

MACROECONOMIC VULNERABILITY AND INVESTMENT RISKS IN THE MIDDLE EAST AND NORTH AFRICA REGION

1. INTRODUCTION

As the neo-classical theory asserts, in the real world, the investors generally try to maximize returns and minimize risks. They are risk averters or diversifiers. Risk arises in a situation when the probability distribution of the investment outcome is known but the specific result of a particular action is not known or, cannot be accurately predicted (Aschheim and Hsieh, 1969). In the business world, risk is sometimes associated with uncertainty to make the determination of the best situation almost impossible. In the case of uncertainty, the probability distribution is completely unknown. However, to examine an uncertain world is almost impossible because of many stochastic elements involved in it, although its significance can never be over-emphasized. But in the literature, the treatment of uncertainty is regarded as an extreme situation (Meldrum, 2000).

Country risk analysis (CRA) as a subject of study has become quite popular since the beginning of neo-liberal globalization when cross-border investment has increased substantially. For making off-shore investment as a channel for maximizing profit, various international agencies including Moody's, Standard and Poor's, Political Risk Services, Control Risk Information Services, Economist Intelligence Unit and the like are engaged in the work of CRA by taking into account economic risk, political risk and social risk, and all risks refer to those factors, situations and circumstances that are likely to impinge on profits and profitability of investment in a country. The risk is judged by credit rating assigned to the bond by investment agencies. The ranking of countries or companies is done on the basis of probability of default. Our perception of risk is not in terms of bond values or probability of default but more in term of the macroeconomic strength of a country. It needs to be mentioned that while all these international agencies have become popular sources of study of country (company) risks, their ranking of the same country more often than not remains contradictory.

In the present analysis, we take into consideration the macroeconomic vulnerability of a country to represent risks. In other words, the more vulnerable a country is in macroeconomic terms, the more risky it is for making an investment. The MENA region has become of late critical for many reasons. Firstly, the location of the region is geo-politically very significant to both the western world, particularly to UK and also the Asian countries. Second, it is the hot-bed of Middle-east politics which entangles many of the world's superpowers for exploring various types of politico-economic gains. Finally, the MENA region is the supply centre for most of the energy needs of the world including oil and gas. Since 2008 when the oil prices escalated up to an unprecedented level, the importance of this region has been continuously increasing and it has become the focus of many critical studies.

We will study countries from the Middle East and the North Africa region (MENA) for the period 1960 to 2008. The sampled countries and the available data period will be discussed in the section on Data and Methods. We have exclusively concentrated on economic factors on the assumption that eventually the impact of socio-political factors are well captured by the changing dynamics of macroeconomic fundamentals of a country. For instance, a country ravaged by civil war, violence or terrorism has to have higher unemployment, escalated inflation rates, lower GDP and so forth. Both conceivably and observably, a country engaged in a long-drawn political turmoil, cannot have stable and strong macroeconomic fundamentals and the index of macroeconomic vulnerability shows an upward drift. However, by this we do not suggest in any way the triviality of the study of socio-political factors for the determination of investment risk in a country but we only emphasize the fact that macroeconomic factors are more decisive in such an analysis. The plan of the paper is as follows: section 2 reviews some selected literature, section 3 discusses the data and methods, section 4 shows the empirical findings, and section 5 concludes.

2. REVIEW OF SELECTED LITERATURE

Macroeconomic volatility of an economy can be regarded as the synthetic indicator that can measure the risk associated with cross-border investment. Country risk analysis enables us to compare countries in terms of risk both present and potential. In the literature on country risk analysis, one can find many interesting

documentation of different types of risks. On the application of theoretical concepts, a paper by Maghyereh and Al-Zoubi (2006) analyses the relative performance of the most popular value at risk (VaR) estimates with an emphasis on the extreme value theory (EVT) methodology in seven MENA countries. Their empirical results suggest that the return distribution for the MENA countries that are analyzed are all characterized by fat tails which imply that VaR measures based on the normal distribution will underestimate VaR. The results show that only for two of the MENA countries, namely, Morocco and Turkey, the skewed Student APARCH model performs better than other terms of VaR forecasting. However, for other countries, Bahrain, Egypt, Jordan, Oman and Saudi Arabia, the extreme value theory performs better. The study concludes that, for the MENA region, the use of conventional methodologies such as the normal distribution model to estimate the financial market risk may lead to faulty estimation.

Many empirical studies these days have brought home the fact that the degree of international consumption risk sharing is indeed limited and that cross-border financial markets are not complete in many respects. On the basis of these two empirical facts, Corsetti *et al.* (2008) have studied international risk sharing and transmission of productivity shocks. Focusing on the Backus-Smith puzzle (1993) and on the performance of international business cycle models, these authors make a quantitative analysis of how productivity shocks can produce large wealth effects and thereby fluctuations in domestic demand. The analysis takes into consideration the impact of changes in trade elasticities and the response of output to technology shocks in the case of the U.S. economy. The authors observe that to the extent that financial markets are not well-developed, relative price movements may accentuate cross-country wealth differences. The impact of technology shocks on output has been found to be an important feature of the U.S. economy as corroborated by the study of Cogley and Nason (1995).

Macroeconomic models are being used by many central banks to quantify the economic consequences of changes in economic policy and also to make forecasts. Such models are very useful for a single country. Multi-country country models are, however, very cumbersome and complex. But such models have some benefits too. In this connection, the model prepared by Pesaran *et al.*, often known as the global vector auto regression model (GVARM) is very precise and straightforward to apply (Dennis and Lopez, 2004). The model by Pesaran *et al.* (2003) is based on eleven countries that include

some from the developed world, Southeast Asia, Latin America and the Middle East. Basically the model seeks to explain six core macroeconomic variables including GDP, consumer prices, nominal money supply, equity prices, nominal exchange rates and long-term nominal interest rates. The six domestic variables are modeled and their parameters are estimated through the VAR technique. The GVAR model uses many national and international macro variables for the purpose of forecasting for several countries at the same time. The model can quantify the impact of global macroeconomic shocks on the values of assets portfolios, and hence for studying country risk profile. The model is also useful for the study of issues involving credit risks. However, the GVAR model may not be very useful for the analysis of the impact of monetary policy changes (Dennis and Lopez, 2004).

In some studies on CRA, it is argued that the existence of structural breaks constitutes a risk factor, as it increases the possibility of institutional changes. This is basically the line of argument developed in a recent paper (Carrera *et al.*, 2001). The basic objective of this paper is to make a contribution to the literature on macroeconomic risk by developing a univariate multidimensional risk indicator that includes different factors that can be obtained from a time series. The methodology of the study includes endogenous detection of multiple structural breaks and the determination of persistence of different types of shocks. The model is applied to the study of risk in 18 countries (9 developed and 9 developing) for the period 1980-1999. On the basis of different degrees of risk, the authors classify the countries into very risky and less risky.

Drawing on the macroeconomic fundamentals, a study by Musa and Rombach (2004) explains the country risk analysis in the case of Ghana. The necessary data are collected from the World Bank, the IMF, the African Development Bank and the Human Development Report. The authors take into consideration many important macroeconomic fundamentals of Ghana like debt/GDP ratio, balance of payments position, growth rate, exchange rate, domestic financial stability and external competitiveness. Apart from macroeconomic fundamentals, the authors have also used social and political factors including human development index, Heritage Foundation index of economic freedom (2003), corruption index and the political stability of the country. The overall risk of the country is then determined by focusing on the strengths and weaknesses of Ghana. However, although all these are the essential indicators for the assessment of risk of a country (Ghana), it is not clear which methodology is

used by them to arrive at the ranking of Ghana among the African nations in terms of risks. Nevertheless, there is no denying the fact that, macroeconomic fundamentals do make the difference.

In fact, the economic-financial crisis in the Southeast Asian economies in the late 1990s was brought about mainly by weak macroeconomic fundamentals which increased the country risk factors in this region (Ghosh, 2000). In a bid to increase the quantitative growth of these economies, particularly the MIT countries (Malaysia, Thailand and Indonesia), a number of mega projects were undertaken and these were funded by foreign sources and the management of internal efficiency was relegated to the background and a number of problems cropped up, e.g., wages exceeded productivity, investment surpassed savings and capital-output ratios started going up in these economies. The overexpansion of the non-traded sector in spite of overheating was continued through foreign debts. The short term debt-reserve ratios went up continuously and these countries became vulnerable to speculative attack. Unrestricted capital inflows contributed to the appreciation of real exchange rates, slow-down in exports and the escalation of current account deficits in the balance of payments. These macroeconomic vulnerabilities became tale-telling before the onset of crisis in these countries, and the risk factors became so disquieting that fresh investment from abroad plummeted to an unprecedented level and decapitalisation through capital outflow exacerbated the speed of the crisis. All these clearly show that weak macroeconomic fundamentals can aggravate the country risk to the point of financial crisis.

Drawing ideas from the International Country Risk Guide (2000), Sekkat and Veganzones-Varoudakis (2004) conduct a study of risk assessment of eight MENA countries. In this study, the economic risk rating includes five indicators: real GDP growth rate, GDP *per capita*, annual inflation rate, budget and current account balance as a percentage of GDP. The study has also taken into account twelve indicators analyzing political risk. These are: government stability, socioeconomic conditions, investment profile, internal and external conflicts, corruption, the role of military in politics, law and order situation, ethnic tensions, democratic accountability and bureaucratic quality. The study concludes that in general, trade and foreign exchange reforms have been very slow in the MENA countries. This is one of the reasons for scanty FDI flow. Similarly, the development of infrastructure is also very limited. Moreover, political climate is not conducive in the MENA region to attract foreign investors without risks.

