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Macroeconomic volatility and stock returns: Evidence from Mediterranean markets

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The link between the macroeconomy and the stock market has intuitive appeal. Our attention in this paper will be addressed to evaluate the effects of macroeconomic shocks on five Mediterranean stock markets (France, Spain, Portugal, Tunisia, and Egypt). Using monthly data from 1995M1 to 2003 M12, A standard VAR model is estimated for each country and the effects of macroeconomic shocks on stock prices are evaluated by means of impulse responses analysis. Our findings highlight weak form efficiency of the Arab stock markets. This weakness was the main obstacle for these two stock returns to respond normally to macroeconomic shocks as it is seen in France, Spain and Portugal. But, there is evidence of a significant cross-country heterogeneity in the persistence, magnitude and timing of these responses. A special precaution is set up to account qualitative interpretations for the responses of stock prices to macroeconomic shocks.

Field of Research : Macroeconomic shocks, stock prices and VAR Methodology,

1. Introduction

In the literature on financial economics, there has been, to our knowledge, no study that examines the degree of fullness of stock markets responses to macroeconomic shocks in Mediterranean countries like France, Spain, Portugal, Egypt and Tunisia. But, the question had been closely treated in Middle east and north African region (MENA) by investigating different empirical tools. Research on these markets has focused on the issue of efficiency as well as on their integration with international markets. Darat and Hakim (1997) examine price linkages among three Arab stock markets (Amman, Cairo, and Casablanca) and their integration with international

markets, and find that these markets are integrated within the region but not at the international level. Darrat and Pennathur (2002) study economic and financial integration among the countries in the Arab Maghreb region (Algeria, Morocco, and Tunisia) and find that they share a robust relation bringing their financial and economic policies.

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Another important country deserves to be treated; Spain could be counted among the most developed economies of the world, its capital markets were fully liberalized and it had qualified to become a founding member of the European Monetary Union. Becketti and Sellon (1989) analyze the economic impact of financial market volatility. Walsh (1984) or Ferderer (1993) analyze similar issues for interest rate volatility while Goldberg (1993), Glick (1998), Campa and Goldberg (1999) and, more recently, Baum et al. (2001) focus on exchange rate volatility.

According to Domowitz et al. (1998), the MENA region is considered a part of the emerging market and is typically much smaller, less liquid, and more volatile than well-known world financial markets. For more studies on the emerging markets in the Mediterranean, see Harvey (1995), Bekaert and Harvey (1997), Errunza (1994).[i]

Our purpose is to study the relationship between macroeconomic volatility and stock returns of five Mediterranean markets, namely, Egypt, Spain, France, Portugal and Tunisia. The focus on these markets is appropriate for a number of reasons. First, these countries are part of the countries in the Mediterranean region and will become an increasingly important component of the regional economy, with their equity market in progress becoming an integral segment of the regional stock markets. Second, the choice of these markets allows comparison of Arabic progressing markets with maturing markets to determine if the returns-generating processes and heterogeneity in responses of stock returns to macroeconomic variables depends on the degree of market development. Third, the presence of long memory in equity prices may reflect some dynamics in the underlying economies, which in turn, would be of value in forecasting or modeling economic conditions in these countries.

To do so, we rely on the standard VAR models to identify macroeconomic volatility and evaluate their effects on stock market indices. Standard vector autoregressions that do not impose error corretions for deviations from the long-run equilibrium of the model are a very commonly used methodology. In this field, different identification schemes have been utilized in the literature (see, e.g. Christiano et al. (1996); Leeper et al. (2000); Sims and Zha (1999), Bernanke and Mihov (1998); Sims (1992);Christiano, Eichenbaum, and Evans (1998); Christiano et al. (2005)).

The remainder of the paper is as follows: Section 2 presents the econometric methodology. Section 3 deals with the empirical results. Section 4 contains a summary of our findings and concluding remarks.

2. Econometric methodology

2.1. Choice of the data

To investigate the potential interactions between the selected macroeconomic variables and returns in each market, this study uses a six-variable vector autoregressive (VAR) model (Bilson et al., 2001).

