Sarno (1997) also emphasized the importance of US interest rates as a determinant of the short-run dynamics of bond flows to developing countries. This paper analyzes US monetary policy, arguably the most important foreign financial variable in the world, for its effect on domestic financial markets. The contribution of this paper is the use of Federal Funds futures data to assess the foreign monetary policy shock and to analyze its effects on the financial variables of selected MENA countries.

The identification of the state of the monetary policy is not a simple task; actions of the central bank depend on its intentions concerning the stance of the monetary policy as well as the state of the economy. Therefore, how one isolates the effects of a central bank's monetary policy per se, and thus the identification of the components of the central bank's policy that are not reactive to the state of the economy is important. The Vector Autoregressive (VAR) model is a widely

[1] One may consult Cushman and Zha (1997) and Kim and Roubini (2000) for further information on the effect of US monetary policy shocks on developed markets.

used method for identifying monetary policy shocks (see Christiano et al., 1999 for an extensive discussion of this issue). However, Rudebusch (1998) criticizes the VAR methodology on several grounds: its being time-invariant, its linear structure (which is taken for granted in VAR literature), the variables not being included in a monetary VAR, the ordering of the variables in VARs, and the long distributed lags which show that monetary policy reacts to old information.

Alternatively, Romer and Romer (1989) proposed looking at the statements of the Central Bank to identify the monetary policy. This paper, similar to Kuttner (2001) identifies the monetary policy by analyzing the futures market data. To be specific, the difference between US 30-day federal fund futures data and the Federal Funds rate on the future date is observed. However, VAR methodology is used to capture the dynamic effect of the US monetary policy stance on an emerging market's financial variables rather than to identify the monetary policy shocks.

In the early studies of Cook and Hahn (1989) and Roley and Sellon (1995), only the actual changes in the federal fund target rate were considered as the monetary policy changes. No consistent result was reported, due to the lack of a distinction between expected and unexpected changes. These studies were also examples of *event studies*, in which higher frequency observations, mostly daily data, are used to analyze the reaction of equity markets to monetary policy in identifying monetary policy shocks.[2] One of the shortcomings of these event studies regarding monetary policy and equity markets is that monetary policy changes are measured simply as the changes in policy rates on the days when policy changes occurred.[3] In contrast to these studies, Gurkaynak (2005) and Gurkaynak et al. (2005) using intraday data, as well as Kuttner (2001), and Bernanke & Kuttner (2005) using a 30-day Federal Funds futures rate have shown that on the day of the Federal Open Markets Committee (FOMC) announcements,

[2] According to Craine and Martin (2003), in event studies, it is assumed that shocks other than monetary policy surprises either do not occur on event days or do not affect short maturities on event days. Poole, Rasche and Thornton (2002) were the first to recognize that the change in a short-maturity interest rate on the event days measures the monetary policy shock with error. They argue that the methodology suggested by Poole and Rasche (2000) and by Kuttner (2001) partly eliminates the measurement error associated with identifying unexpected changes in the Federal Funds target, which cause a downward bias in the estimate of the response of the Treasury rates to unexpected target changes. In order to overcome this problem, Craine and Martin (2003) implement an errors-in-variables model.

[3] In two related studies, Melvin et al. (2004) focused on inference regarding shifts in the dollar-sterling exchange rate during Monetary Policy Committee (MPC) meetings of the Bank of England, and Sager and Taylor (2004) examined the systematic patterns in the euro-dollar foreign exchange market on days when the Governing Council (GC) of the European Central Bank announced its interest rate decisions versus other days.

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markets do not react to the announcements *per se*, but mainly to their *unexpected* component, which is consistent with the *efficient market hypothesis*.[4]

Rather than event study data, Kuttner (2001) and Bernanke & Kuttner (2005) used monthly data to assess the effect of policy changes in which a surprise policy action can occur in any month, and a policy surprise can be represented by a failure to change the Federal Funds target rate in any month. Similar to these studies, we define the surprises in monthly intervals. This is similar to performing regression analysis as an event study by using only the differences in meeting dates, allowing inactions as well as actions to create policy surprises. Unlike the event study approach, however, this approach allows target rate changes to come in any month—not just on the FOMC meeting dates—so that the inter-meeting changes will still be in the sample. This approach will also allow us to avoid the strong assumption that policy actions are associated with meeting dates and to provide a framework associated with the VAR methodology on monetary policy shocks. Using monthly data rather than adopting the event study approach also addresses the criticism raised by Craine and Martin (2003). Here, we do not use intraday data due to the unavailability of such data for selected MENA countries. In addition, assuming that we had the data, the time interval when both of the markets are open is limited to approximately two to three hours a day.