Harping on the same string, Abed (2003) maintains that most of the MENA countries are poorly integrated with the world economy, and their trade performance is well below the other comparable regions, particularly of the East Asian region. The public sector is dominant everywhere although there are some stray attempts for privatization. MENA region's information and technology links are among the weakest in the world. As a matter of fact, the slowdown in economic reforms is key factor for its comparative backwardness. Political and human development reforms in the region are also insignificant. As a result, the region experiences limited political and civil liberties, gender inequalities, civil wars, human capability failure in many fronts and political instability. Corruption and rent-seeking practices are rampant. Financial market as a whole is underdeveloped and financial risk-taking for the prospective investors is potentially dangerous.

3. DATA AND METHODS

The data used in the present study are taken from World Bank's World Development Indicators – WDI (www.worldbank.org). We have calculated macro variables including ratio of gross capital formation to GDP (as a proxy of investment over GDP ratio), external debt and current account balance as percentage of GDP, annual growth rate of real GDP (at constant 1995 US\$), inflation rate, labor force participation rate, real exchange rate and unemployment rate for a group of 20 MENA countries from 1960 to 2008 (Table 1). However, not all data are available for these MENA countries. To maintain reliability of our estimation results, we only selected the variables with at least 20 years of available data for any MENA country. The captured dataset is described in Table 1. The major countries in the region are included, e.g., Saudi Arabia, Algeria, Israel, Syria, and Jordan.

Our objective is to compare the effects of shocks on macro outcomes in MENA countries. Firstly, we estimate an unrestricted vector autoregression (VAR) on the macro outcome variables mentioned above. We then conduct an *impulse response* (IR) analysis on the outcome variables. For example, we calculate the effects of 1 standard deviation (1 SD) shock in say, exchange rate, on say, investment. Finally, we compare the effects of shocks on the outcome variables for the MENA countries. This allows us to determine who is more vulnerable to these shocks. The *impulse response function* (IRF) is elaborated below.

TABLE 1 - The Dataset for Selected MENA Countries and Macro Variables
(with Unrestricted VAR Estimation Statistics)

Country/variable	cap	deb	cab	gdp	inf	lab	rer	une	Sample period
United Arab Emirates (4)	0.7171, 0.7923	NA	NA	0.8952, 2.6687	0.8697, 2.0862	0.9979, 147.2955	NA	NA	1984-2005
Bahrain (2)	0.7942, 3.2157	NA	0.4950, 0.8168	0.7679, 2.7573	0.6815, 1.7831	0.9532, 16.9897	0.9736, 30.7539	NA	1983-2005
Algeria (2)	0.8485, 5.1358	0.9472, 16.4443	NA	0.5342, 1.0512	0.6476, 1.6842	0.9997, 2615.16	0.9821, 50.2380	NA	1982-2005
Israel (2)	0.8348, 3.2483	NA	0.8681, 4.2292	0.8418, 3.4204	0.8213, 2.9547	0.9861, 45.7497	0.9017, 5.8970	0.9397, 10.0122	1982-2005
Jordan (2)	0.8743, 6.9551	0.9571, 22.3133	0.6811, 2.1356	0.7542, 3.0690	0.5188, 1.0781	0.9986, 712.4679	NA	NA	1982-2006
Malta (2)	0.8760, 7.0648	NA	0.6598, 1.9395	0.7753, 3.3909	0.4431, 0.7956	0.9815, 52.9858	0.9408, 15.9040	NA	1982-2006
Oman (2)	0.8206, 4.1922	0.8392, 4.7829	0.4199, 0.6637	0.5817, 1.2749	0.6764, 1.9163	0.9979, 438.0322	NA	NA	1982-2005
Saudi Arabia (2)	0.8376, 5.1575	NA	0.9256, 12.4478	0.9129, 10.4855	0.6872, 2.1972	0.9961, 252.3892	0.9933, 149.1363	NA	1982-2006
Syria (2)	0.8533, 5.8144	0.8961, 2.8171	0.7380, 2.8171	0.5248, 1.1044	0.7023, 2.3596	0.9972, 359.5327	NA	NA	1982-2006
Tunisia (2)	0.9023, 6.5980	0.8331, 3.5657	0.8394, 3.7336	0.5405, 0.8400	0.8570, 4.2806	0.9985, 481.8054	0.9907, 76.3804	NA	1982-2006

* The number in brackets following each country name is the lags used in the estimated unrestricted VAR – depending on data availability.

** For each macro variable, the pair of numbers for each MENA country indicate the R² and F-statistic, respectively, of the estimated unrestricted VAR.

Macro variable definition:

cap – Capital formation as % of GDP; deb – External debt as % of GDP; cab – Current account balance as % of GDP; gdp – GDP growth rate (%); inf – Inflation rate (%); lab – Labor force participation rate (%); rer – Real exchange rate (index 1995 = 100); une – Unemployment rate (%).

An IRF traces the effect of a 1 SD shock to one of the innovations on current and future values of the endogenous variables (Hamilton, 1994). Consider a bivariate VAR(1) involving investment (IV) and exchange rate (EX):

$$IV_t = \alpha_{11} IV_{t-1} + \alpha_{12} EX_{t-1} + \varepsilon_{1,t} \quad (1)$$

$$EX_t = \alpha_{21} EX_{t-1} + \alpha_{22} IV_{t-1} + \varepsilon_{2,t} \quad (2)$$

where t is the time index, ε 's are the innovations and the α 's are coefficients. A change in $\varepsilon_{1,t}$ will immediately change the value of current investment. It will also change all future values of investment and exchange rate since lagged investment appears in both equations.

If the innovations $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ are uncorrelated, then $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ are the innovations for investment and exchange rate, respectively. The IRFs for $\varepsilon_{1,t}$ measures the effect of a 1 SD investment shock on current and future investment and exchange rate. If the innovations are correlated, then they will have a common component. The effect of this is usually attributed to the variable that comes first in the VAR system. For example, the common component of $\varepsilon_{1,t}$ and $\varepsilon_{2,t}$ is totally attributed to $\varepsilon_{1,t}$. This is because $\varepsilon_{1,t}$ precedes $\varepsilon_{2,t}$. $\varepsilon_{1,t}$ is then the investment innovation. $\varepsilon_{2,t}$, the exchange rate innovation, is transformed to remove the common component. This is achieved by orthogonalizing the errors through Cholesky decomposition. As a result, the covariance matrix of the resulting innovations is diagonal (Hamilton, 1994). Thus, changing the order of equations can change the IRs.

4. EMPIRICAL FINDINGS

To compute the IRFs, the unrestricted VARs are first estimated for the following MENA countries with at least 20 years of available data (1982-2006): United Arab Emirates (UAE), Bahrain, Algeria, Israel, Jordan, Malta, Oman, Saudi Arabia, Syria and Tunisia (Table 1). All estimations in this paper are done in Eviews (v3.1). Table 1 also gives the lags used in VAR (number in brackets following each country) and the R^2 and F-statistic for each VAR equation (the pair of numbers in each entry). All VAR's are estimated with 2 lags except UAE (4 lags), due to data availability. The vast majority of the VAR equations for the included MENA countries have high R^2 (>0.80) and significant F-statistics (>3.50). This indicates potentially reliable forecasting.

Tables 2.1 to 2.10 give the IRFs for the 10 MENA countries. These tables should be read as follows. Column 1 shows the macro variable in which there is a 1 SD shock to its innovation (error term). Column 2 shows all the macro variables that provide a response to this 1 SD shock. Columns 3 to 12 are the forecast responses for each and every macro variable in the MENA country. For example, Table 2.1 is for United Arab Emirates (UAE). When there is a 1 SD shock to capital formation as % of real GDP (cap), cap responds in the first period by increasing 1.591%. This is the size of the SD for cap in the sample for UAE. All other variables (gdp, inf and lab) show no response in the first period. This is because any response is, by definition of VAR, lagged. Then in period 2, the response of cap (to the original 1 SD shock in cap) drops to 0.446% and gdp shows a response of -0.557%. In other words, GDP decreases 0.557% 1 period after there was 1 SD shock in capital formation. Similarly, inflation decreases 0.208% while labor force participation rate increases 0.168% in the second period. This interpretation is analogous for the rest of the forecast periods and for all 1 SD shocks in other macro variables. Note that the size of an IR depends on 2 factors: the size of the 1 SD shock in the originating variable and the estimated VAR. Hence, all else being equal, the higher the variability in a macro variable (where there is a 1 SD shock), the larger the size of the resulting IRs.

There are 2 notes of caution. First, the sequence of SD shocks in the macro variables can have a slight impact on the IRs. For example, in Table 2.1 for UAE, gdp is the second variable in which there is a 1 SD shock (after cap). The interpretation for 1.853% increase in GDP in the first period is the same as before (i.e., the size of the SD for GDP growth in the sample). However, note that cap also responded by decreasing 1.446% where the response should have been lagged. This is because the innovations (error terms) for cap and gdp are correlated. The correlated component of the 1 SD shock in gdp is attributed entirely to the variable that precedes gdp (i.e., cap). Hence the immediate response in cap to a 1 SD shock in gdp in period 1. Similarly, this effect also carries over to inf and lab in the UAE table. As a result, the order in which the 1 SD shocks appear can have an impact on the IRs. However, since the order of the 1 SD shocks is entirely random and this order is the same for all MENA countries, the effect of the correlated innovations is the same for all countries. This preserves the validity of cross-country comparisons.