In each model, the equity market studied is France, Spain, Portugal, Egypt, and Tunisia. Apart from these domestic macroeconomic variables, theory and existing

literature point to the possible relevance of some worldwide information variables in predicting market returns. This includes the MSCI world index to proxy the state of the global economy and expects a positive sign (Ferson and Harvey,1998 ; Giovannini and Jorion, 1989; Harvey, 1991). All returns are derived from Morgan Stanley Capital International (MSCI) and cover the period January 1995 to December 2003, a total of 108 observations. They are calculated with gross dividend reinvestment and represent value-weighted portfolios of the larger firms traded on the national equity markets.

The domestic macroeconomic variables as well as the U.S. 3-month Treasury-bill (T-bill) yield and the MSCI world index are obtained in monthly intervals from the International Financial Statistics Database and cover the same period. The domestic macroeconomic variables used for each country are industrial productivity as measured by the industrial production index, the nominal exchange rate, the money supply as measured by the narrow stock of money (M1) and nominal interest rate. The U.S. 3-month T-bill yield and the MSCI world index are used as proxies for global variables. All variables are differenced in specifying the VAR in Eq. (1).

2.2. VAR approach

A popular approach to identify the linkages between macroeconomic volatility and stock returns behavior is to estimate the vector-autoregressive (VAR) model of various economic indicators and stock returns. This methodology first developed by Sims (1980), after he criticized the methodological concepts of large-scale structural simulations models which failed to forecast for unprecedented events. Followed by LeRoy and Porter (1981) in the context of variance-bounds literature and most recently several researchers among which Campbell and Shiller (1988) applied this methodology.

The VAR approach models every endogenous variable in the system as a function of the lagged values of all other endogenous variables in the system. In addition, vector autoregression (VAR) has proven to be a useful tool for the analysis of short-term dynamics of several economic time series. The basic VAR model is just a multivariate generalization of the univariate autoregressive (AR) model. Formally a VAR model used in our study can be written as:

$$S_t = \psi_0 + \sum_{j=1}^{P} \beta_j W_{t-j} + \varepsilon_t \qquad (1)$$

Where S_t is the vector of stock returns series for the markets (France, Spain, Portugal, Tunisia, and Egypt). ψ_0 is the deterministic component and β_j is the matrix of coefficient for MSCI world index, the US 3 month treasury bill, nominal exchange rates, nominal effective exchange rates, nominal market rates and the stock of money M1. The lag length is denoted by p and ε_t is the vector of innovations and is not linked with past S_t values.

In order to derive impulse responses, a set of identifying restrictions has to be imposed. The approach taken in this paper is based on the contemporaneous effects of shocks. To do so, the standard approach is a Choleski decomposition of the

residual covariance matrix from the VAR model, i.e. from the so called reduced form model. It imposes a contemporaneous recursive structure on the shocks that depends in a crucial way on the ordering of the variables which reflects the speed with which variables respond to the shocks[ii]. The triangular form used for the Choleski decomposition only imposes contemporaneous restrictions without any restrictions on the lagged structural parameters.

The use of the VAR model also allows for the inclusion of the appropriate lag lengths. This is important because of the time delays in the production of information concerning the macroeconomic variables[iii]. In particular, the transmission and incorporation of information into stock returns is not always instantaneous. This may be the case because reporting delays may create a lag between the observation of data concerning a macroeconomic variable and the incorporation of that information into stock returns.

After estimating the VAR model, impulse response functions (IRFs) are derived from the estimates. An (IRFs) measures the time profile of the effect of a shock on the behavior of a series. It should be noted that results from impulse response functions may differ significantly depending on the standard errors or confidence intervals; Runkle (1987) argues that reporting the IRFs without standard errors or confidence intervals is equivalent to reporting regression coefficient without t-statistics. Therefore, confidence bands around the mean response can be used for statistical inference (Doan and Litterman, 1986). When the upper and lower bands carry the same sign, the response is interpreted as being statistically significant at the 95% confidence level.