In this paper, we have examined how a US monetary policy shock affects the financial variables of a set of MENA countries: Algeria, Bahrain, Israel, Jordan, Kuwait, Tunisia and Turkey. These countries are small, open economies in which factors outside of these countries are likely to play a large role in determining their financial variables. In our analysis, the USA serves the rest of the world, and MENA countries are relatively small and thus not likely to have an effect on the USA. To this end, in accordance with Kuttner (2001) and with Bernanke and Kuttner (2005), unanticipated Federal Funds shocks on Algerian, Bahraini, Israeli, Jordanian, Kuwaiti, Tunisian and Turkish short-term interest rates are examined using a monthly frequency. Although Ellingsen and Söderström (2003) consider the pitfalls of VAR methodology to be the necessity for using low frequency data and a heavy dependence on the included data series and the econometric specification; this methodology led us to identify the dynamic effect of the unanticipated exogenous change so that its effects on various asset prices can be examined via impulse response functions (see Bredin et al., 2004).

The paper proceeds as follows. Section 2 presents the methodology in this study. Section 3 introduces the data and reports the findings of the estimates. Finally, section 3 concludes the paper.

[4] According to the efficient market hypothesis, asset prices should reflect all information available at any point in time (Fama, 1970).

## 2. Methodology

This paper applies the block recursive VAR estimation technique developed by Cushman and Zha (1997) to assess the effect of US monetary policy shocks on a small open economy. The model is used to identify the impact of the change in the US Federal Funds futures rate on a set of MENA countries' short-term interest rates. The model presented here has two variables: one is the unanticipated part of the US monetary policy, and the other is the MENA countries' short-term interest rates. In our VAR model, the MENA countries' financial variables are affected by the current and past values of the US monetary policy stance, but not vice versa. This imposes the restriction that events in the US markets affect MENA countries' markets but that developments in the MENA countries' markets do not affect the US economy.

The structural form of the VAR model suggested by Cushman and Zha (1997) is expressed by the following

$$A(L)\,y(t) = \varepsilon(t) \tag{1}$$

where *A(L)* is a 2x2 matrix polynomial in the lag operator *L*, *y(t)* is the *1x1* observations vector, and $\varepsilon(t)$ is the *2x1* vector of structural disturbances. The model can be specified as follows:

$$y(t) = \begin{bmatrix} y_1(t) \\ y_2(t) \end{bmatrix}, \quad A(L) = \begin{bmatrix} A_{11}(L) & 0 \\ A_{21}(L) & A_{22}(L) \end{bmatrix}, \quad \varepsilon(t) = \begin{bmatrix} \varepsilon_1(t) \\ \varepsilon_2(t) \end{bmatrix}. \tag{2}$$

Here we assume $\varepsilon(t)$ to be uncorrelated with *y(t-j)* for *j>0* and *A(0)* to be non-singular. The block exogeneity (which is zero) is denoted by $A_{12}(L)$. Moreover, the contemporaneous and lagged values of $y_1(t)$ are exogenous to the second block.

In our specified model, the vectors $y_1$=[*unexpected change in the US Federal Funds futures rate*] and $y_2$=[*change in the short term interest rates* of each of the MENA countries] are the observation matrices, and the lag order of each country is determined by Bayesian Information Criterion (BIC).

The calculation of the unexpected change in the US Federal Funds futures rate is defined by Kuttner (2001) as follows:

$$\overline{\Delta \tilde{r}}_s^{\,u} = \frac{1}{m} \sum_{i \in s} \tilde{r}_i \; - f_{s-1}^{\,l}, m \tag{3}$$

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where $\tilde{r}_s^u$ denotes the unexpected component of the Federal Funds rate, $\tilde{r}_i$ is the average Federal Funds rate in month *s*, and $f_{s-1}^1$ is the one month futures rate on the last day of the month $s-1$. Thus, the unexpected change in the Federal Funds rate is calculated as the average rate in month $s$ minus the one month futures rate on the last day of month $s-1$.