TABLE 2.1 - Impulse Response Function (IRF) for UAE

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.591	0.446	0.025	0.379	0.271	0.205	-0.188	-0.234	-0.361	-0.674
	gdp	0.000	-0.557	0.003	0.150	0.615	0.579	0.320	-0.185	-0.010	-0.143
	inf	0.000	-0.208	-0.015	0.182	0.092	0.313	0.220	-0.164	-0.011	-0.078
	lab	0.000	0.168	-0.146	0.092	-0.118	-0.063	-0.113	0.080	0.029	-0.144
gdp	cap	-1.446	2.855	-0.540	-0.435	-0.128	-1.554	0.655	0.008	1.264	1.980
	gdp	1.853	2.157	-1.006	-1.692	-0.715	-1.374	0.634	0.794	-0.806	-0.251
	inf	0.000	1.376	-0.439	-1.133	-0.332	-1.064	0.391	0.693	-0.487	-0.313
	lab	0.000	-0.453	0.187	0.581	-0.064	0.149	0.310	-0.631	0.509	0.293
inf	cap	-2.044	0.947	2.102	-1.917	-1.482	1.141	0.974	0.450	0.112	-0.591
	gdp	0.598	-0.214	-1.117	0.632	-1.187	0.464	0.524	-0.906	-0.370	-0.302
	inf	1.096	-0.713	-0.974	0.203	0.146	0.072	-0.332	-0.125	-0.456	0.061
	lab	0.000	-0.375	1.297	-1.207	0.396	0.554	-0.676	0.618	-0.253	0.300
lab	cap	0.063	0.079	0.044	0.051	0.050	0.068	0.121	0.142	0.130	0.142
	gdp	-0.034	-0.045	-0.089	-0.118	-0.114	-0.124	-0.144	-0.155	-0.155	-0.136
	inf	-0.035	-0.061	-0.087	-0.105	-0.108	-0.110	-0.124	-0.134	-0.123	-0.111
	lab	0.029	0.030	0.031	0.052	0.046	0.048	0.059	0.056	0.053	0.048

Secondly, the standard errors of forecast for the IRs (not reported) beyond the first or second period are typically quite high for all macro variables in all MENA countries. Therefore, the accuracy of these IRs should be interpreted with a pinch of salt.

Our strategy for analyzing macroeconomic vulnerability and investment risk for a MENA country involves the following steps: 1. Generate the IRFs for the 10 sampled MENA countries (Tables 2.1 to 2.10); 2. For each sampled country, examine the stability of the IRs (10 forecast periods) for each and every macro variable (column 2) due to a 1 SD shock to a chosen macro variable (column 1); 3. The country that achieves higher stability in the IRs in more macro variables is deemed to be less vulnerable to macroeconomic shocks. This country is thus less risky for investment purposes.

Firstly, we classify the possible IRs of a country to a shock in macro variable into 6 categories: 1. stable fast – excellent stability achieved after 4 or 5 periods; 2. stable slow – excellent stability achieved after 7 or 8 periods; 3. fluc long – fluctuates with long periodicity (7 to 8 periods); 4. fluc medium – fluctuates with medium periodicity (4 to 5 periods); 5. fluc short – fluctuates with short periodicity (2 to 3 periods); 6. explo – unstable, trending up or down (see Table 3).

Algeria achieves quick stability in all its macro variables after a 1 SD shock in each and every macro variable. Therefore, Algeria is ranked first (least risky). Graphs depicting this quick stability are also provided in the Appendix (Figures 1.1 to 1.6). Syria is ranked second as it also achieves quick stability in almost all macro variable shocks. The exception is when the shock occurs in capital formation. The macro variables then respond by fluctuating with long cycles (Figure 3.1). Malta is ranked third since the only macro shock that does not produce quick stability is labor force participation rate. This resulted in explosive behavior in its IRs. Note that explosive behavior is much less desirable than periodic fluctuation for investment planning purposes. The other sampled MENA countries are ranked accordingly (see Table 3 for the complete country risk assessment rankings). It is interesting to note that the fastest growing mid-east countries such as Jordan, UAE and Bahrain are also the riskiest (8th, 9th and 10th respectively). The graphs showing the explosive behavior in all its macro shocks in the riskiest country – Bahrain – are also provided in the Appendix (Figure 2.1 to 2.6).

TABLE 2.2 - IRF for Bahrain

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	4.117	1.109	-0.007	-0.674	-0.342	-1.403	-2.159	-2.461	-3.020	-3.856
	cab	0.000	1.083	0.862	0.437	0.619	0.739	1.363	1.576	1.609	2.058
	gdp	0.000	1.027	-0.381	0.096	0.235	0.222	0.195	0.161	0.121	0.105
	inf	0.000	0.691	1.818	0.788	1.010	1.541	1.821	2.182	2.850	3.458
	lab	0.000	0.143	-0.392	-1.180	-2.314	-2.672	-2.856	-3.503	-4.428	-5.209
	rer	0.000	0.258	-0.549	-1.146	-1.817	-2.101	-2.450	-3.123	-3.886	-4.621
cab	cap	-3.748	-0.940	-0.029	0.021	-0.514	0.609	1.059	1.118	1.667	2.371
	cab	3.129	-0.087	-1.542	-0.814	0.076	-0.188	-1.368	-1.338	-0.895	-1.287
	gdp	0.000	-0.435	1.065	0.531	0.449	0.256	0.086	0.076	0.103	0.028
	inf	0.000	-0.564	-1.582	-0.747	-1.138	-1.287	-1.228	-1.596	-2.135	-2.360
	lab	0.000	-0.877	-1.738	-0.893	0.871	1.149	1.001	1.674	2.673	3.262
	rer	0.000	-0.749	-0.560	0.182	1.069	1.088	1.174	1.805	2.479	2.954
gdp	cap	0.744	0.230	-1.577	-0.785	-0.620	-1.848	-2.317	-2.443	-3.199	-4.200
	cab	0.201	-0.673	0.297	1.634	0.956	0.537	1.564	2.034	1.925	2.345
	gdp	1.614	-0.580	-0.438	-0.131	-0.142	-0.231	-0.056	0.023	-0.027	-0.012
	inf	0.000	1.792	1.444	0.664	1.709	2.192	2.101	2.563	3.442	4.047
	lab	0.000	-1.061	-0.559	-0.566	-1.820	-2.472	-2.706	-3.446	-4.575	-5.582
	rer	0.000	-1.036	-0.719	-1.067	-1.869	-2.275	-2.592	-3.313	-4.212	-5.096

TABLE 2.2 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
inf	cap	-2.042	-1.248	0.056	-3.289	-3.105	-3.291	-4.410	-5.777	-6.555	-8.043
	cab	2.224	-0.511	0.228	0.712	3.352	2.220	2.003	3.239	4.670	4.961
	gdp	0.208	-0.561	-0.013	-0.323	0.040	-0.247	-0.176	-0.083	0.088	-0.008
	inf	4.095	-0.488	2.687	2.184	2.856	3.522	4.853	5.184	6.358	8.026
	lab	0.000	-1.065	-4.290	-2.946	-3.057	-4.556	-6.420	-7.212	-8.668	-10.932
	rer	0.000	-2.126	-3.118	-2.742	-3.172	-4.630	-5.775	-6.674	-8.112	-10.136
lab	cap	0.017	-0.044	-0.038	-0.030	-0.050	-0.078	-0.108	-0.143	-0.193	-0.248
	cab	0.007	0.056	0.032	0.051	0.067	0.093	0.100	0.113	0.136	0.170
	gdp	-0.089	-0.061	-0.085	-0.053	-0.044	-0.031	-0.024	-0.015	-0.008	-0.002
	inf	0.044	0.110	0.098	0.109	0.119	0.143	0.160	0.189	0.222	0.265
	lab	0.089	0.080	0.049	-0.007	-0.040	-0.082	-0.136	-0.204	-0.271	-0.345
	rer	0.000	-0.002	-0.039	-0.062	-0.085	-0.114	-0.156	-0.206	-0.259	-0.323
rer	cap	1.039	3.105	4.591	4.178	5.168	6.340	7.576	9.106	11.491	14.340
	cab	-0.075	0.231	-1.405	-3.668	-3.383	-4.019	-5.274	-6.576	-7.609	-9.200
	gdp	2.751	2.165	1.944	1.518	1.578	1.301	0.961	0.632	0.469	0.245
	inf	-0.923	-3.814	-3.288	-4.806	-6.202	-7.495	-8.429	-10.219	-12.344	-14.780
	lab	1.253	3.040	2.491	3.253	4.785	6.878	8.983	11.816	15.238	19.263
	rer	2.822	3.648	3.863	4.660	6.071	7.603	9.398	11.739	14.642	18.095

TABLE 2.3 - IRF for Algeria

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.418	0.425	0.809	1.406	0.895	0.390	0.499	0.560	0.463	0.530
	deb	0.000	-0.464	-0.767	-0.462	-0.156	-0.561	-0.815	-0.562	-0.518	-0.766
	gdp	0.000	0.743	0.058	0.147	0.436	0.157	0.141	0.265	0.262	0.344
	inf	0.000	-0.323	-0.193	0.251	0.173	-0.037	-0.044	0.048	0.017	-0.145
	lab	0.000	-0.410	-0.195	0.213	0.104	0.064	0.038	-0.146	-0.274	-0.348
	rer	0.000	-0.055	-0.387	-0.345	-0.230	-0.177	-0.114	0.006	0.107	0.092
deb	cap	0.170	-4.282	-4.649	-3.359	-3.892	-4.772	-4.532	-4.032	-3.923	-3.731
	deb	3.831	3.804	2.437	3.558	4.868	3.981	2.993	3.333	3.607	2.985
	gdp	0.000	-1.541	-2.433	-1.942	-1.863	-1.986	-1.761	-1.717	-1.631	-1.213
	inf	0.000	-0.262	-0.194	0.679	1.088	0.587	0.173	0.448	0.640	0.251
	lab	0.000	0.210	1.167	1.689	1.781	1.926	1.783	1.462	1.255	1.014
	rer	0.000	0.525	0.144	-0.037	0.188	0.257	0.121	0.218	0.465	0.460
gdp	cap	1.080	0.822	0.160	0.328	0.410	0.253	0.115	0.081	0.038	-0.042
	deb	-0.535	-0.045	-0.473	-0.362	0.054	0.014	-0.210	-0.167	-0.009	-0.025
	gdp	1.330	0.576	-0.211	0.063	0.109	0.039	0.074	-0.009	-0.071	-0.004
	inf	0.000	-0.469	-0.225	-0.034	0.122	0.078	-0.062	-0.016	0.107	0.073
	lab	0.000	-0.555	-0.253	-0.119	-0.063	0.061	0.076	0.046	0.057	0.036
	rer	0.000	-0.194	0.008	-0.039	-0.073	-0.061	-0.087	-0.075	0.007	0.055

