

The Impact of Exchange Rate Shocks on Trade In Times Of Uncertainties: Evidence From Three Oil-Importing Countries In MENA

Brahim Guizani[†]

Abstract

On the basis of a monthly data relating to trade flows, nominal exchange rates and other economic variables and a VAR model framework, some impulse-response functions (IRFs) are estimated for three Oil-Importing Countries (OICs) of the MENA region. These IRFs were estimated for two sub-periods notably the periods of political transition in these countries that were characterized by high degrees of uncertainty. The main finding is that unlike what many might expect, during the periods of transitions a shock in the exchange rate has a very weak impact of the levels of exports and imports in all three countries. It is therefore concluded that the deteriorating international competitiveness of the OICs especially throughout the transition is related to other structural factors rather than the exchange rate.

Keywords: exports, imports, exchange rate shock, uncertainty, transition.

JEL classification: F10, F14, F17, F31.

[†]Associate researcher at WTO chair at Tunis Business School, University of Tunis.

Address: Tunis Business School, Mourouj, 2074, Tunis, Tunisia

Phone: 216- 53-258-525; 216-71-476-600; *Fax:* 216-71-477-555; *E-mail:* brahim_guizani@yahoo.fr.

Introduction

Since January 2011 a popular uprising broke out in Tunisia and ended up by ousting the then current president Ben Ali, who ruled the country with a rod of iron for more than twenty-three years. This event has escalated and spread as a ripple effect in several other countries such as Egypt, Morocco, Libya, Syria and Yemen which, likewise, experienced popular unrests and political instability that are still occurring to this time. This process that was coined by some observers as the *Arab Spring* has, in an environment of considerable uncertainties, put several MENA countries in a track of transition toward not only new political regimes of democracy and freedom but also toward new economic and social orders. Recall that the principle trigger of the uprisings was economic; namely *youth unemployment*.

However, it is, for the time being, too early to say that these countries are back to normal; rather they are still passing through a transition stage with all its uncertainties and risks. In fact, the inflation has since 2011 soared in Tunisia and Egypt (see figure 1). The real economy has, the same year, also incurred a severe shock in Tunisia, Egypt and to a lesser extent Morocco whose negative effects are still lived until now (see figure 2). During the aftermath of the popular uprising these three countries have been experiencing remarkable deteriorations of their trade and current accounts (see figure 3). In the same time, the exchange rates of national currencies have experienced huge depreciations with respect to the main trade partners' currencies; namely the euro and the U.S. dollar (see figure 4). The increasing pressures on the foreign currency reserves that Tunisia, Egypt and Morocco during the period of unrest that was characterized by huge political, economic and social instability have obliged them to move to a more flexible regime in their exchange rate markets.

The purpose of this paper is to provide evidence on the extent to which the exchange rate policy in three MENA countries, in transition and passing through high uncertainties and risks, has affected foreign trade. The three selected countries are: Tunisia, Egypt, and Morocco. Unlike other MENA countries, these countries experienced all the uncertainties of the Arab Spring episode and are classified in the category of oil-importing countries (will be referred as OICs). Through this research we aim to find out how have exchange rates shocks influenced the trade of these

countries with the world with a special focus on their post-political-shock periods (that we call in the following: *the transition periods*). We will compare between two periods; namely the period of a relatively more stability in the economic and political sides the comes before the Tunisian revolution of January 2011 (we call this period in the following *the normal period*) and the more troubled and confusing period that comes after this event that had a spillover effects on many other countries like the ones selected in our sample; i.e., Egypt and Morocco.

The rest of the paper is organized as follows. Section 1 presents a brief literature review. Section 2 provides the model to be used in this empirical research. Section 3 describes the data. Then section 4 presents the results of the empirical estimations and then we conclude.

2. Literature Review

Since the breakdown of the Bretton-Woods agreement and many world major trading nations have been embracing a regime of floating exchange rate determination, the economic theory has started to examine the relationship between the exchange rate, on the one hand, and trade on the other hand. Economists agree that is the uncertainties related to the exchange rate that can affect trade between nations.

A large part of the literature has focused on the impact of the exchange rate volatility on trade flows; namely exports and imports. Early literature has suggested that unexpected changes in exchange rates can reduce trade flows (see Artus (1983) and Brodsky (1984))

Using the standard deviation as a measure of the exchange rate risk Akhtar and Spence-Hilton (1984) show that during the period (1974 – 1981) the exchange rate variability did dampen the German bilateral trade with the U.S. Chowdhury (1993) using a data of the OECD G7 countries over the period (1973 – 1990) examined the effect of the exchange rate volatility on trade. On the basis of an error correction model, the results produced a significant negative relationship between export volume and exchange rate volatility.

On the bases of the U.S. bilateral trade flows to several industrialized countries throughout the period (1959 – 1985), Koray and Lastrapes (1989) find a weak relationship between trade and the exchange rate volatility. When they exclude the period of the fixed exchange rate regime; namely (1959 – 1972) Lastrapes and Koray (1990) find a significant relationship between the two studied variables.

Razin and Collins (1997) construct an indicator of the real exchange rate misalignment for a large sample of developed and developing countries. On the basis of regression analysis they find evidence of a non-linear relationship between the exchange rate and growth in the sample economies. They also find that moderate and moderately high under-valuations of exchange rates are associated with rapid economic growth. Hall et al (2010) reveal that the relationship between developing countries exports and exchange rate volatility depends on whether the country is an emerging market economy or not. Using a data throughout the period (1980 – 2006) the authors show that the relationship is negative and significant only for the non-emerging market economies.

Nabli and Veganzones-Varoudakis (2002) show the MENA countries' exports have been seriously affected by the overvaluation of their currencies despite the exchange rate policy reforms of the 1990s. They point out that the countries with more diversified economies and exports benefited more from the above-mentioned reforms than the others. Rey (2006) on the basis of a quarterly data between 1970 and 2002 finds that for Tunisia and Egypt there is a negative relationship between the exchange rate volatility and their exports to the European Union. On the other hand this relationship becomes positive for Morocco.