## 3. Data

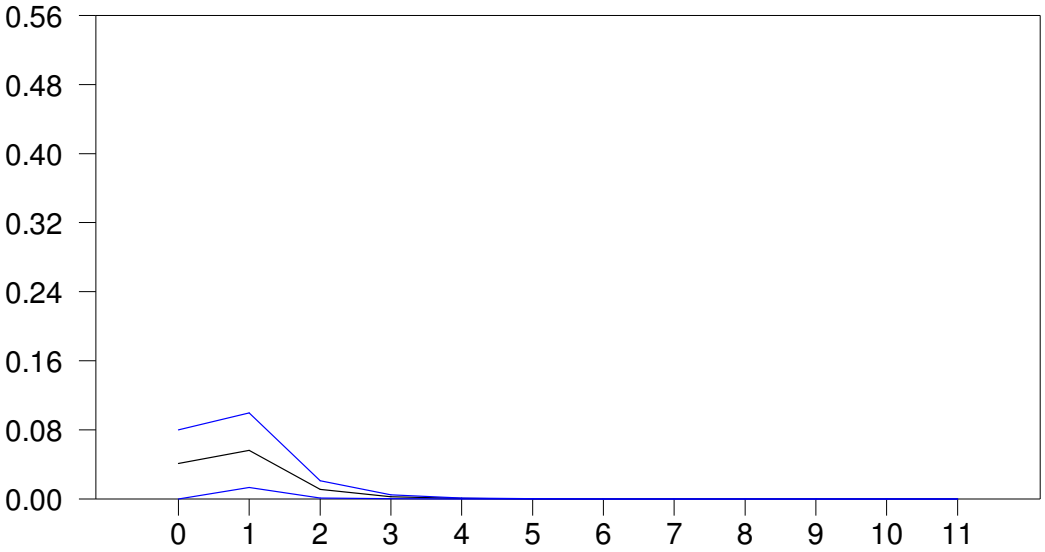
In this paper, we report two sets of results: the first one uses the short term interest rates (as defined by the International Monetary Fund—International Financial Statistics and Datastream) for seven MENA countries, and the second one uses four interest rates for different maturities from Turkey. The seven countries that we used for the short-term interest rates are Algeria, Bahrain, Israel, Jordan, Kuwait, Tunisia and Turkey. The data regarding the short-term rates are the money market rates for Algeria, Jordan and Tunisia; the Treasury bill rate for Bahrain, Israel and Turkey; and the interbank deposit rate for Kuwait. The data for Algeria was gathered from *Datastream*, the data on Turkey is from the Istanbul Stock Exchange, and the rest of the countries' interest rates were taken from the International Monetary Fund—International Financial Statistics. For Turkey, besides (3-month) Treasury bill rates, additional interest rates were used, 12 month Treasury bill rates were gathered from the Istanbul Stock Exchange, and Treasury auction interest rates as well as interbank interest rates were obtained from the electronic data dissemination system of the Central Bank of the Republic of Turkey. The data for the Federal Funds futures rates were obtained from Bernanke and Kuttner (2005) and were updated from the *Datastream* database. The data used in estimations are monthly, but the period varies from one country to another due to data availability. For the first part of the analyses, we gathered data on Algeria for the 1994:03–2005:12 period; on Jordan for the 1999:01–2005:12 period; on Kuwait for the 1992:11–2005:12 period; and on Bahrain, Israel, Tunisia and Turkey for the 1989:03–2005:12 period. For the second part of the analysis, data on Turkish interest rates covers the 2002:01–2005:12 period. The choice of the earliest starting date is due to the Federal Funds futures market having been established in 1989.

## 4. Empirical Evidence

Economic theory suggests that there are various ways that a higher Federal Funds rate can affect domestic rates. Firstly, under the uncovered interest rate parity condition, if the exchange rate does not completely adjust to changes in global interest rates, then an unanticipated increase in US interest rates will cause an increase in interest rates. Secondly, a higher Federal Funds rate may indicate

greater optimism about the strength of the US economy. This may encourage international liquidity movement to the USA and decrease liquidity for the rest of the world (see Calvo et al., 1993 and 1996 and Wongswan, 2005).

Figure 1: The Response of the Money Market Rate of Algeria.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

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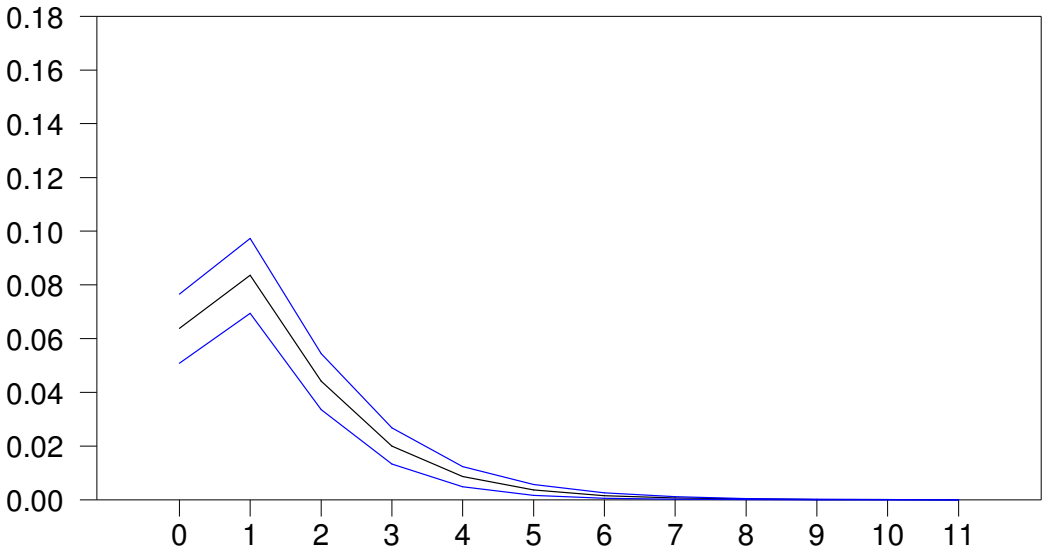
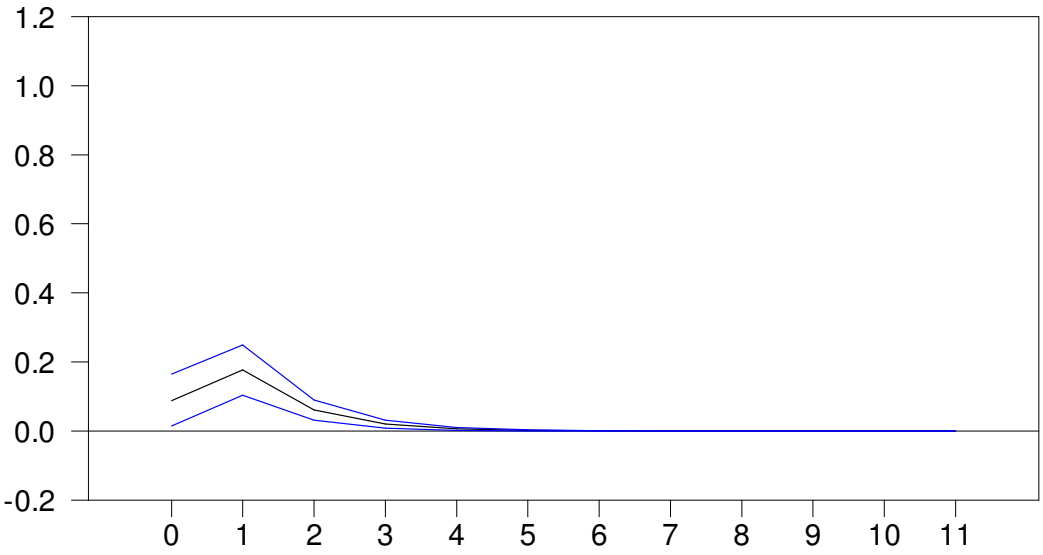
Figure 2: The Response of the Treasury Bill Rate of Bahrain.