3. Empirical results

Using the minimum of the Akaike information criteria (AIC) and the Schwarz criteria (SC), the appropriate lag length is determined to be four. And before estimating the model, the time series properties of the data were checked by testing for stationarity using the Augmented Dickey–Fuller (ADF) and Phillips-Perron (PP) tests in order to avoid the possibility of finding spurious relationships. The Augmented Dickey–Fuller test results are reported in Table 1[iv] and the series taken in first differences are shown to be stationary and integrated of order zero I(0).

Table 2 reports the summarized results in terms of the VAR coefficients for each market's response to the country and global factors. The results show that the MSCI world index and the U. S. 3-month T-bill yield are consistently significant at the 1% for all markets examined except Egypt and Tunisia. Interest rates and exchange rates are significant in three out of the five markets examined. The significant coefficients for the MSCI world index, the U.S. 3-month T-bill yield, interest rates and exchange rates do show the expected signs for the most part. The performance of money supply and industrial production is generally very weak. Because the results of the VAR estimates are similar to those obtained by plotting the impulse response functions, detailed discussion and explanation of the results are presented under the context of the impulse response functions.

Table 2

	France		Spain		Portugal		Tunisia		Egypt	
	Estimates	**S.E.**	**Estimates**	**S.E.**	**Estimates**	**S.E.**	**Estimates**	**S.E.**	**Estimates**	**S.E.**
Constant	0.016176	0.00862	0.005040	0.01226	0.017382	0.01379	0.005701	0.00844	0.006965	0.00638
MSCI(-1)	-0.038350	0.10847	-0.053840	0.10074	0.092818	0.10841	-0.026146	0.11186	0.308952	0.11086
MSCI(-2)	0.156264	0.10352	-0.105716	0.09945	0.020521	0.10947	0.028964	0.10910	-0.090596	0.1216
MSCI(-3)	0.004834	0.10249	-0.022207	0.09846	0.081695	0.10869	-0.103118	0.11103	0.154833	0.12277
MSCI(-4)	-0.213425	0.10613	0.115465	0.09594	-0.114960	0.10838	0.037034	0.10760	0.042644	0.11426
USTI(-1)	0.002984	0.00443	0.006556	0.00399	0.000410	0.00535	-0.003984	0.00371	-0.000747	0.00271
USTI(-2)	-0.003504	0.00451	-0.000465	0.00410	-0.002695	0.00508	0.004545	0.00377	-0.002083	0.0027
USTI(-3)	0.007938	0.00429	0.004361	0.00365	0.002018	0.00496	-0.001153	0.00367	0.001742	0.0025
USTI(-4)	-0.002704	0.00396	-0.009732	0.00358	-0.006852	0.00482	-0.004985	0.00364	-2.49E-05	0.00247
NEXR(-1)	1.429555	0.89221	0.059551	0.03800	0.078038	0.04595	0.065102	0.0341	-0.030364	0.02402
NEXR(-2)	-2.332418	0.95855	-0.070768	0.03984	-0.075909	0.04801	-0.01955	0.03675	0.046204	0.02502
NEXR(-3)	-0.362237	0.99289	0.010485	0.03821	-0.007535	0.05299	0.040093	0.03852	-0.004867	0.02611
NEXR(-4)	0.526324	0.94643	0.141501	0.03807	0.061609	0.04758	0.058295	0.03769	-0.028011	0.0251
NMR(-1)	-0.017602	0.04155	0.022108	0.01114	0.006607	0.01081	0.008342	0.00599	-0.357470	0.82516
NMR(-2)	-0.012265	0.04159	0.002703	0.01128	0.009785	0.01050	0.003335	0.00604	-1.507181	0.8234
NMR(-3)	-0.019259	0.04058	0.030209	0.01258	0.002011	0.01021	-0.007590	0.00597	-0.243685	0.77859
NMR(-4)	0.027442	0.04151	-0.018229	0.01253	0.011568	0.00995	-0.003895	0.00580	-0.118603	0.80158
M1(-1)	0.020318	0.23625	-0.065436	0.03751	-0.016008	0.02032	-0.030842	0.03837	0.00965	0.0154
M1(-2)	-0.216320	0.23850	-0.097716	0.03816	-0.002181	0.01987	0.029898	0.03968	0.054047	0.01859
M1(-3)	0.300427	0.21146	-0.028143	0.03703	-0.014338	0.01890	0.092573	0.03889	-0.004553	0.01962
M1(-4)	0.268391	0.21259	-0.018379	0.03443	0.012495	0.01954	-0.022956	0.04106	-0.059151	0.01933
PI(-1)	6.84E-05	0.00104	2.05E-05	2.0E-05	-9.34E-05	9.1E-05	5.59E-05	4.7E-05	7.06E-06	3.6E-06
PI(-2)	-0.000111	0.00113	6.99E-06	2.2E-05	-1.90E-05	8.6E-05	0.000109	4.6E-05	-6.42E-06	3.8E-06
PI(-3)	0.000718	0.00114	-9.06E-06	2.3E-05	-3.07E-05	8.3E-05	4.22E-05	4.5E-05	1.25E-06	3.8E-06
PI(-4)	0.000266	0.00098	-6.22E-06	2.0E-05	-2.93E-05	8.6E-05	5.31E-05	4.5E-05	-4.64E-09	3.7E-06
Rsquared	0.575609		0.353570		0.198873		0.323120		0.469443	
Adj Rsquared	0.446680		0.157186		-0.044508		0.10359		0.308261	
Sum sq.residual	9.790565		0.350596		0.439465		0.222024		0.118706	
S.E.equation	0.063575		0.066618		0.074585		0.054775		0.038763	
F-statistic	4.464547		1.800405		0.817127		1.471880		2.912503	
Log Likelihood	153.3035		148.4411		136.6930		161.4795		204.7564	
AIC criteria	-2.467376		-2.373867		-2.147941		-2.757161		-3.456854	
SC criteria	-1.831705		-1.738196		-1.512271		-2.101828		-2.821183	
Mean dependant	0.007735		0.010362		0.007948		0.005578		0.017563	
S.Ddependent	0.064612		0.072564		0.072978		0.057854		0.046607	