Achy and Sekkat (2003) study the effect of exchange rate policy on the exports of for 11 sectors over the period 1970–1997 in a sample of countries that include Tunisia, Egypt and Morocco. They find that the exchange rate management plays a crucial role in providing incentives for manufactured exports toward Europe. They suggest also that policymakers should be more concerned with misalignment than with volatility. Bahmani-Oskooee et al (2015) examining the link between exchange-rate volatility and trade flows for 36 separate export and import industries

vis-à-vis the United States, from 1994 to 2007 show that exports increase due to higher risk while imports stay nevertheless unaffected.

3. Model

Since the seminal work Sims (1980), Vector Autoregressive (VAR) models have been broadly by researchers to address the relationship between monetary and exchange rate policies and macroeconomic variables. Though VAR models are a-theoretical,¹ they are suitable because they come with a number of useful tools such as impulse response functions and variance decomposition that are useful in studying the effects of the shocks and their role and importance in specific historical periods.

As emphasized by Bini-Smaghi (1991) VAR methodology has two important advantages over other times series frameworks. First, VAR methodology can present dynamic relationship between variables. Second, VAR models do not impose explicit theoretical restrictions on the system variables.

Lastrapes and Koray (1990), Chowdhury (1993) and Koray and Lastrapes (1989) have used the VAR approach to examine the relationship between trade flows of the U.S. and the volatility of the exchange rate.

The structural VAR model can be written as follows

$$Y_t = A(L)Y_{t-1} + \xi_t \quad (1)$$

Where:

A(L) the matrix lag polynomial

Y_t is the vector of endogenous variables

X_t is the vector of exogenous variables

ξ is the residuals vector

The structural VAR model (1) can be rewritten as follows:

¹ In the sense that they are not bound by precise theoretical economic relationships.

$$Y_t = B(L)\varepsilon_t$$

Where:

$B(L)$ is the matrix lag polynomial

ε_t is the vector of the underlying of structural shocks

In this paper the endogenous variables we are going to use are the values of exports, ex , imports, im , the consumer price index, p , the short-term interest rate, r , and the nominal exchange rates of the Euro against national currencies, x^{eur} .

$$Y'_t = [ex_t, im_t, p_t, r_t, x^{eur}_t]$$

Following the empirical literature such as Bernanke and Blinder (1992), Forni et al. (2010), Bjornland (2008) and Holtemoller (2004), this study assumes a recursive structure of ordering in which the exchange rate shock affects the trade flows and prices with lags.

Moreover, as suggested by Eichenbaum and Evans (1995) in a small open economy, like Tunisia, the exchange rate should be placed last in the order of variables. It ensures a lagged response of monetary policy towards any change to exchange rate shocks.

On the other hand, many empirical studies that have extended the closed economy VAR model so as to make it an open economy model.² This extension typically involved the addition of some foreign variables, such as commodities price index and foreign interest rate. In the light of these theoretical suggestions, and getting inspired by Chailloux et al. (2009) the structural VAR model (1) will include a vector X_t of exogenous variables that comprises the commodity price, oil , the European Union's industrial production index, ip^{eur} , and the short-term interest rate in the European Union, r^{eur} .

$$X'_t = [oil_t, ip^{eur}_t, r^{eur}_t, r^{eur}_{t-1}]$$

These exogenous variables, such as the commodity price, were proposed by

² Such studies are the following: Eichenbaum and Evans (1995); Cushman and Zha (1997); Kim and Roubini (2000); Kim (2003); Fung (2002).

researchers (Sims, 1992; Christiano et al., 1999; Kim and Roubini, 2000).³ Note that to conserve degrees of freedom, standard VARs rarely employ more than six to eight variables

4. Data

The data we use in the analysis are of monthly frequency. Each country's exports, imports, exchange rate, and consumer price index (CPI), fuel oil price per barrel⁴ and Euro area's industrial production index data comes from IMF IFS database. Interest rate data come from various sources. For Egypt, overnight interbank interest rate from Datastream is used. Morocco's money market rate is taken from IMF IFS database. For Tunisia, rate of the money market – TMM comes from Central Bank of Tunisia.

The data was expressed in natural logarithms and seasonally adjusted except for both domestic and foreign short term interest rates, which were expressed solely in terms of levels and not seasonally adjusted.⁵

Sample periods depend on data availability and begin in January 2007 for Egypt and Morocco, and in January 2000 in case of Tunisia. Samples end in September 2016 for Egypt and Morocco and in October 2016 for Tunisia.

5. Results

This section presents the results of the VAR model estimations; for each country an impulse-response function (IRF) is estimated in order to depict the responses of trade flows; namely the exports and the imports, to a positive shock in the nominal exchange rate.

In order to investigate how has uncertainty influenced the relationship between trade and the exchange rate, the sample period of each country has been divided into two sub-periods; namely a more stable pre-popular uprising *normal period* and a more

³ Kim and Roubini (2000) suggest the world oil price (WOP) as a proxy for expected inflation, to surmount the problems of price puzzles and endogeneity

⁴ UK Brent.

⁵ The X11 method was employed to convert the gross time series into seasonally adjusted series.

uncertain and volatile post-popular uprising *transition period*. For each country a Chow test is run in order to determine the date of a structural break in the data. All the given structural break points were found in the period the followed January 2011; i.e., the date of the outbreak in Tunisia of a process of radical political changes in many other Arab countries including our sample countries Egypt and Morocco.

Thus, by comparing the two sub-periods we are able to assess the impact of the growing uncertainty in the OICs on the relationship between trade and the exchange rate. Recall that during the period of transition, each country has experienced a profound depreciation of its national currency with respect to the major foreign currencies; i.e., the U.S. dollar and the Euro (see figure 4). Moreover, during the periods of transition that were characterized by not only severe changes in the political side but also by tremendous economic and social pressures, the current account and trade balances have incurred expanding deficits in Tunisia, Egypt and Tunisia (see figure 4). The two main exporting sectors on which the OICs count remarkably; namely *tourism* and *manufacturing* were severely hit by the political crisis.