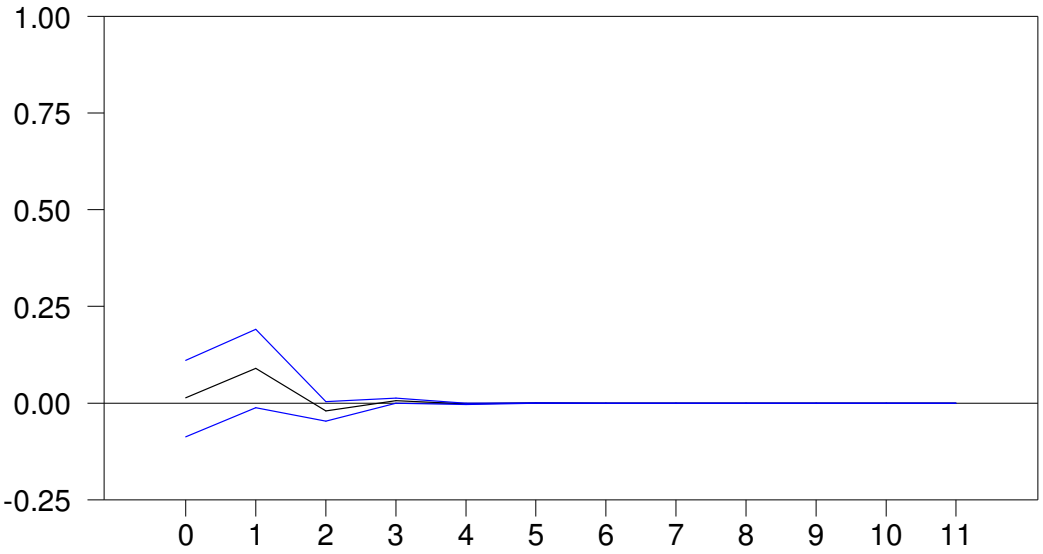

Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figure 3: The Response of the Treasury Bill Rate of Israel.