TABLE 2.3 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
inf	cap	-1.263	-0.272	-0.684	-1.596	-1.899	-2.512	-2.260	-0.720	0.074	-0.057
	deb	6.517	2.981	-1.073	0.356	2.454	1.800	-0.344	-0.805	0.384	0.572
	gdp	-0.854	-1.781	1.387	-0.975	-2.640	-0.410	0.421	-0.109	0.004	0.287
	inf	3.280	1.908	-1.348	-0.475	2.002	1.172	-0.704	-0.693	0.057	-0.042
	lab	0.000	3.022	2.216	0.877	1.571	1.182	0.007	-0.515	-0.722	-0.741
	rer	0.000	-0.370	-1.250	-1.119	0.368	0.948	0.456	0.258	0.494	0.453
lab	cap	-0.032	-0.069	-0.115	-0.146	-0.168	-0.185	-0.196	-0.202	-0.206	-0.213
	deb	0.012	0.033	0.050	0.057	0.062	0.068	0.073	0.079	0.088	0.100
	gdp	-0.043	-0.062	-0.073	-0.085	-0.087	-0.089	-0.093	-0.095	-0.098	-0.104
	inf	0.019	0.032	0.040	0.043	0.043	0.040	0.037	0.035	0.035	0.036
	lab	0.032	0.055	0.067	0.074	0.074	0.067	0.061	0.058	0.057	0.062
	rer	0.000	0.005	0.013	0.022	0.031	0.040	0.046	0.048	0.048	0.047
rer	cap	-2.021	6.567	12.830	15.737	17.397	18.740	17.765	14.477	11.407	9.447
	deb	-11.410	-12.995	-10.588	-10.655	-11.983	-10.706	-7.615	-6.199	-6.710	-6.823
	gdp	2.417	7.719	7.457	8.455	9.019	7.225	5.507	4.569	3.735	3.093
	inf	-1.196	-4.145	-3.191	-3.699	-4.952	-3.736	-1.338	-0.333	-0.354	-0.074
	lab	-2.398	-8.305	-10.575	-10.389	-9.455	-7.179	-4.211	-1.823	-0.419	-0.066
	rer	4.032	2.533	2.123	1.128	-1.208	-3.092	-3.601	-3.549	-3.360	-2.669

TABLE 2.4 - *IRF for Israel*

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.196	0.709	0.616	0.612	0.613	0.494	0.154	-0.033	-0.254	-0.390
	cab	0.000	0.198	0.697	1.045	0.930	0.851	0.632	0.250	-0.253	-0.517
	gdp	0.000	0.002	-0.105	-0.109	-0.101	0.070	0.087	-0.014	-0.163	-0.141
	inf	0.000	-0.639	-0.416	-0.315	-0.105	0.093	0.535	0.631	0.459	0.222
	lab	0.000	-0.311	-0.086	-0.003	0.053	0.043	0.115	0.042	-0.137	-0.271
	rer	0.000	-0.376	-0.454	-0.163	-0.077	-0.244	-0.183	0.042	0.220	0.224
	une	0.000	0.368	0.146	-0.077	-0.076	-0.065	-0.138	-0.182	-0.047	0.090
ctrb	cap	-0.476	-0.770	-0.583	-0.594	-0.665	-0.503	-0.091	-0.103	0.005	0.069
	cab	1.187	0.734	0.021	-0.869	-0.757	-0.446	-0.206	-0.247	-0.203	-0.098
	gdp	0.000	0.371	0.076	-0.396	-0.086	0.186	0.304	0.121	-0.024	-0.115
	inf	0.000	1.435	0.776	-0.241	-0.617	-0.064	0.062	0.070	-0.168	-0.351
	lab	0.000	0.225	0.252	-0.017	-0.212	0.131	0.282	0.234	0.044	-0.077
	rer	0.000	0.287	0.678	0.407	0.126	0.113	-0.055	-0.078	0.006	0.054
	une	0.000	-0.237	-0.331	0.016	0.154	0.027	-0.095	-0.067	-0.020	0.094
gdp	cap	0.496	0.712	0.041	-0.346	0.310	-0.385	-0.251	-0.256	-0.077	-0.305
	cab	0.394	0.362	0.786	0.199	0.010	-0.008	0.405	0.052	-0.300	-0.474
	gdp	0.822	-0.201	0.101	-0.347	-0.264	-0.123	0.234	0.022	-0.007	-0.007
	inf	0.000	0.254	0.167	0.790	-0.394	-0.216	0.199	0.424	0.036	0.074
	lab	0.000	0.453	-0.245	-0.063	-0.400	-0.261	0.096	0.317	0.075	-0.039
	rer	0.000	-0.655	-0.471	0.664	0.314	-0.094	-0.078	0.215	0.092	0.035
	une	0.000	0.015	-0.097	-0.121	0.132	0.319	-0.116	-0.244	-0.111	0.055

TABLE 2.4 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
inf	cap	-1.982	1.445	5.527	6.415	12.030	22.834	17.770	16.958	12.950	11.147
	cab	-16.988	-23.160	-32.651	-16.487	-0.863	10.473	8.102	3.854	-1.579	0.158
	gdp	12.087	2.967	-13.139	-3.653	4.505	9.424	3.819	-1.063	-4.850	-2.107
	inf	33.152	7.298	-19.423	-29.657	-9.925	-2.263	5.294	2.622	-0.324	-1.579
	lab	0.000	-1.190	-6.335	-11.606	0.488	6.538	6.798	0.360	-5.422	-7.869
	rer	0.000	8.034	1.222	-4.484	-5.090	-11.646	-10.619	-5.231	-1.255	-3.239
lab	une	0.000	-0.702	6.287	8.383	3.649	-1.981	-3.409	-2.984	1.706	4.063
	cap	-0.236	-0.159	-0.136	-0.112	-0.124	-0.096	-0.114	-0.123	-0.129	-0.143
	cab	0.017	0.009	0.042	0.133	0.252	0.329	0.338	0.321	0.299	0.272
	gdp	0.048	0.057	-0.042	-0.025	0.010	0.005	-0.025	-0.030	-0.007	0.023
	inf	-0.025	-0.023	-0.112	-0.118	-0.037	-0.016	-0.042	-0.058	-0.030	0.034
	lab	0.090	0.122	0.083	0.008	0.017	0.052	0.062	0.063	0.074	0.089
rer	rer	0.000	-0.014	0.021	0.011	0.029	0.031	0.043	0.056	0.048	0.030
	une	0.000	-0.054	-0.030	0.013	0.016	-0.014	-0.031	-0.041	-0.044	-0.053
	cap	0.094	1.012	1.351	1.416	1.580	1.316	0.671	-0.145	-0.465	-0.738
	cab	1.363	0.888	1.796	2.299	2.300	1.658	1.216	0.747	0.345	0.056
	gdp	-0.147	0.296	0.358	0.328	0.422	0.179	-0.021	-0.377	-0.541	-0.433
	inf	-1.139	-1.552	-2.113	-0.926	0.121	0.816	0.941	0.954	0.412	0.006
une	lab	0.130	0.361	0.831	1.164	0.930	0.462	-0.142	-0.451	-0.628	-0.537
	rer	1.188	0.066	-0.990	-1.120	-0.698	-0.515	-0.404	0.149	0.554	0.548
	une	0.000	0.238	-0.078	-0.556	-0.705	-0.375	-0.082	0.045	0.131	0.227

T ABLE 2.4 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
une	cap	-0.198	-0.242	-0.235	-0.145	-0.175	-0.137	-0.124	-0.173	-0.262	-0.272
	cab	0.159	0.483	0.459	0.402	0.354	0.259	0.025	-0.197	-0.312	-0.290
	gdp	-0.171	-0.160	-0.133	-0.060	0.052	0.151	0.128	0.053	-0.039	-0.094
	inf	0.044	0.071	-0.029	-0.251	-0.149	0.123	0.300	0.288	0.181	-0.005
	lab	-0.284	-0.271	-0.127	0.032	0.199	0.300	0.258	0.088	-0.071	-0.155
	rer	-0.005	0.220	0.324	0.144	-0.017	-0.037	-0.002	0.025	0.095	0.152
	une	0.188	0.109	0.056	-0.001	-0.095	-0.199	-0.185	-0.081	0.026	0.093

TABLE 2.5 - *IRF for Jordan*

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.917	0.431	0.396	0.116	0.372	0.487	0.915	1.014	0.681	-0.165
	cab	0.000	0.509	-0.207	0.222	0.243	-0.288	-1.121	-1.287	-0.760	0.018
	deb	0.000	0.773	0.534	0.718	0.710	0.715	0.556	0.407	0.040	-0.319
	gdp	0.000	-0.269	-0.368	-0.113	-0.756	-1.110	-0.818	-0.274	0.066	0.222
	inf	0.000	1.438	0.579	0.306	0.116	-0.146	-0.258	0.124	0.464	0.456
	lab	0.000	0.058	-0.054	-0.010	-0.026	-0.156	-0.169	0.034	0.226	0.222
crb	cap	-2.171	-1.383	-0.012	1.643	0.983	-0.701	-1.911	-1.320	-0.159	0.808
	cab	3.354	0.845	-1.708	-2.118	-0.202	1.375	1.599	0.920	0.365	-0.230
	deb	0.000	-0.640	-0.374	-0.114	-0.084	-0.525	-0.550	-0.311	0.223	0.576
	gdp	0.000	-1.619	0.023	1.235	0.989	0.311	0.174	0.283	0.010	-0.547
	inf	0.000	-1.740	-2.129	-0.308	1.566	1.474	0.211	-0.904	-0.802	-0.203
	lab	0.000	-0.652	-0.737	0.080	0.721	0.516	-0.046	-0.332	-0.248	-0.102
deb	cap	-3.646	7.813	8.231	16.192	13.794	9.128	-3.457	-10.200	-11.806	-7.509
	cab	5.621	1.922	-5.404	-17.395	-16.526	-9.127	1.544	5.413	6.078	4.630
	deb	7.896	8.378	11.876	8.226	7.269	1.159	-3.138	-7.324	-7.646	-6.664
	gdp	0.000	-10.541	-15.640	-11.287	-3.728	-0.189	1.721	3.370	5.681	5.823
	inf	0.000	-0.791	0.168	-1.561	5.323	7.760	6.541	-1.004	-6.321	-7.668
	lab	0.000	-0.640	-1.878	-1.702	1.304	3.414	2.849	0.446	-1.180	-1.408