The Chow test reveals a structural break in August 2011 for Tunisia. This date not only occurs just few months after the collapse of the political regime but it corresponds exactly to the adoption by the central bank of Tunisia of a new exchange rate policy framework. This framework aimed at stabilizing the exchange rate market in this country. For Egypt, the Chow test reveals a structural break in June 2013; this is the very date when Egypt has experienced its second *coup d'état* in less than three years.⁶ The data of Morocco are ranging between 2007 and 2016. At a high level of statistical significance the Chow test rejects the null hypothesis of no structural break in January 2011. Hence the sample period for this country is divided into two sub-periods; namely (2007 – 2010), as the earlier period, and (2011 – 2016) as the period of transition.⁷

⁶ The first one has taken place in February 2011 as an event in the process of the domino effect initiated by the Tunisian revolution one month before.

⁷ The Chow test of a structural break at an unknown date gives April 2009 as a structural break point. But since this date does not give us a sufficient data to estimate properly the earlier period we chose the date of the eruption of the so-called Arab Spring as a break point for Morocco. Note however that the results remain qualitatively unchanged.

Figures 5, 6 and 7 represent the estimated responses of the levels of the exports and the imports to a positive shock in the exchange rate in Tunisia, Egypt and Morocco respectively (an exchange rate shock means a depreciation of the national currency). The estimated responses are shown for the entire sample period and each sub-period; namely the normal period and the transition period.

In the case of Tunisia, there is clear evidence that a one unit depreciation of the Tunisian dinars has negative effects not only imports but surprisingly on exports also. This finding holds true for in each sub-period. In the normal period a one standard deviation increase in the exchange rate induces a rapid decrease in volume of exports of almost 3 percent after just one month. The diminution of exports continue for further several months until it fades away by the seventh month from which the effect becomes weak and not statistically significant and they get back to their pre-shock level. On the part of imports and as it is theoretically predicted a one unit depreciation of the exchange rate reduces them by almost 1.8 percent by the second month that follows the shock. The decrease in imports continues for a longer period than the imports and it fades away by the tenth month following the shock when the exchange rate impact becomes very weak and statistically not significant.

With regard the transition period, the impact of a one unit depreciation of the Tunisian dinar on exports and imports is the same as in the normal period, nevertheless it is much weaker in terms of statistical significance. This finding can be a proof in favor of the argument that the exchange rate is not to blame about the increasing trade deficit that Tunisia has experienced after its revolution.

Similar observations can be drawn from the export and import responses estimations after an exchange rate positive shock in Egypt; exports decline start to be felt since the second month following the shock. They continue in this course until they reach the sharpest decline of almost 2 percent by the sixth month. The negative effect on Egyptian exports continues for a longer period than Tunisia to fade away by the end of the second year that follows the exchange rate shock when their responses become statistically not significant. Imports, as predicted by the theory, decline sharply after a depreciation of the Egyptian pound. Like exports the impact on imports start to be felt after the second month following the shock and continues to be

statistically significant for roughly one more year. As shown by the figure, the same exchange rate shock has a disproportional negative impact on both exports and imports; in fact, by the fourth month the latter decrease by more than 2 percent compared to the less-than-2 percent variation of the former.

Throughout the normal period the impact of an exchange rate innovation on exports and imports is almost the same as for the whole period of study. Nevertheless, the intensity of the impact is severer for both variables this time. In fact, by the fourteenth month following the shock the decline in exports crosses the level of 3 percent; a higher level than the whole period's. Likewise, the same depreciating shock decreases imports more severely on imports during the normal period than the whole period of study; since the second month Egyptian imports continue to decrease relentlessly until they reach the bottom level of 3.5 percent by the fifteenth month.

Figure 4 shows also the impact of a depreciating shock of the Egyptian pound on exports and imports during the tremulous transition period. The bottom part of the figure shows that the intensity of this impact is very weak and no longer significant on Egyptian foreign trade throughout this sub-period. This finding is similar to Tunisia's transition period. Like Tunisia in Egypt also the exchange rate is not to blame for the soaring deficit of the trade balance during its own transition period and therefore other, likely structural, factors should be investigated for that.

The impacts of an exchange rate's positive shock on Moroccan exports and imports are shown by figure 7. In the whole, these impacts are obviously milder when compared with both Tunisia and Egypt. In fact, throughout the whole sample period the effect of a one unit depreciation of a Moroccan dirham on exports is very weak and cannot be considered as statistically significant. However, one should note that this exchange rate shock induces, as in Tunisia and Egypt, a reduction in Moroccan exports. With regard to imports, as expected by the theory, the depreciation of the domestic currency induces a reduction of imports that start to be felt after the second month following the shock and reaches its peak of 1.4 percent by the third month. The impact of the shock on imports, compared with Tunisia and Egypt, fades away sooner in Morocco and becomes not statistically significant by the fifth month.

From the other graphs in the same figure, it appears that the above-mentioned statistically significant Moroccan import response to an exchange rate increase by a one standard deviation is attributed the transition period; in fact, throughout the normal period a shock in the exchange rate has a very weak effect on imports, whereas the same shock becomes having a statistically significant effect on the same variable in the period of transition. During the period (2011 – 2016), from the second month after the shock Moroccan imports decrease by 2 percent with respect to their initial level at the time of the shock. This strong effect is however short-lived and imports start to stabilize and get back to their initial level from the fifth month.

Despite the weak effect of a shock in the exchange rate market on Moroccan trade flows during the very stable normal period, note however that, unlike in Tunisia and Egypt, the response of exports is positive and the response of imports is negative, and that in accordance with the predictions of the theory.

Conclusion

In this paper we examined the impact of an exchange rate shock on trade flows during times of increasing uncertainties in three oil-importing countries in the MENA region. The estimations of the impulse-response functions of Tunisia and Egypt have showed almost the same results. The first striking result is that, in general, a depreciating shock of the domestic currencies in these two countries induces not only a significant decrease in the level of imports but also a significant decrease in the level exports. This result shows that, unlike what one might expect, depreciation in the currency of both countries does not necessarily enhance their international competitiveness. Firms' competitiveness in both countries seems to be more related to other factors than to the value of the currency.