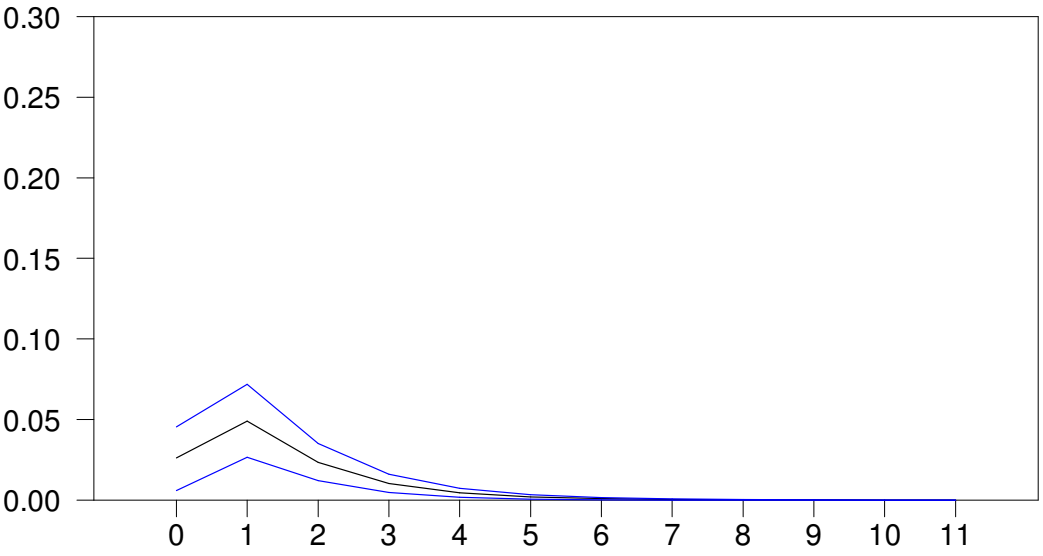

Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figure 4: The Response of the Money Market Rate of Jordan.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figure 5: The Response of the Interbank Deposit Rate of Kuwait.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

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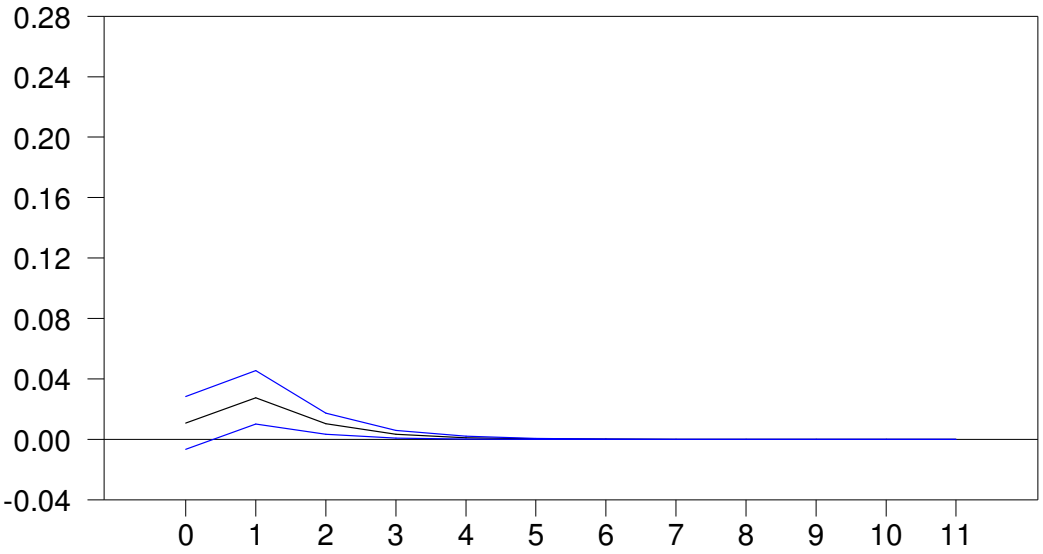
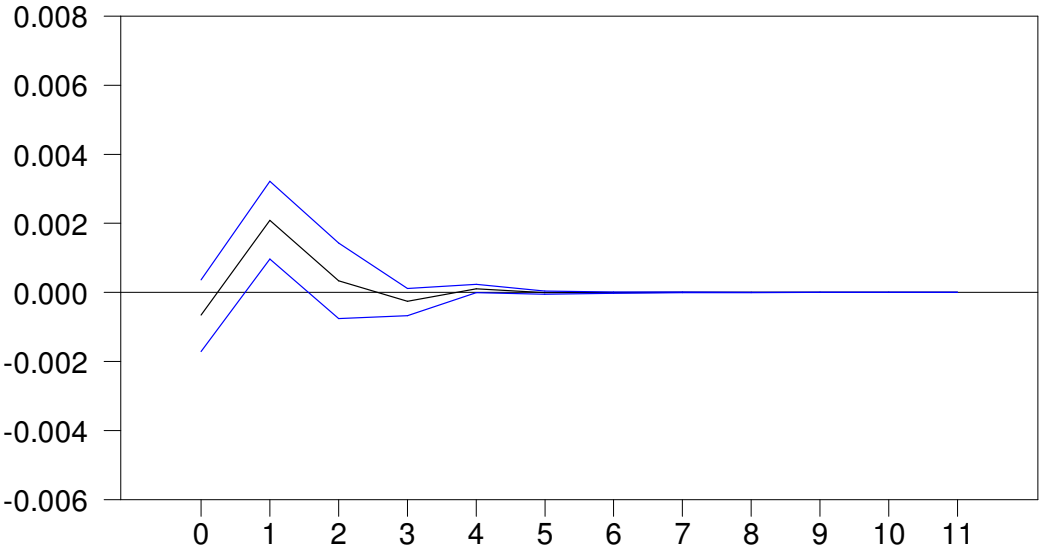
Figure 6: The Response of the Money Market Rate of Tunisia.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figure 7: The Response of the Turkish 3 Month Treasury Bill Rate for the 1989–2005 period.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figures 1 through 7 report the responses of each variable of the selected MENA countries to one-standard deviation shock in the unanticipated change in Federal Funds rates, where the lag order was always one for each country, as suggested by the Bayesian Information Criterion. The Bayesian Simulation Method, with replications of 2500 iterations, is used to obtain the confidence intervals for the impulse response functions. In our model, the impulse response functions are gathered from bootstrap simulations in which the confidence intervals of impulse responses are 90%.[5] In the figures, the middle lines show the impulse response functions, and the upper and lower lines represent the confidence intervals. When the confidence interval contains the horizontal line, the null hypothesis that there is no effect of US monetary policy changes on the selected MENA countries' financial variables cannot be rejected. Hence, adding the horizontal line for that particular period shows evidence of statistical insignificance.