VAR coefficients for the response of stock markets shocks

3.1. France

The plots in **Fig.1B** and **A**[v] show that the U.S.3-month T-bill and MSCI world index yield are virtually significant in explaining the movement of returns in the French market and have the expected positive signs. In fact, the international conditional asset pricing model (ICAPM) implies that if stock markets are integrated, then the world market risk is a significant pricing factor and assets with the same risk have identical expected return irrespective of the market. That is why the positive sign of the MSCI world index return implies that the French market is significantly integrated with the world market. The positive sign for the U.S.3-month T-bill leads to a rise of stock returns.[vi]

Fig. 1C plots the response of stock returns in France to an exchange rate shock. The response is positive in the first month. Then it becomes negative and significant till the fifth month. This results has the expected sign mainly when Bilson et al (2001) and Pebbles and Wilson(1996) advanced that exchange rate depreciation leads to declines in stock returns, at least from the international investor's perspective.

Fig.1D plots the response of stock returns to an interest rate shock in France. The response is negative[vii] during the first fifth months, and then it joins its positive equilibrium closer to the baseline, implying that lower nominal interest rates lead to appreciations in market returns.

Fig.1E plots the response of stock returns to industrial production and shows that an unexpected industrial productivity decrease leads to a negative gain in market returns only after two months. There is a short negative but not significant response in the fourth month. This follows from the argument that financial securities are claims against future output, therefore any decrease in expected level of economic activity should induce a lower level of return (Cheung et al., 1997).

The impulse response function in Fig.1F show how does the French stock market is very sensible to a money supply shock reaching a peak of 1% in the third month. This finding is not surprising since a decrease in money supply can lead to lower inflation and lower returns. France has in the recent years a controlled inflation rate. Similarly, in Carmichael's (1983) cash-in-advance model, an increase in steady state inflation has a depressing effect on stock prices. This happens for two reasons: first, the real value of the flow of dividends is reduced with higher inflation that acts as a tax. Secondly, dividends are reduced because higher inflation reduces the supply of labor, and hence production (this result holds under the assumption that labor is inferior and consumption normal).