TABLE 2.5 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
gdp	cap	0.187	-1.999	-0.524	-2.060	0.114	1.255	2.401	1.128	-0.025	-0.901
	cab	-1.024	0.938	2.044	2.610	-0.469	-1.715	-1.744	-0.482	0.036	0.311
	deb	-1.552	0.158	-0.933	0.272	0.096	0.947	0.796	0.640	-0.026	-0.229
	gdp	1.733	1.849	0.632	-0.822	-1.244	-0.226	-0.167	-0.388	-0.366	0.096
	inf	0.000	1.258	-0.380	-0.153	-1.749	-0.796	0.551	1.549	0.904	0.061
	lab	0.000	0.421	0.272	-0.251	-0.753	-0.390	0.242	0.481	0.237	-0.015
inf	cap	0.782	0.865	0.945	0.664	0.875	-0.255	-0.668	-0.773	-0.350	-0.165
	cab	0.802	-0.426	-0.980	-1.208	-0.747	0.364	0.365	0.259	0.156	0.230
	deb	1.764	0.959	0.376	0.669	0.019	-0.102	-0.454	-0.449	-0.382	-0.223
	gdp	-1.224	-1.905	-0.498	-0.181	0.105	0.083	-0.021	0.339	0.432	0.273
	inf	2.176	-0.047	-0.372	0.465	0.323	0.646	-0.030	-0.485	-0.491	-0.208
	lab	0.000	-0.224	-0.277	0.043	0.258	0.255	0.010	-0.125	-0.081	-0.010
lab	cap	0.049	-0.007	-0.060	-0.083	-0.057	0.074	0.263	0.399	0.397	0.286
	cab	0.005	0.019	0.106	0.228	0.230	0.061	-0.148	-0.264	-0.261	-0.199
	deb	-0.023	-0.010	0.037	0.098	0.178	0.263	0.340	0.375	0.353	0.285
	gdp	0.026	0.078	0.102	0.018	-0.140	-0.254	-0.287	-0.288	-0.281	-0.252
	inf	0.111	0.216	0.256	0.241	0.181	0.112	0.130	0.234	0.334	0.349
	lab	0.042	0.061	0.073	0.066	0.028	-0.010	-0.006	0.036	0.074	0.083

TABLE 2.6 - *IRF for Malta*

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.784	0.698	-0.537	-0.671	-0.295	0.075	0.163	0.066	-0.044	-0.122
	cab	0.000	1.000	1.131	0.819	0.299	0.152	0.141	0.054	0.033	-0.043
	gdp	0.000	-0.185	0.434	0.638	0.523	0.250	-0.072	-0.240	-0.321	-0.363
	inf	0.000	-0.521	-0.640	-0.316	-0.074	-0.025	-0.038	0.078	0.252	0.401
	lab	0.000	-0.193	-0.167	-0.275	-0.352	-0.412	-0.470	-0.512	-0.557	-0.600
	rer	0.000	0.057	0.013	-0.106	-0.057	0.091	0.180	0.249	0.234	0.194
cab	cap	-2.028	-1.469	0.096	0.759	0.481	0.288	0.002	-0.031	0.083	0.043
	cab	1.690	0.023	-0.337	0.342	-0.206	0.258	-0.057	-0.467	-0.146	-0.373
	gdp	0.000	0.243	0.631	-0.227	-0.302	-0.249	-0.470	-0.220	-0.305	-0.344
	inf	0.000	0.344	0.469	-0.158	-0.297	-0.149	0.050	0.364	0.342	0.283
	lab	0.000	-0.162	-0.045	-0.203	-0.138	-0.135	-0.198	-0.124	-0.131	-0.106
	rer	0.000	-0.148	0.318	0.184	0.529	0.492	0.213	0.295	0.107	0.089
gdp	cap	0.411	0.130	-0.124	0.082	-0.006	-0.038	0.010	-0.115	-0.059	-0.064
	cab	0.314	0.978	-0.053	0.451	0.108	-0.300	0.166	-0.211	-0.057	0.128
	gdp	1.105	0.577	0.538	0.461	-0.096	0.086	-0.111	-0.179	-0.006	-0.148
	inf	0.000	-0.672	-0.533	-0.354	-0.235	0.092	0.109	0.158	0.220	0.123
	lab	0.000	-0.058	-0.043	-0.050	-0.179	-0.113	-0.174	-0.184	-0.154	-0.210
	rer	0.000	-0.462	-0.026	0.037	-0.136	0.128	-0.055	-0.042	0.054	-0.071

TABLE 2.6 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
inf	cap	0.365	0.005	-0.173	0.153	0.184	0.069	0.049	-0.043	-0.003	0.033
	cab	-0.711	0.396	-0.071	0.224	0.221	-0.164	0.096	-0.142	-0.173	0.002
	gdp	0.398	0.289	0.389	0.405	-0.024	0.043	0.000	-0.080	0.053	-0.029
	inf	1.119	0.247	-0.266	-0.342	-0.375	-0.147	-0.049	0.009	0.078	0.004
	lab	0.000	-0.017	0.092	0.125	0.040	0.075	0.061	0.054	0.101	0.091
	rer	0.000	-0.367	-0.147	0.067	-0.043	0.121	0.013	-0.059	0.008	-0.084
lab	cap	0.055	0.173	0.113	0.089	0.030	0.059	0.059	0.065	0.080	0.068
	cab	-0.102	-0.123	-0.155	-0.027	-0.167	-0.091	-0.083	-0.117	-0.040	-0.075
	gdp	0.187	-0.128	0.032	-0.038	0.032	0.092	0.081	0.142	0.159	0.172
	inf	-0.125	-0.070	-0.091	-0.100	-0.085	-0.089	-0.143	-0.165	-0.212	-0.244
	lab	0.276	0.150	0.255	0.240	0.287	0.320	0.344	0.387	0.418	0.451
	rer	0.000	0.009	0.053	-0.039	-0.047	-0.067	-0.117	-0.099	-0.128	-0.144
rer	cap	0.398	0.587	0.402	0.383	0.418	0.538	0.529	0.427	0.307	0.202
	cab	0.531	0.641	0.139	-0.162	-0.588	-0.693	-0.744	-0.770	-0.670	-0.624
	gdp	-1.128	-1.324	-0.781	-0.681	-0.595	-0.644	-0.736	-0.692	-0.584	-0.422
	inf	-0.478	-0.307	0.022	0.284	0.345	0.331	0.283	0.291	0.276	0.223
	lab	0.183	-0.155	-0.068	-0.099	0.005	0.102	0.204	0.321	0.431	0.540
	rer	1.387	1.479	1.274	0.960	0.786	0.666	0.521	0.406	0.235	0.080

TABLE 2.7 - IRF for Oman

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	2.510	0.172	-0.163	-0.462	-0.806	-1.120	-1.171	-0.817	-0.423	-0.026
	cab	0.000	1.330	1.908	1.125	1.044	0.761	0.557	0.439	0.386	0.456
	deb	0.000	-0.080	-0.386	-0.735	-0.816	-0.477	-0.245	0.056	0.233	0.264
	gdp	0.000	0.945	1.000	0.212	-0.152	-0.356	-0.357	-0.183	0.024	0.224
	inf	0.000	0.378	-0.076	0.044	-0.264	-0.294	-0.236	-0.125	-0.008	0.060
	lab	0.000	0.148	-0.071	-0.340	-0.471	-0.592	-0.617	-0.553	-0.406	-0.223
cab	cap	-5.302	-0.509	-0.231	-0.387	-0.380	0.574	0.826	0.242	-0.035	-0.456
	cab	4.061	0.008	-1.590	1.407	0.573	0.599	1.151	1.193	0.908	0.543
	deb	0.000	-0.089	-0.601	0.833	0.963	-0.008	0.056	-0.284	-0.667	-0.778
	gdp	0.000	-0.625	-0.398	0.416	-0.191	0.521	1.251	0.738	0.028	-0.207
	inf	0.000	-0.615	0.711	-0.456	-0.039	0.300	0.387	0.085	-0.165	-0.190
	lab	0.000	-1.526	-0.977	-0.176	-0.271	-0.186	0.028	0.142	0.051	-0.113
deb	cap	1.758	1.515	3.077	2.054	1.689	0.545	-0.672	-1.122	-1.158	-0.630
	cab	-2.111	-2.280	0.187	-0.231	-0.098	-0.340	-0.893	-1.441	-1.758	-1.828
	deb	3.281	0.821	1.165	0.309	-0.893	-1.009	-1.088	-0.650	0.061	0.735
	gdp	0.000	-0.229	1.411	1.400	0.762	-0.202	-1.001	-1.308	-1.263	-0.992
	inf	0.000	0.590	0.444	0.744	0.205	-0.133	-0.440	-0.439	-0.319	-0.148
	lab	0.000	0.881	1.314	1.208	1.126	0.804	0.350	-0.024	-0.193	-0.176