The second important result derived from this research is the weak impact of an exchange rate shock on the level of both exports and imports in Tunisia and Egypt during times of uncertainties. This finding shows that during this period the exchange rate has not had any role relating to the trade balance soaring deficit. This result confirms the previous that the deteriorating competitiveness of exporting firms in both countries is related to other factors rather than the exchange rate.

For Morocco, the impact of a shock in the exchange rate seems to have a very small role in shaping trade flows. Though during the entire period and the two sub-periods, the impact on exports is weak and not significant, the level of imports in Morocco seems to be slightly negatively impacted by a depreciating shock of the Moroccan dirham during the transition period. Note however that this impact is very short-lived and the level of imports stabilizes very quickly.

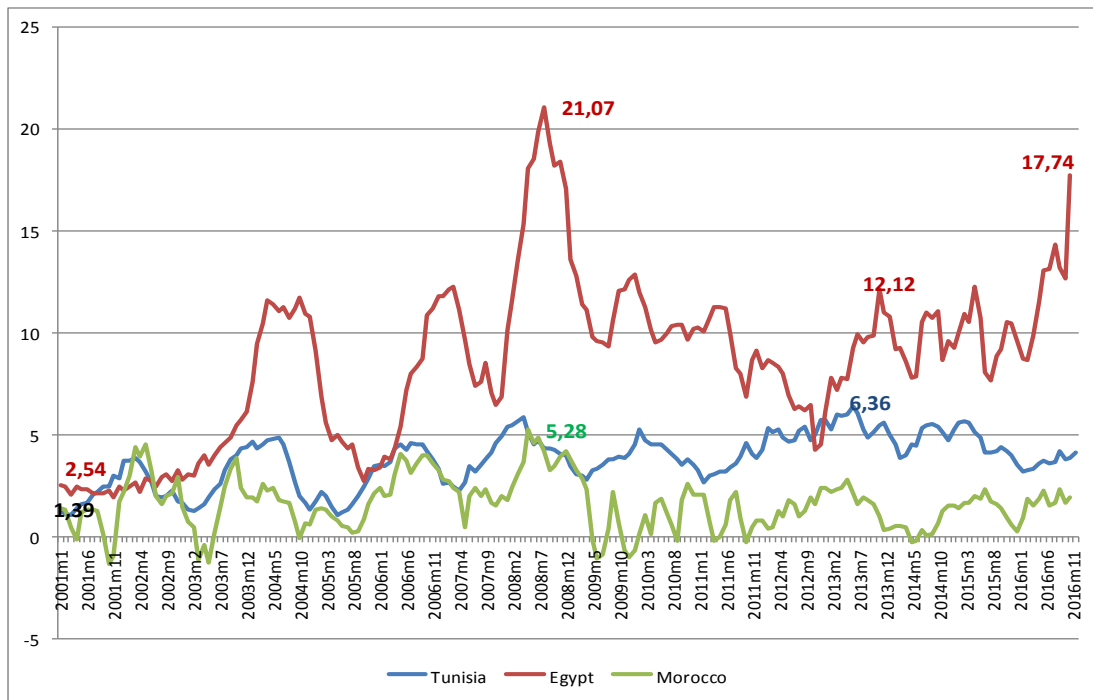


Fig. 1 Year to year inflation rate in percentage

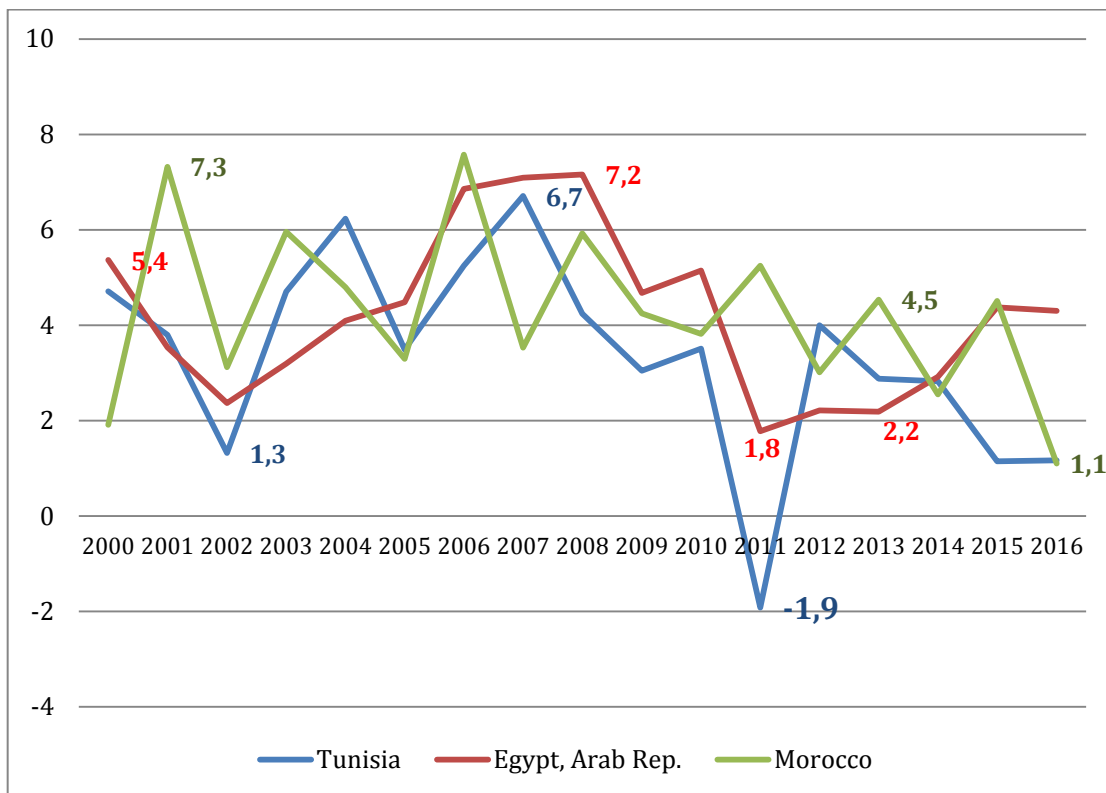


Fig. 2 Year to year GDP growth in percentage, World Bank

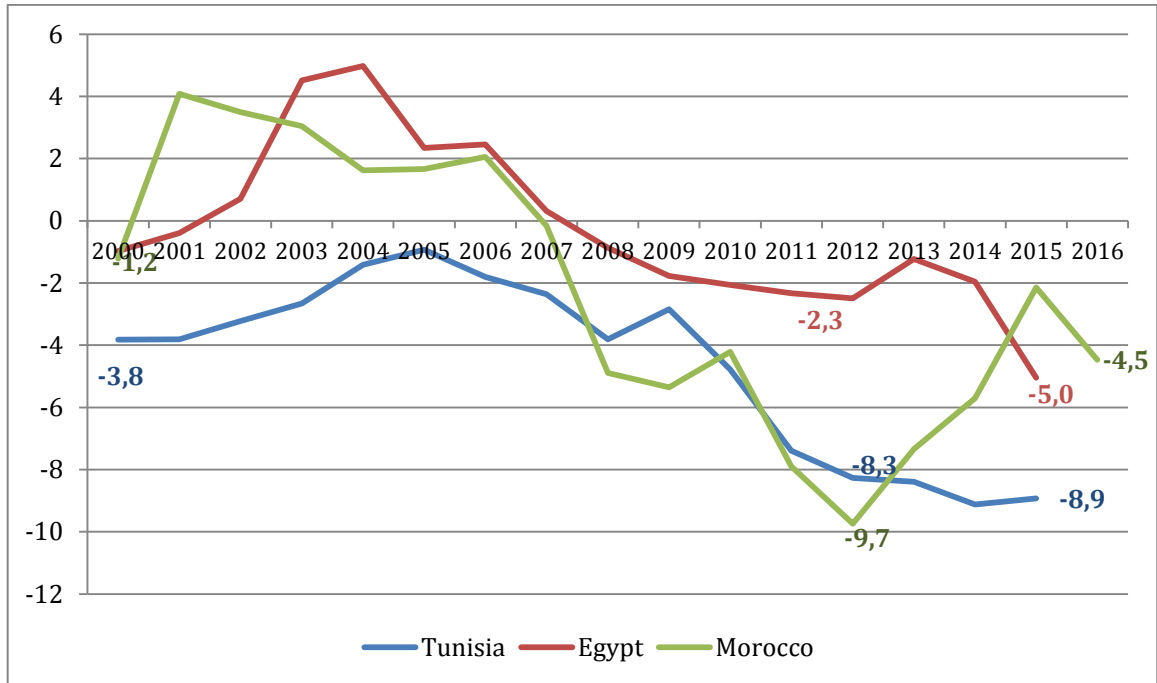


Fig. 3 Current account balance (% of GDP), World Bank

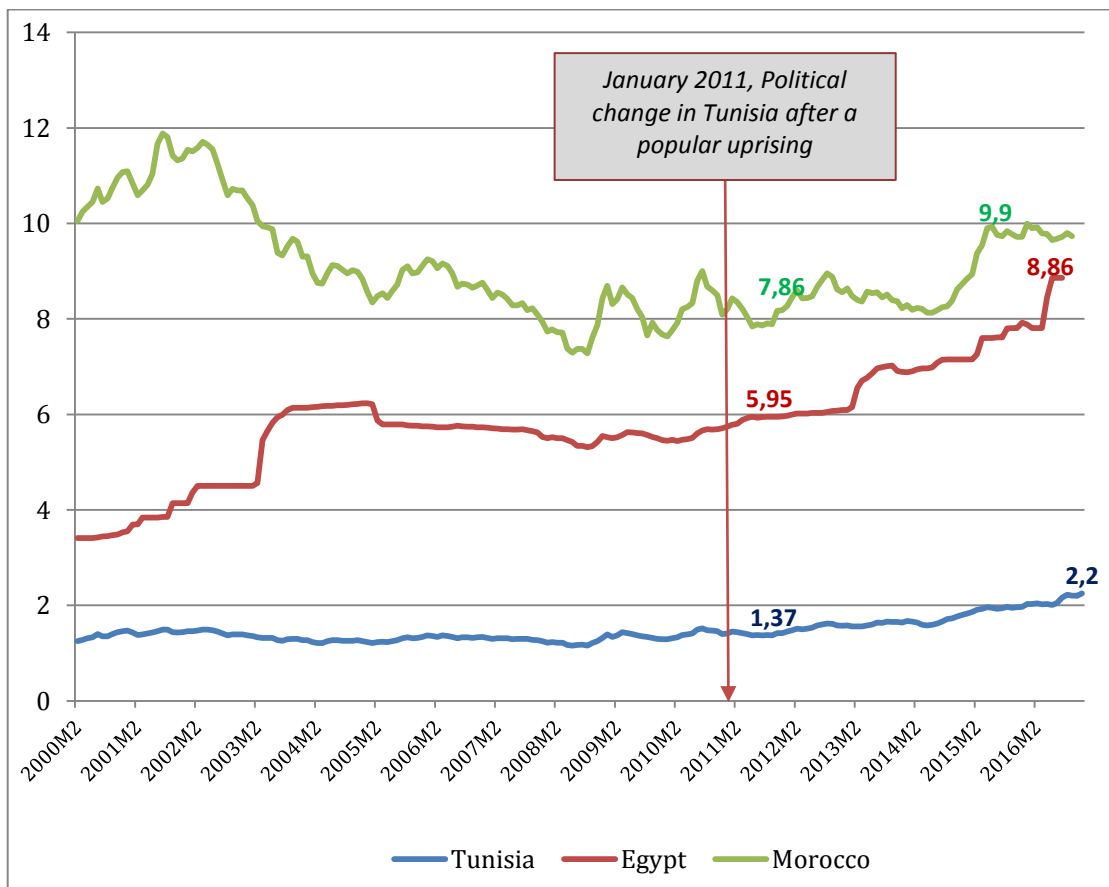


Fig. 4 Monthly exchange rates average of national currencies towards the U.S. dollar, IMF