3.2. Spain

For the last 20 years Spain has been ambitiously immersed in opening and liberalizing its strategic economic sectors. These processes have been the object of frequent attention by specialized literature[ix] and have been motivated, first, by demands from the European authorities responsible for liberalizing the public Spanish services, as requirement to enter the European Union (EU); and secondly, because the Spanish authorities recognized that these actions would improve welfare even in Spanish stock market.

Campbell et al. (2001) and Schwert (2002) are among the most recent papers focused on the behaviour and evolution of volatility in the stock market. The latter may also affect business investment spending (Zuliu, 1995) and, consequently, economic growth (Levine and Zervos, 1998): Investors interpret a raise in stock market volatility as an increase in the risk of equity investment and they shift their funds to less risky assets. This reaction raises the cost of funds for firms and new firms might bear the brunt of this effect as investors gravitate toward the purchase of stock in larger, better known firms. Finally, extremely high volatility could also disrupt the smooth functioning of the financial system and lead to structural or regulatory changes that may be necessary to increase the resiliency of the market in the face of greater volatility.

Fig. 2[x] shows that responses do not differ in terms of magnitude, timing and persistence to Fig. 1. With respect to the latter, we find that responses are qualitatively similar although the magnitudes are different. Exchange rate shock in Spain presented in schema C was transitory and mainly positive in the first two months. After that date, this shock has no significant effects on the stock market. This means, last but certainly not least, that a positive exchange rate shock means depreciation in the Spanish local currency "*peseta*" which affects stock returns[xi].

Fig.2D and Fig.2F plots the response of returns in Spain to a Spanish interest rate [xii] and money supply monetary policy shock. Our results are similar to Thorbecke (1997) who analyses how stock returns respond to these shocks. Relying on the VAR methodology, on narrative indicators and on an event study, the author finds that an expansionary monetary policy increases ex-post stock returns. He argues that this result can be explained by the positive effect on economic activity and thus on future cash flows and by the reduction in the discount factor at which those flows are discounted. The result is confirmed when changes in the Boschen and Mills' index are used as measures of monetary policy shocks: the author finds that an increase of one unit in the index has a positive effect on stock returns (more than 10 percent on an annual basis)[xiii].

3.3. Portugal

In the case of Portugal which is included in the group of code law countries, specifically in the French family, together with France, Italy, Spain and The Netherlands (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997), stock returns respond positively and significantly to the U.S. 3-month T-bill till the third month, then joins the equilibrium baseline progressively[xiv]. Others responses of returns to macroeconomic shocks are less potent in magnitude and persistence than France and Spain.

As a theoretical explanation to these responses, we can say that Portuguese institutions are less developed than their European Union and East Asia counterparts, more developed than Greek institutions and on level similar to that of Spanish institutions. Portugal is a bank-oriented country with a universal bank system, strongly concentrated in a few financial groups and with very small influence of foreign banks (Bartholdy and Mateus, 2006)).

According to the World Development Indicators database (World Bank Group), Portugal has a very small capital market, the ratio of stock market capitalization of listed companies to GDP of Portugal in 2000 was 57% compared to 154% and 179% in USA, and the UK, respectively. It has been shown that the capital structure of companies reflect the differences in financial systems (Rajan and Zingales, 2003), meaning that the financing policies of Portuguese companies are mainly bank-oriented.

3.4. Tunisia

In contrast to the findings for France, Spain and Portugal, Fig 4 [xv] plots responses of Tunisian stock returns to macroeconomic Shocks. All these responses are not significant and very tight in magnitude except Fig.4.C which illustrates the effect of the exchange rate on the Tunisian Stock market.

Finance theory postulates that if financial markets are efficient, then asset values and returns should reflect the expected components of the relevant fundamental variables. Therefore, it is the surprise component as measured by the unexpected portion of the shock that should explain any movement in asset values or returns.