When the impulse responses are considered for each of the MENA countries, it can be observed that overall, a one standard deviation shock to US monetary policy has positive effects on each countries' interest rates. This is in line with what we expected. As the US interest rates increase, the interest rates of the selected MENA countries are also expected to increase. Moreover, for all the countries, the effect reaches its peak in the first period after the US shock.[6] This positive effect is statistically significant for all the countries except Jordan. Moreover, we observed that the contemporaneous effect was always positive except for Jordan and Turkey. We considered it may be too restrictive to use the Bayesian Information Criterion to determine the lag order, thus we also determined the lag order by using the Akaike Information Criterion. The lag orders are still one for Algeria, Israel and Kuwait, but different lag orders are estimated for Bahrain (9), Jordan (11), Tunisia (6) and Turkey (11). We estimated impulse responses for these countries with extended lags. The estimates for

[5] One can consult Lütkepohl (2005) for a discussion of the bootstrapping method. Moreover, setting the confidence at 90 is common; see, for example, Berument and Dincer (2005).

[6] Kuttner (2001) examines the effects of the unexpected changes in the US Federal Funds rates on the longer-term interest rate changes. In order to assess any long-run relationship between the variables of interest and to determine whether the variables are cointegrated or not, we performed Augmented Dickey Fuller and Phillips Perron unit root tests for interest rates both in level and in difference (these unit root tests are not reported here but are available from the authors upon request). The test results in level show that, except for Jordan, all series have unit roots. No series has unit roots in differences. Thus, these series could not be cointegrated. Furthermore, parallel to Kuttner (2001), we performed the analyses between unexpected changes in the US Federal Funds rates and domestic interest rate changes.

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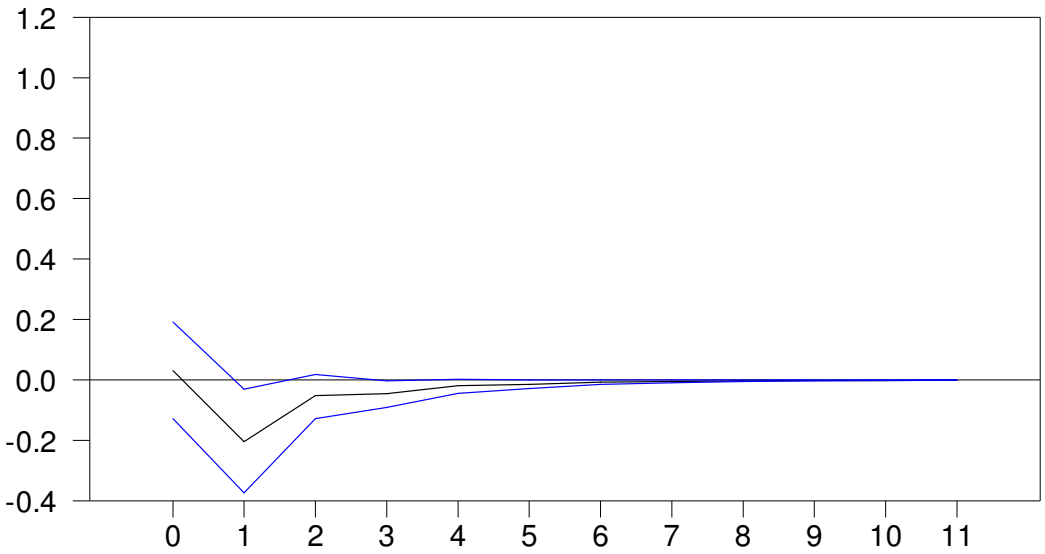
Bahrain, Tunisia and Turkey are similar, but the evidence for Jordan is slightly better.[7]

The relationship between US monetary policy and domestic interest rates may vary for different interest rates and for different sub-periods. Conducting such analyses for the above-mentioned seven countries could be too much for a single paper. We will repeat the exercise for only a single country: Turkey. Turkey is an interesting case due to its economic history and financial market deepness. The country has well functioning and developed financial markets with numerous foreign investors. However, our full sample, the 1989–2005 era, covers different sub periods in which the monetary policy conduct was different. For example, in the 1989–1993 period, the Central Bank of the Republic of Turkey (CBRT) mostly conducted non-sterilized monetary policy actions, whereas between 1995 and 1999, the CBRT chose to implement a sterilized intervention policy. Then the CBRT adopted the exchange-rate-based stabilization program during 2000 until the outbreak of the crisis in February 2001. This was followed by the implicit inflation-targeting regime during 2002–2005. Thus, we only consider the 2002–2005 period when we assess the role of US monetary policy on Turkish interest rates.