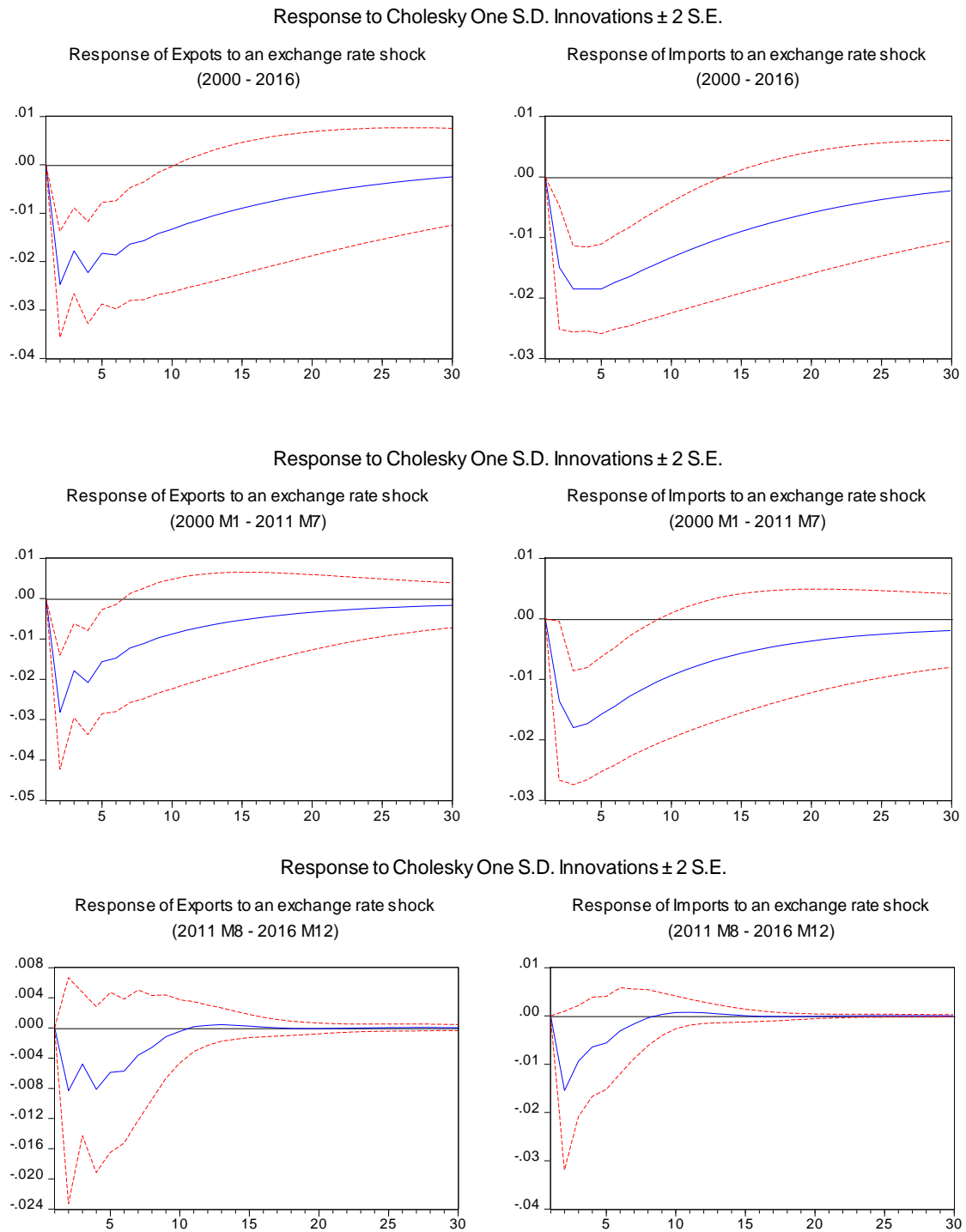
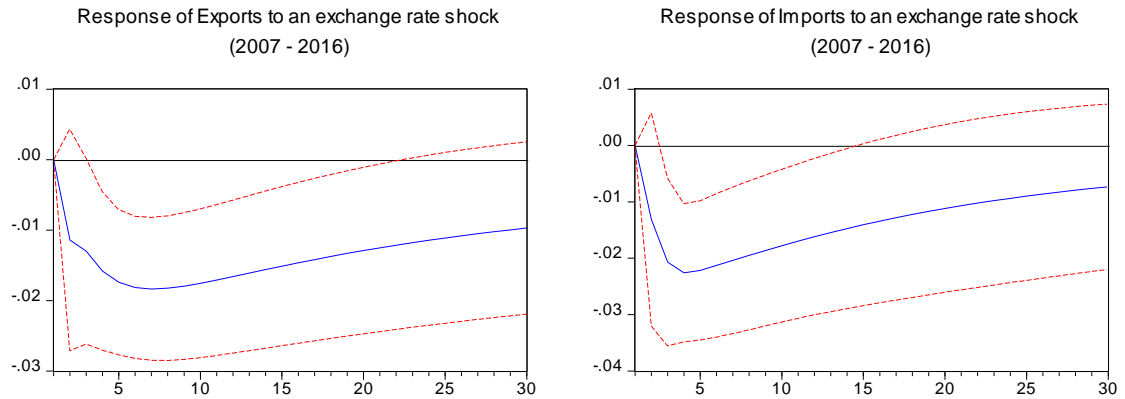
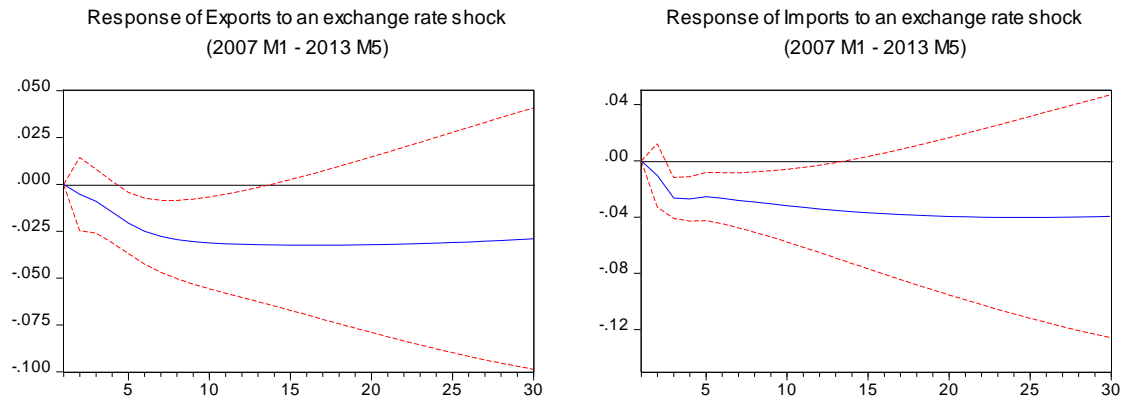