TABLE 2.7 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
gdp	cap	-0.232	-0.862	-0.101	-0.093	-0.629	-0.770	-0.416	0.046	0.065	0.097
	cab	1.168	1.319	0.803	-0.576	0.484	0.622	0.171	0.229	0.453	0.574
	deb	0.195	0.027	-0.334	-0.626	-0.284	0.280	0.087	0.101	0.168	0.058
	gdp	2.997	0.935	-0.772	-0.805	0.245	0.137	-0.253	0.029	0.350	0.354
	inf	0.000	0.650	-0.588	-0.062	-0.051	-0.101	-0.062	0.034	0.100	0.065
	lab	0.000	0.328	-0.146	-0.494	-0.305	-0.290	-0.320	-0.251	-0.131	-0.045
inf	cap	-3.804	2.914	0.225	-0.812	-0.045	1.270	1.404	0.234	0.250	-0.173
	cab	2.408	-1.626	-4.402	2.405	-0.614	-0.763	0.622	0.325	-0.002	-0.086
	deb	-0.867	-0.091	-0.494	1.263	1.393	-0.478	0.383	-0.032	-0.625	-0.541
	gdp	-1.374	0.065	-1.351	-0.009	-0.486	0.901	1.429	0.030	-0.463	-0.079
	inf	3.536	-1.943	1.140	-1.236	0.218	0.767	0.373	-0.103	-0.204	-0.010
	lab	0.000	-1.770	-0.214	0.847	-0.128	0.064	0.505	0.484	0.217	0.014
lab	cap	0.054	0.123	0.128	0.108	0.076	0.077	0.106	0.159	0.228	0.287
	cab	-0.046	-0.167	-0.287	-0.384	-0.498	-0.591	-0.643	-0.651	-0.618	-0.550
	deb	-0.013	-0.038	-0.075	-0.067	-0.036	0.012	0.080	0.145	0.188	0.201
	gdp	-0.014	-0.045	-0.071	-0.121	-0.197	-0.235	-0.223	-0.183	-0.131	-0.072
	inf	-0.020	-0.014	-0.006	-0.024	-0.036	-0.035	-0.016	0.008	0.032	0.053
	lab	0.103	0.152	0.183	0.200	0.200	0.193	0.189	0.192	0.198	0.202

TABLE 2.8 - *IRF for Saudi Arabia*

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.733	0.877	-0.193	-0.370	-0.113	-0.022	-0.053	-0.024	0.052	0.069
	cab	0.000	0.017	0.024	-0.035	-0.019	-0.026	-0.075	-0.109	-0.096	-0.079
	gdp	0.000	-0.653	-0.377	0.250	0.356	0.086	-0.060	-0.057	-0.062	-0.102
	inf	0.000	0.072	0.376	0.242	-0.144	-0.181	0.023	0.114	0.038	-0.006
	lab	0.000	0.254	-0.120	-0.278	-0.086	0.046	-0.008	-0.082	-0.103	-0.107
	rer	0.000	0.073	-0.280	-0.349	-0.075	0.133	0.122	0.045	-0.001	-0.018
cab	cap	-1.903	-0.035	0.586	-0.121	-0.078	-0.243	-0.272	-0.620	-0.702	-0.734
	cab	3.027	2.028	2.947	2.729	2.880	3.184	3.639	3.947	4.231	4.595
	gdp	0.000	1.470	1.075	0.453	1.237	1.354	1.582	1.714	2.118	2.331
	inf	0.000	-0.928	-2.281	-0.788	-0.675	-1.013	-1.610	-1.545	-1.550	-1.737
	lab	0.000	-0.322	0.941	1.433	1.488	1.965	2.204	2.491	2.741	3.120
	rer	0.000	-0.772	0.177	0.455	0.111	0.200	0.157	0.274	0.331	0.471
gdp	cap	-0.158	-1.622	-0.174	-0.390	0.079	0.017	0.265	0.087	0.004	-0.044
	cab	0.285	-0.578	0.037	0.043	-0.002	-0.138	-0.061	0.004	0.007	-0.036
	gdp	1.436	0.257	0.846	-0.339	-0.006	-0.149	-0.021	-0.193	-0.065	0.023
	inf	0.000	1.189	-0.897	-0.403	-0.122	0.353	0.013	-0.047	-0.008	0.084
	lab	0.000	0.724	0.120	0.295	-0.143	0.003	-0.036	0.012	-0.077	-0.042
	rer	0.000	0.697	0.061	0.418	0.037	0.128	-0.034	-0.025	-0.102	-0.051

TABLE 2.8 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
inf	cap	-2.100	0.538	-0.696	-0.917	-0.423	0.349	0.207	-0.245	-0.285	-0.079
	cab	0.239	0.071	1.211	0.654	0.257	0.433	0.796	0.870	0.812	0.873
	gdp	0.347	2.337	-0.240	0.148	0.792	0.579	-0.061	0.013	0.493	0.651
	inf	4.224	-1.323	-2.411	-0.288	0.691	-0.181	-0.732	-0.352	-0.066	-0.294
	lab	0.000	-0.076	1.053	0.165	0.341	0.723	0.732	0.429	0.390	0.627
lab	rer	0.000	-0.947	0.505	0.102	0.268	0.353	0.221	-0.049	-0.089	0.067
	cap	-0.029	-0.013	-0.011	-0.015	-0.029	-0.038	-0.043	-0.039	-0.032	-0.025
	cab	-0.009	0.015	0.022	0.025	0.031	0.039	0.046	0.050	0.055	0.061
	gdp	-0.007	0.010	0.019	0.039	0.047	0.053	0.054	0.053	0.049	0.044
	inf	-0.006	-0.036	-0.018	-0.007	-0.007	-0.020	-0.026	-0.026	-0.027	-0.029
rer	lab	0.069	0.089	0.100	0.102	0.102	0.093	0.084	0.075	0.069	0.064
	rer	0.000	-0.008	-0.002	0.002	0.008	0.010	0.014	0.017	0.019	0.018
	cap	1.170	2.961	2.316	0.974	-0.046	0.491	0.804	0.870	0.576	0.517
	cab	-1.494	-0.183	-0.725	-0.039	-0.380	-0.745	-0.998	-1.053	-1.157	-1.295
	gdp	-0.917	-1.447	-1.935	-1.591	-1.098	-0.269	-0.687	-1.082	-1.237	-0.996
inf	inf	0.522	1.984	1.523	-0.166	0.412	0.454	0.469	0.343	0.576	0.666
	lab	0.109	-1.353	-2.216	-2.785	-2.853	-2.449	-1.660	-1.460	-1.493	-1.544
	rer	1.806	1.040	-0.319	-1.091	-0.995	-0.612	-0.028	-0.069	-0.256	-0.413

TABLE 2.9 - *IRF for Syria*

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.519	1.205	0.843	0.325	0.224	0.267	0.036	-0.084	-0.075	-0.026
	cab	0.000	0.208	0.269	0.672	0.587	-0.296	-0.762	-0.692	-0.497	-0.335
	deb	0.000	-0.425	-0.305	-0.228	0.217	0.451	0.518	0.522	0.467	0.333
	gdp	0.000	0.382	0.127	0.107	0.289	0.266	0.093	-0.054	-0.135	-0.140
	inf	0.000	-0.517	-0.772	-0.242	0.098	0.320	0.364	0.265	0.117	-0.066
	lab	0.000	-0.520	-0.496	-0.460	-0.293	-0.121	0.076	0.161	0.096	0.000
cab	cap	-0.802	-0.567	-0.601	-0.573	-0.471	-0.144	0.004	0.010	0.147	0.174
	cab	2.506	0.099	-1.614	-1.285	-0.504	-0.334	0.000	0.532	0.705	0.491
	deb	0.000	0.576	0.657	0.406	0.354	0.012	-0.250	-0.426	-0.382	-0.309
	gdp	0.000	0.425	0.048	-0.249	-0.330	-0.204	-0.259	-0.130	0.027	0.126
	inf	0.000	0.733	0.775	0.684	0.288	-0.141	-0.389	-0.401	-0.318	-0.130
	lab	0.000	-0.230	0.652	0.713	0.506	0.281	0.069	-0.084	-0.170	-0.161
deb	cap	5.950	7.410	6.191	5.177	4.713	4.729	4.192	3.879	3.369	2.781
	cab	-6.103	-12.734	-9.197	-7.163	-5.449	-4.500	-3.809	-3.300	-2.928	-2.438
	deb	14.460	9.279	9.726	8.989	8.167	7.860	7.257	7.016	6.652	6.325
	gdp	0.000	0.184	-0.623	-1.304	-0.871	-0.951	-0.675	-0.578	-0.601	-0.572
	inf	0.000	1.963	-0.476	-1.348	-1.894	-2.142	-2.034	-2.112	-1.988	-2.018
	lab	0.000	2.545	0.954	0.051	-0.816	-1.626	-2.277	-2.734	-3.229	-3.616