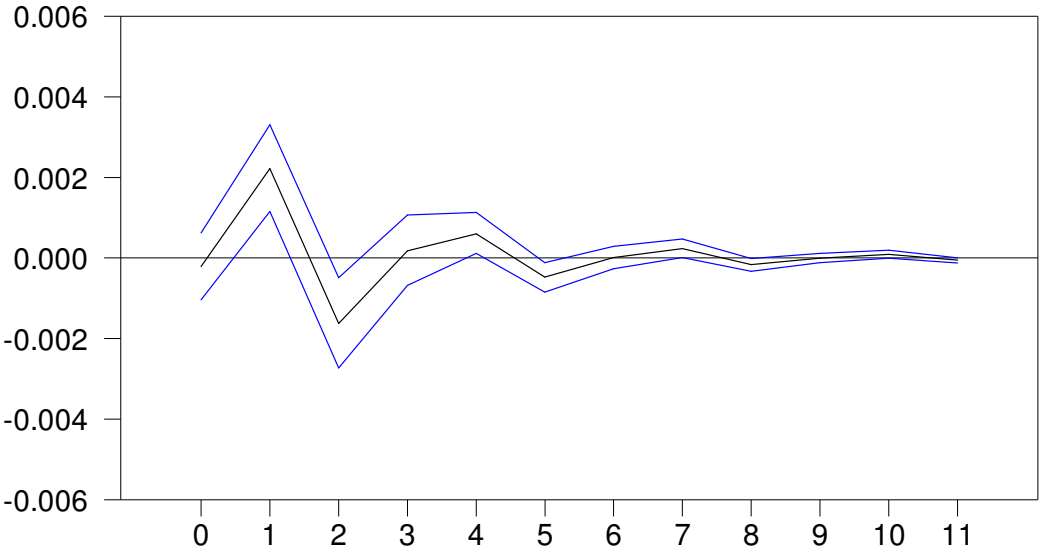
Figure 8: The Response of the Turkish Interbank Interest Rate for the 2002–2005 period.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

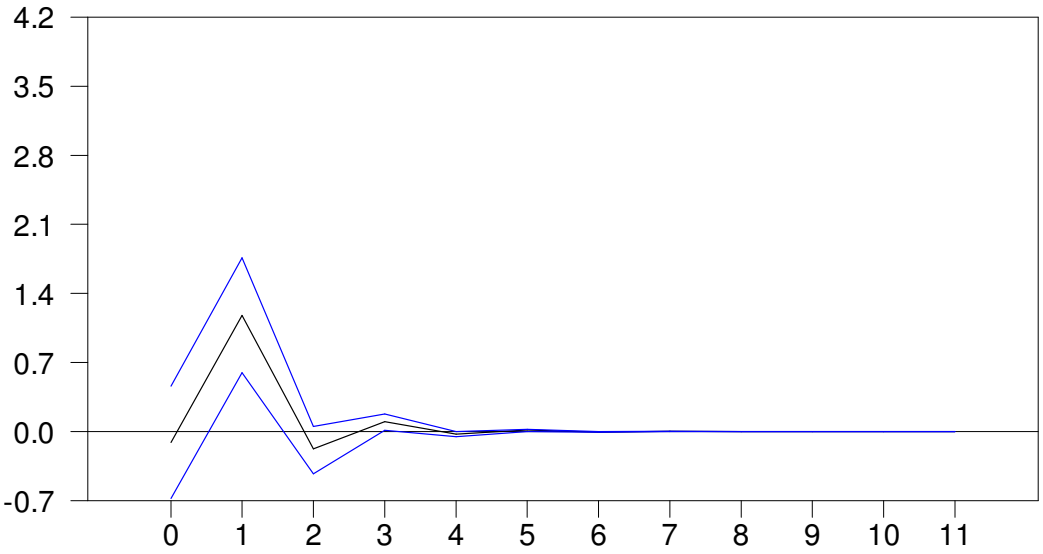
[7] These estimates are not reported in the paper but are available from the authors upon request.