Fig. 5 IRF, Tunisia

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



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



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

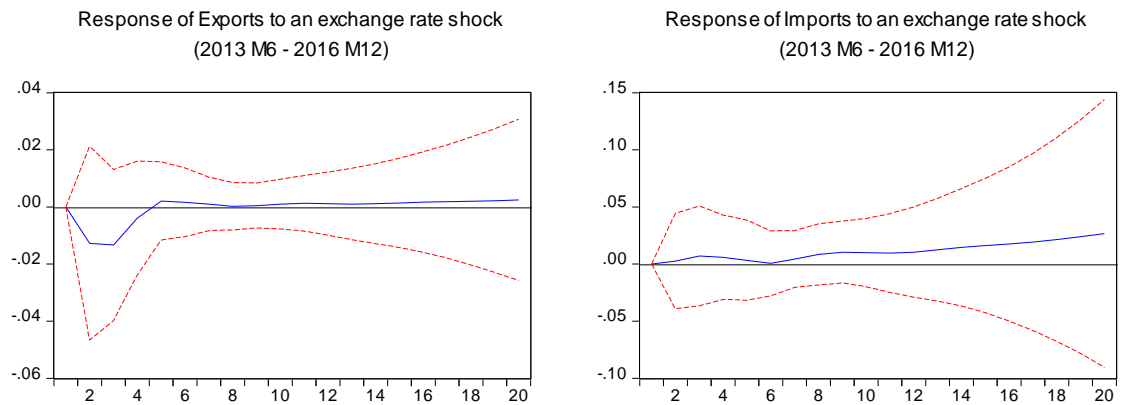
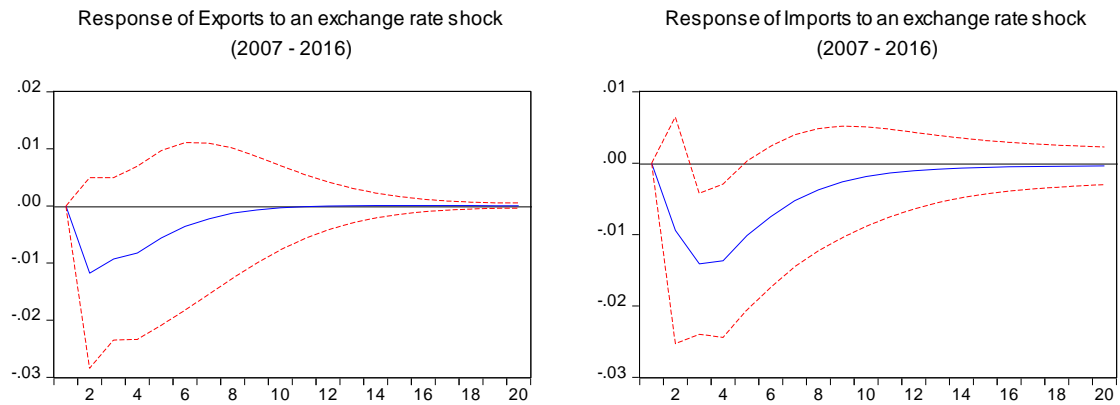
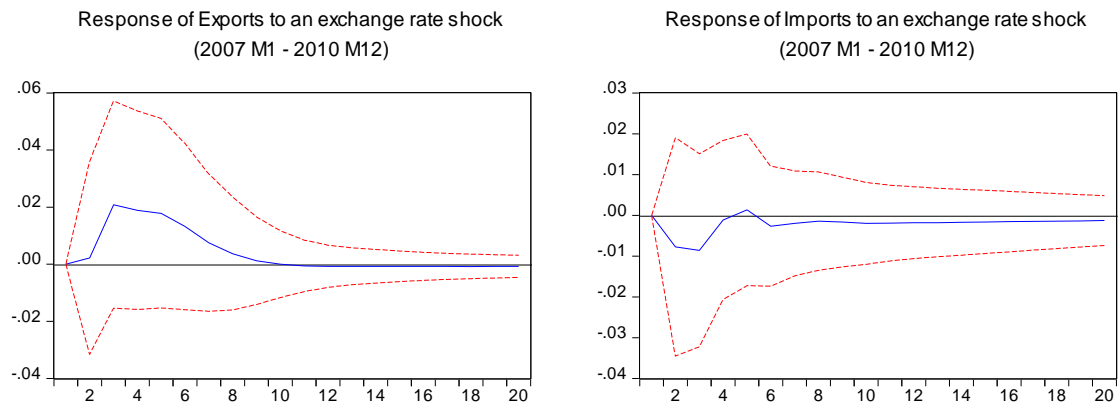