TABLE 2.9 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
gdp	cap	1.371	0.448	-0.677	0.961	-0.345	-0.299	0.223	-0.113	0.168	0.069
	cab	-2.207	0.300	0.795	-0.927	-1.163	-0.006	-0.233	-0.112	-0.092	0.125
	deb	-1.412	0.786	-0.375	0.975	-0.052	0.357	0.252	0.078	0.041	-0.019
	gdp	1.811	-1.271	1.075	0.027	-0.185	0.004	-0.210	-0.025	-0.041	-0.117
	inf	0.000	0.328	0.808	-0.177	0.577	-0.067	0.047	-0.053	-0.246	-0.106
inf	lab	0.000	-0.098	0.006	0.182	0.069	0.389	0.005	0.003	0.014	-0.129
	cap	-1.483	-0.406	0.493	-1.031	-0.110	0.039	0.009	0.319	-0.092	-0.100
	cab	-2.329	-1.615	-2.552	-0.621	0.705	1.338	1.351	0.861	0.708	0.389
	deb	0.488	1.293	0.451	-0.219	-0.549	-0.686	-0.810	-0.586	-0.485	-0.187
	gdp	0.255	0.587	-0.520	-0.585	-0.359	-0.377	0.244	0.149	0.200	0.283
lab	inf	3.450	1.210	0.566	-0.291	-0.947	-0.670	-0.612	-0.389	0.075	0.190
	lab	0.000	1.677	0.377	0.327	0.026	-0.592	-0.522	-0.488	-0.368	-0.118
	cap	0.049	0.125	0.083	0.090	0.086	0.072	0.101	0.099	0.100	0.113
	cab	-0.077	-0.093	-0.116	-0.177	-0.172	-0.155	-0.175	-0.187	-0.173	-0.171
	deb	0.025	0.019	0.067	0.057	0.083	0.083	0.100	0.095	0.099	0.104
gdp	gdp	0.011	0.029	0.016	0.030	-0.008	0.007	0.004	-0.003	0.000	-0.002
	inf	0.030	0.072	0.069	0.060	0.065	0.070	0.054	0.055	0.045	0.043
	lab	0.174	0.128	0.136	0.161	0.162	0.166	0.167	0.163	0.164	0.158

TABLE 2.10 - IRF for Tunisia

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
cap	cap	1.040	-0.020	-0.424	-0.535	-0.549	-0.326	0.066	0.155	0.197	0.067
	cab	0.000	-0.179	-0.136	-0.281	-0.085	0.342	0.155	-0.239	-0.282	-0.196
	deb	0.000	-0.273	-0.373	-0.644	-0.506	-0.190	0.101	0.211	0.113	-0.024
	gdp	0.000	0.102	0.032	0.285	0.385	0.284	-0.019	-0.029	0.051	0.111
	inf	0.000	0.371	0.450	0.441	0.280	0.068	-0.042	-0.019	0.020	0.091
	lab	0.000	0.108	0.217	0.347	0.146	-0.126	-0.182	-0.093	-0.040	0.006
	rer	0.000	0.081	0.035	0.018	0.091	0.116	0.067	0.010	-0.023	-0.022
cab	cap	-0.847	-0.029	-0.133	0.484	0.507	0.341	0.042	-0.077	-0.194	-0.103
	cab	0.670	0.035	0.018	0.650	0.362	-0.236	-0.201	0.111	0.196	0.120
	deb	0.000	0.160	0.276	0.384	0.329	0.143	-0.170	-0.299	-0.198	-0.029
	gdp	0.000	-0.420	0.008	-0.247	-0.395	-0.309	0.035	0.109	0.052	-0.038
	inf	0.000	-0.203	-0.290	-0.461	-0.305	-0.086	0.045	0.063	0.045	-0.027
	lab	0.000	0.100	-0.022	-0.336	-0.200	0.055	0.157	0.096	0.051	0.018
	rer	0.000	-0.065	0.001	0.009	-0.045	-0.092	-0.073	-0.018	0.021	0.024
deb	cap	-0.632	0.447	0.919	1.035	0.613	0.238	-0.213	-0.212	-0.182	0.099
	cab	-1.711	-0.406	0.471	1.005	0.536	0.340	0.622	0.766	0.456	0.173
	deb	2.522	2.039	1.912	1.296	0.567	-0.250	-0.660	-0.641	-0.356	-0.109
	gdp	0.000	-0.953	-0.875	-1.458	-1.049	-0.621	-0.026	-0.013	0.015	-0.028
	inf	0.000	-0.865	-1.036	-1.014	-0.592	-0.301	-0.104	-0.077	-0.059	-0.107
	lab	0.000	0.051	-0.299	-0.262	0.053	0.250	0.161	0.009	-0.041	-0.076
	rer	0.000	-0.119	-0.107	-0.160	-0.225	-0.194	-0.079	0.008	0.039	0.027

TABLE 2.10 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
gdp	cap	0.902	0.176	-0.885	0.539	-0.270	0.147	0.101	0.109	0.024	0.078
	cab	1.038	-0.471	-0.098	0.044	-0.057	0.389	0.077	-0.236	-0.065	0.041
	deb	-0.506	0.142	0.283	-0.194	-0.118	0.029	0.039	0.086	0.019	0.007
	gdp	0.794	-0.685	0.217	-0.284	0.227	-0.058	-0.067	-0.056	0.089	0.001
	inf	0.000	0.164	0.175	-0.134	-0.004	-0.147	-0.071	-0.028	-0.017	-0.018
	lab	0.000	0.036	0.114	0.080	0.032	-0.185	-0.057	0.007	-0.003	-0.024
	rer	0.000	0.129	0.028	-0.077	0.024	0.013	-0.020	-0.030	-0.019	-0.010
inf	cap	-0.656	-0.753	-0.307	-0.504	-0.204	0.094	-0.086	-0.055	-0.268	-0.365
	cab	-0.846	-0.327	-0.301	0.069	0.170	-0.242	-0.316	-0.039	-0.084	-0.181
	deb	-0.173	-0.447	-0.397	-0.009	0.285	0.208	0.066	-0.149	-0.218	-0.188
	gdp	0.253	0.319	0.635	0.202	0.060	-0.193	0.108	0.120	0.191	0.213
	inf	0.541	0.387	0.371	0.198	0.096	0.063	0.139	0.148	0.233	0.247
	lab	0.000	0.295	0.145	-0.057	-0.145	-0.002	0.034	-0.004	0.029	0.038
	rer	0.000	-0.030	0.059	0.162	0.103	0.027	0.013	0.012	0.025	0.036
lab	cap	0.021	0.058	0.063	0.072	0.096	0.114	0.148	0.177	0.207	0.235
	cab	0.007	0.010	0.050	0.078	0.088	0.102	0.128	0.133	0.130	0.137
	deb	-0.018	-0.010	-0.020	-0.025	-0.041	-0.047	-0.045	-0.034	-0.021	-0.012
	gdp	-0.032	-0.030	-0.063	-0.078	-0.097	-0.094	-0.106	-0.120	-0.138	-0.154
	inf	-0.001	-0.004	-0.020	-0.036	-0.057	-0.077	-0.100	-0.119	-0.137	-0.156
	lab	0.035	0.043	0.045	0.044	0.047	0.042	0.033	0.030	0.034	0.039
	rer	0.000	0.002	0.004	0.000	-0.007	-0.010	-0.014	-0.019	-0.025	-0.030

TABLE 2.10 - (continued)

1SD shock	Forecast period/ response	1	2	3	4	5	6	7	8	9	10
rer	cap	-0.995	-0.471	-1.136	-1.909	-1.979	-1.582	-1.249	-0.628	-0.298	-0.358
	cab	0.452	0.752	-0.953	-1.283	0.024	0.279	-0.373	-0.778	-0.875	-1.003
	deb	-0.288	-0.423	-1.302	-1.895	-2.121	-1.579	-0.803	-0.324	-0.120	-0.030
	gdp	0.620	-0.034	0.210	1.073	1.514	1.140	0.923	0.879	0.871	0.811
	inf	0.717	1.095	1.726	1.882	1.567	1.223	0.964	0.719	0.635	0.705
	lab	-0.155	-0.043	0.847	0.977	0.481	0.062	-0.086	-0.205	-0.269	-0.205
	rer	0.415	0.364	0.245	0.306	0.416	0.444	0.368	0.253	0.172	0.114

TABLE 3 - Assessment of Stability of IRFs due to 1 SD Shock in Macro Variables for Sampled MENA Countries

MENA country/ shock	cap	deb	cab	gdp	inf	lab	rer	une	Country risk ranking
UAE	explo	NA	NA	fluc short	fluc short	stable fast	NA	NA	9
Bahrain	explo	NA	explo	explo	explo	explo	explo	NA	10
Algeria	stable fast	stable fast	NA	stable fast	stable fast	stable fast	stable fast	NA	1
Israel	stable fast	NA	stable fast	fluc short	stable fast	stable fast	stable fast	fluc medium	4
Jordan	fluc long	fluc medium	fluc medium	fluc medium	stable fast	fluc long	NA	NA	8
Malta	stable fast	NA	stable fast	stable fast	stable fast	explo	stable fast	NA	3
Oman	stable fast	fluc long	stable fast	stable fast	stable fast	explo	NA	NA	7
Saudi Arabia	stable fast	NA	explo	stable fast	stable fast	stable fast	stable slow	NA	5
Syria	fluc long	stable fast	stable fast	stable fast	stable fast	stable fast	NA	NA	2
Tunisia	stable slow	stable fast	stable slow	stable fast	explo	stable fast	stable slow	NA	6

Assessments:

stable fast – excellent stability achieved after 4 or 5 periods

stable slow – excellent stability achieved after 7 or 8 periods

fluc long – fluctuates with long periodicity (7 to 8 periods)

fluc medium – fluctuates with medium periodicity (4 to 5 periods)

fluc short – fluctuates with short periodicity (2 to 3 periods)

explo – unstable, trending up or down

Ranks (1 to 10) – 1 = least risky, 10 = most risky

5. CONCLUSIONS

There are various methodologies for conducting country risk assessment (CRA) that focus on the political, socioeconomic, geographical or security dimensions. In this paper we assess a country's investment risk by studying its vulnerability to shocks in macroeconomic variables. We select a sample of 10 MENA countries with the following chosen macro variables that have at least 20 years of available data: capital formation, external debt, current account balance, GDP growth, inflation, labor force, unemployment and exchange rate.