Figure 9: The Response of the Turkish 3 Month Treasury Bill Rate for the 2002–2005 period.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figure 10: The Response of the Turkish 12 Month Treasury Bill Rate for the 2002–2005 period.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

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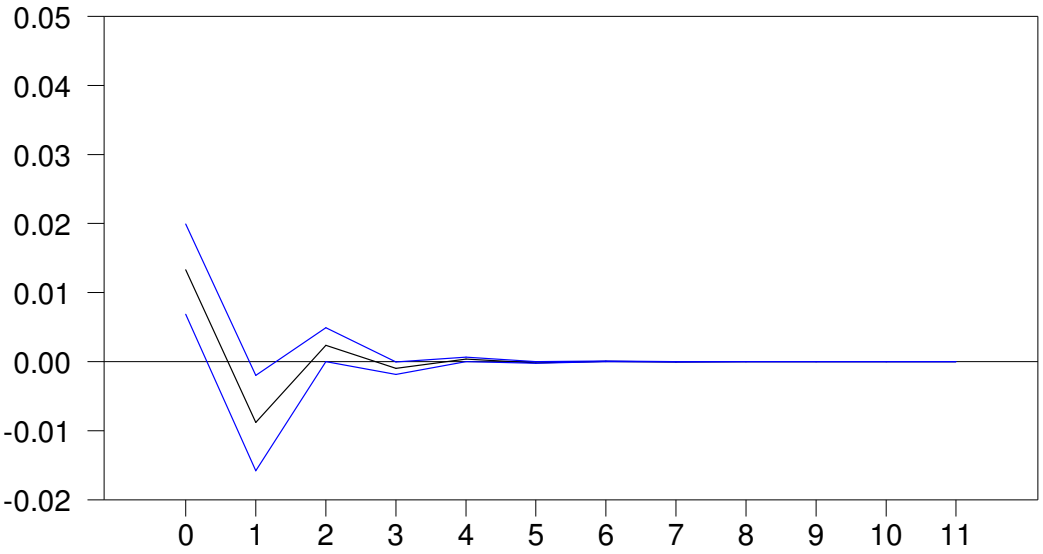
Figure 11: The Response of the Turkish Auction Interest Rate for the 2002–2005 period.




Note: The middle line represents the impulse responses, and the upper and lower lines represent the confidence intervals at the 90% level.

Figures 8 to 11 report the impulse responses of Turkish interest rates when one standard deviation shock is given to the US monetary policy variable. Figure 8 reports the impulse responses of interbank interest rates. Figure 9 reports the Turkish 3-month interest rates, while Figures 10 and 11 show the Turkish 12-month interest rates and Turkish treasury auction interest rates, respectively. The lag orders of the VARs are one, except for that used for the 3-month interest rate, which is two (as suggested by the Bayesian Information Criterion). The effect of US monetary policy changes is positive on 3-month and 12-month treasury bill rates in the first period and on the treasury auction interest rates contemporaneously. However, their effect on the two government controlled (or influenced) interest rates—interbank rates (mostly controlled by the Central Bank) and treasury auction interest rates (thanks to the three big government banks and social security administration whose presidents are also appointed by the government)—are negative in the first period. [8,9]

[8] We also determine the lag length for these four VAR specifications for Turkey by using the Akaike Information Criterion. The optimum lag lengths were 6 for the 3-month treasury bill rate and 4 for the 12-month rates. The optimum lag length was unchanged for the other two interest rates. Even if the basic results were to remain robust, with the extended lags, the effect of the US monetary policy changes was slightly more persistent for these two interest rates.

[9] Interest rates for 3- and 12-month rates are the constant maturity government bills that are traded by the public. Therefore, there is no direct control of these rates by the government.

The reverse position of the impulse response function of the interbank rate (and maybe the treasury auction rates) compared to the other three interest rates might be interpreted as the "leaning against the wind" approach of the policy authority, if one considers the interbank rate as a measure of the stance of the monetary policy.

## 5. Conclusion

This paper estimates the impact of an unanticipated Federal Funds target rate change on a set of MENA countries' interest rates. The conclusion is reached by using the block recursive VAR model over the 1989:03–2005:12 period. The sub-period after 2002 is also considered in the analysis for Turkey for different interest rates. The estimates suggest that the effects of the shock on the domestic rate were mostly positive.

With the biggest economy in the world, the USA can affect the interest rates of other countries. The first implication of the role of US monetary policy on domestic interest rates is that the conduct of US monetary policies will make domestic interest rates more volatile and financial markets less stable. This may make the conduct of the domestic monetary policy more conservative. Secondly, the transparency of the MENA countries' central banks on the conduct of their monetary policies is likely to play a more important role in the success of that policy. It should be made clear whether the change in the domestic monetary policy variable is due to preference change, expected (forecast) future inflation or the economic environment that may stem from the world interest rate,[10] so that the public can foresee if the change has a permanent or transitory effect and will be able to make more informative decisions. Thirdly, if the tool used by the central bank for conducting monetary policy is not interest rates but aggregates, such as money supply and exchange rate, then the selection of the domestic monetary policy tool is crucial to the success of the monetary policy. The reason is that the effect of the US monetary policy changes on the exchange rate and money supply might differ from the effect on short term interest rates. These three variables affect the economic performance differently; thus, selection of the policy tool may accelerate or slow down the effect of US monetary policy changes on the domestic economy. Fourthly, the effect of US interest rates on domestic interest rates tends to increase with globalization and financial integration. Thus, if the degree of integration can be controlled, it can be used as a tool to affect each country differently, as US interest rates increase.

[10] One can consult Ellingsen and Söderström, 2003, for the preference changes of the central bank.

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