Fig. 6 IRF, Egypt

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



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



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

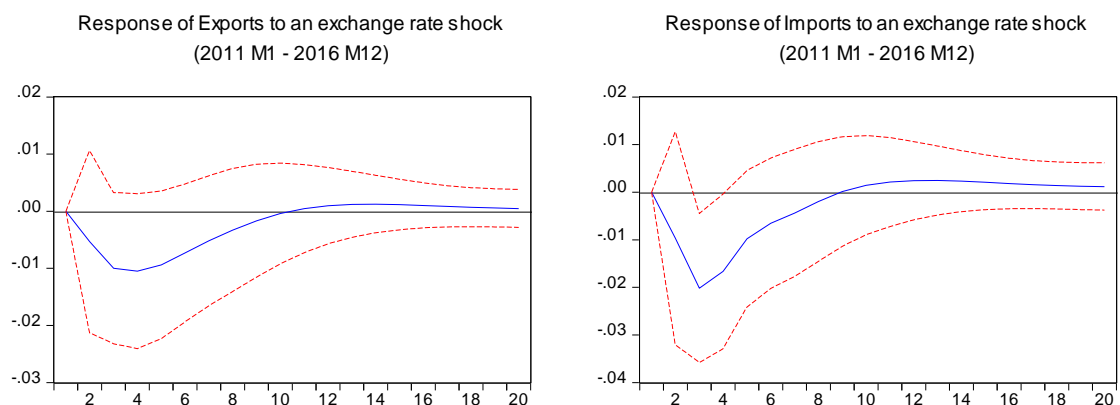


Fig. 7 IRF, Morocco

References

- Achy, L., and Sekkat, K. (2003). "The European single currency and MENA's exports to Europe" *Review of Development Economics*, 7(4), 563-582.
- Akhtar, M. A., and Hilton, R. S. (1984) "Exchange rate uncertainty and international trade: some conceptual issues and new estimates for Germany and the United States."
- Artus, J. (1983). "Toward a more orderly exchange rate system." *Finance and Development*, 20(1), 10.
- Bahmani-Oskooee, M., Hegerty, S. W., and Hosny, A. S. (2015). "The effects of exchange-rate volatility on industry trade between the US and Egypt." *Economic Change and Restructuring*, 48(2), 93-117.
- Bernanke, B and A Blinder (1992): "The federal funds rate and the channels of monetary transmission", *American Economic Review*, 82(4): 901-921.
- Bini-Smaghi, L. (1991). "Exchange rate variability and trade: why is it so difficult to find any empirical relationship?" *Applied economics*, 23(5), 927-936.
- Bjørnland, H. C. (2008). "Monetary policy and exchange rate interactions in a small open economy" *Scandinavian Journal of Economics*, 110 (1), 197-221.
- Brodsky, D. A. (1984). "Fixed versus flexible exchange rates and the measurement of exchange rate instability." *Journal of International Economics*, 16(3-4), 295-306.
- Chailloux, A., Durré, A., and Laurens, B. (2009). "Requirements for using interest rates as an operating target for monetary policy: The case of Tunisia" *IMF Working Papers*, 1-45.
- Chowdhury, A. R. (1993). "Does exchange rate volatility depress trade flows? Evidence from error-correction models." *The Review of Economics and Statistics*, 700-706.
- Christiano, L. J., Eichenbaum, M., and Evans, C. L. (1999). "Monetary policy shocks: What have we learned and to what end?" *Handbook of macroeconomics*, 1, 65-148.
- Cushman, D. O., and Zha, T. (1997). "Identifying monetary policy in a small open economy under flexible exchange rates" *Journal of monetary economics*, 39(3), 433-448.
- Eichenbaum, M., and Evans, C. L (1995) "Some empirical evidence on the effects of shocks to monetary policy shocks on exchange rates" *Quarterly Journal of Economics*, Vol. 110, No. 4, 975:1010
- Forni, M., and Gambetti, L. (2010). "The dynamic effects of monetary policy: A structural factor model approach" *Journal of Monetary Economics*, 57(2), 203-216.
- Fung, B. S. C. (2002). "A VAR analysis of the effects of monetary policy in East Asia" *BIS Working Papers* No 119.
- Hall, S., Hondroyannis, G., Swamy, P. A. V. B., Tavlas, G., and Ulan, M. (2010). "Exchange-rate volatility and export performance: Do emerging market economies resemble industrial countries or other developing countries?" *Economic Modelling*, 27(6), 1514-1521.

- Holtemöller, O. (2004). "A monetary vector error correction model of the euro area and implications for monetary policy" *Empirical Economics*, 29(3), 553-574.
- Kim, S. (2003). "Monetary policy, foreign exchange intervention, and the exchange rate in a unifying framework" *Journal of International Economics*, 60(2), 355-386.
- Kim, S., and Roubini, N. (2000). "Exchange rate anomalies in the industrial countries: A solution with a structural VAR approach" *Journal of Monetary Economics*, 45(3), 561-586.
- Koray, F., and Lastrapes, W. D. (1989). "Real exchange rate volatility and US bilateral trade: a VAR approach." *The Review of Economics and Statistics*, 708-712.
- Lastrapes, W. D., and Koray, F. (1990). "Exchange rate volatility and US multilateral trade flows." *Journal of Macroeconomics*, 12(3), 341-362.
- Nabli, M.K. and Véganzones-Varoudakis, M.A., (2002) "Exchange rate regime and competitiveness of manufactured exports: The case of MENA countries." *World Bank*.
- Razin, O. and Collins, S.M., (1997) "Real exchange rate misalignments and growth" *National Bureau of Economic Research* (No. w6174).
- Rey, S., (2006) "Effective exchange rate Volatility and MENA countries' exports to the EU." *Journal of Economic Development*, 31(2), p.23.
- Sims, C. A. (1980). "Macroeconomics and reality" *Econometrica: Journal of the Econometric Society*, 1-48.
- Sims, C. A. (1992). "Interpreting the macroeconomic time series facts: The effects of monetary policy" *European Economic Review*, 36(5), 975-1000.