By estimating an unrestricted vector autoregression (VAR) for each country, we can forecast the impulse responses (IRs) in all its macro variables due to a 1 standard deviation (1 SD) shock in any chosen variable, say, capital formation. The IRs constitute an impulse response function (IRF). As a result of the 1 SD shock, the IRs for any macro variable can stabilize, fluctuate over a periodic cycle, or trend upward or downward explosively, with the same order of desirability for investment purposes. The country with more IRs that quickly stabilize after the one SD shocks is deemed to be less risky. Based on this criterion, the ten sampled MENA countries are ranked as follows: Algeria (least risky), Syria, Malta, Israel, Saudi Arabia, Tunisia, Oman, Jordan, United Arab Emirates and Bahrain (most risky).

Note that the most rapidly developing countries such as UAE and Bahrain are also the most risky. The presence of vast oil reserves also does not seem to correlate with the country's riskiness, e.g., Algeria, Saudi Arabia and UAE. This suggests that a country's economic policy appears to be more important in stabilizing its economy and attracting FDI in the MENA region.

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ABSTRACT

In this paper we assess a country's investment risk by studying its vulnerability to shocks in macroeconomic variables including GDP growth, inflation, and unemployment. Based on the criteria of quick stabilization in the impulse responses of the macro variables after a one standard deviation shock, we rank a sample of ten MENA countries as follows: Algeria (least risky), Syria, Malta, Israel, Saudi Arabia, Tunisia, Oman, Jordan, United Arab Emirates and Bahrain (most risky). We conclude that a country's economic policy appears to be more important than its oil reserves in stabilizing its economy and attracting FDI in the MENA region.

Keywords: Vulnerability, Investment Risk, Impulse Response, Macroeconomic Shock

JEL Classification: C32, E22

RIASSUNTO

Vulnerabilità macroeconomica e rischio degli investimenti nella regione Medio Oriente e Nord Africa

In questo studio viene valutato il rischio paese attraverso la vulnerabilità agli shock delle variabili macroeconomiche tra cui la crescita del PIL, l'inflazione e la disoccupazione. Sulla base dei criteri di stabilizzazione veloce nelle risposte agli impulsi delle variabili macroeconomiche dopo uno shock pari ad una deviazione standard, consideriamo un campione di dieci paesi dell'area Medio Oriente e Nord Africa: Algeria (il meno rischioso), Siria, Malta, Israele, Arabia Saudita, Tunisia, Oman, Giordania, Emirati Arabi Uniti e Bahrein (il più rischioso).

La conclusione è che la politica economica di un paese si rivela più importante delle eventuali riserve petrolifere sia al fine della stabilizzazione della sua economia sia per quanto riguarda la capacità di attrarre investimenti diretti esteri nella zona Medio Oriente e Nord Africa.

APPENDIX

Graphs of impulse responses for the 1st ranked country (Algeria) and last ranked country (Bahrain)

FIGURE 1.1 - *Impulse Response Function for Algeria (1 SD Shock in cap)*

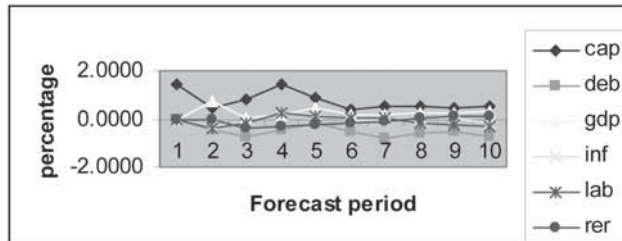


FIGURE 1.2 - *Impulse Response Function for Algeria (1 SD Shock in deb)*

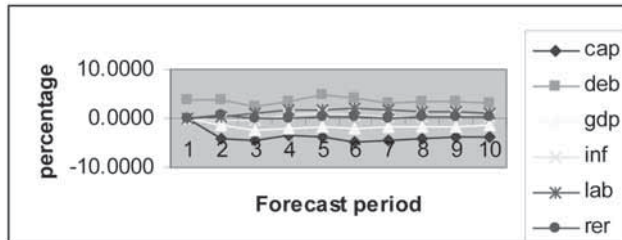


FIGURE 1.3 - *Impulse Response Function for Algeria (1 SD Shock in gdp)*

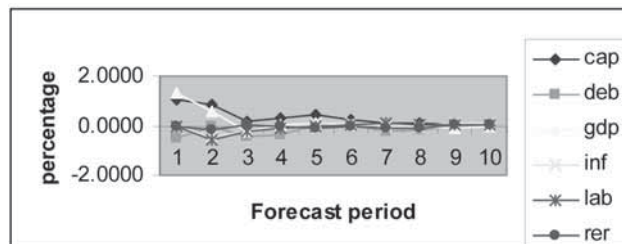


FIGURE 1.4 - *Impulse Response Function for Algeria
(1 SD Shock in inf)*

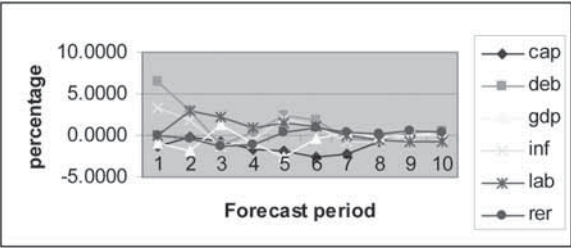


FIGURE 1.5 - *Impulse Response Function for Algeria
(1 SD Shock in lab)*

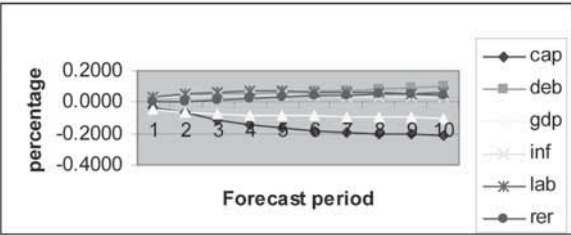


FIGURE 1.6 - *Impulse Response Function for Algeria
(1 SD Shock in rer)*

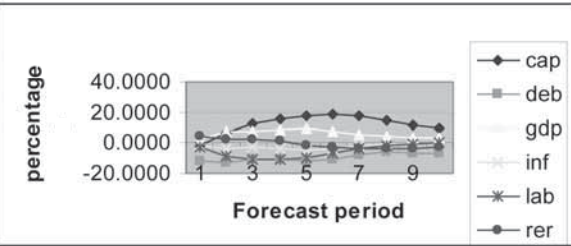


FIGURE 2.1 - *Impulse Response Function for Bahrain
(1 SD Shock in cap)*

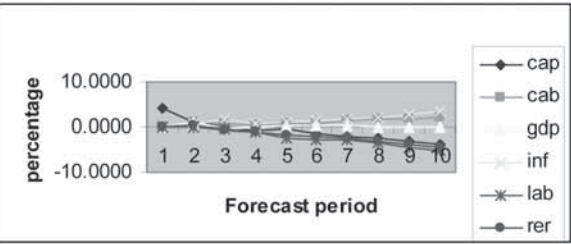


FIGURE 2.2 - *Impulse Response Function for Bahrain
(1 SD Shock in cab)*

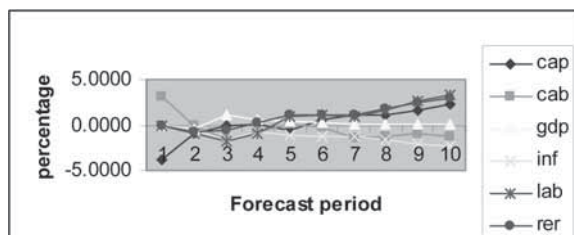


FIGURE 2.3 - *Impulse Response Function for Bahrain
(1 SD Shock in gdp)*

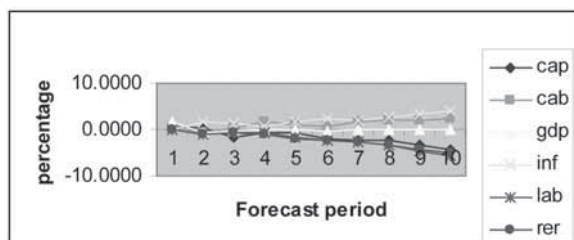


FIGURE 2.4 - *Impulse Response Function for Bahrain
(1 SD Shock in inf)*

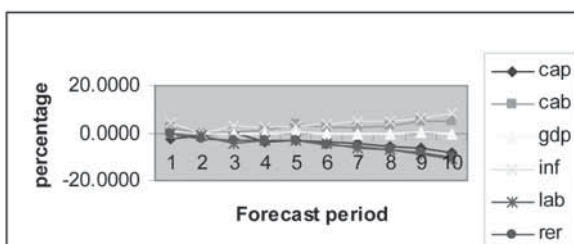


FIGURE 2.5 - *Impulse Response Function for Bahrain
(1 SD Shock in lab)*

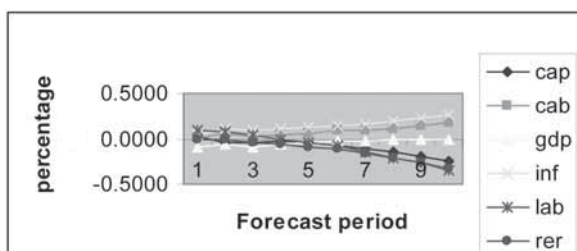


FIGURE 2.6 - *Impulse Response Function for Bahrain*
(1 SD Shock in rer)

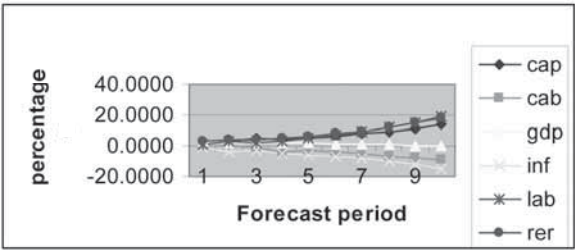


FIGURE 3.1 - *Impulse Response Function for Syria*
(1 SD Shock in cap)