Erian and Kumar (1995) identified the principle characteristics of these markets and analyzed their informational efficiency. They showed that Tunisian stock market had a pattern of price dependence due to less information available to investors, structural and institutional factors and investors may be characterized by short bravery because of possible political and economic uncertainties.

3.5. Egypt

In the case of Egypt, the significant variables are only the interest rate, the production index and the money supply. Effectively, this indicates that Egyptian stock market is more effective than that of Tunisia despite it is illiquid and dominated by a small number of stocks.

The Egyptian stock market has witnessed an average annual growth rate in turnover of about 60%during the period from 1988 to 1997 (Smith, Jefferis, and Ryoo, 2002). The market is the second largest in Africa after the Johannesburg stock exchange. [xvi]
In early 1990s, Egypt embarked on economic reform and structural adjustment program with the technical assistance of the IMF and the World Bank. Early in the stabilization program major reforms were implemented in the financial sector to develop effective monetary instruments to control liquidity. In early 1991, multiexchange rates were unified, official limits on interest rates were lifted and auctions for the sale of treasury bills were introduced. Lifting direct credit controls to both private and public sector had followed these reforms.

The exchange rate regime is maintained successfully to be pegged to the U.S.Dollar due to the rapid accumulation of foreign reserves. An active sterilization policy was followed to dampen the expansionary impact of capital inflows using Treasury bill sales with the proceeds deposited at the Central Bank of Egypt (CBE). In addition, the tight control of liquidity growth yielded to continuous decline in inflation.

4. Conclusion

In this paper, we have analysed the relationship between macroeconomic volatility and stock market returns in Mediterranean countries using the methodology of standard VAR. We have found that the persistence, the magnitudes and the timing of these effects differ significantly from country to country. It is worth noting that stock market responses to macroeconomic shocks are potent in France, Spain and Portugal. We had proved empirically that Portugal has a very small capital market. In addition our empirical results reveal that the Egyptian and especially the Tunisian stock market suffer from thin trading. These two markets may be inefficient because they have weak form institutional infrastructure where according to Antoniou, Ergul and Holmes (1997), (i) the local culture and political environment are not sympathetic to a market economy; (ii) a sophisticated and well-informed analyst profession does not exist; (iii) there are significant capital inflow–outflow restrictions; (iv) ineffective regulatory framework and inadequate investor protection system; (v) market participants have unrealistic expectations about the risks and returns from investments; (vi) insider trading rules are nonexistent or not enforced; and (vii) efficiency of stock price behaviour is not rigorously and regularly researched or tested through practices such as technical analysis trading.
Finally, Given the importance of a smooth functioning of stock markets and the continuous increased importance of international financial flows, efforts towards understanding the factors that affect the stock market – by making it more unstable, or changing its dynamic behavior – and the side consequences derived from these changes in behaviour are likely to yield benefits both for regulators, investors and for those involved in the processes of economic reform especially for Tunisia.

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Endnotes:

[i] See El Erian and Kumar (1995) for an overview of the state of equity markets in some Middle Eastern countries.

[ii] It is worth noting that economic theories reveal no absolute agreement of the variables (Cushman and Zha (1997)).

[iii] See Bilson et al. (2001).

[iv] For graphic illustrations, see Annex.

[v] See Annex

[vi] See Annex.

[vii] In Latin American markets, Bekaert et al (2002b) find that the negative sign for the U.S. 3-month T-bill can be reconciled with the literature that an increase in U.S. interest rates drives capital flows away from and leads to a depression of stock returns.

[viii] The negative sign can be explained by either the discount rate effect or by macroeconomic evidence explained by Fisher which concerns the inflationary effects of higher nominal interest rates.

[ix] See Salas and Saurina (2003) in the banking sector.

[x] See Annex.

[xi] Goldberg (1993), Glick (1998), Campa and Goldberg (1999) and, more recently, Baum et al. (2001) focus on exchange rate volatility.

[xii] See Walsh (1984) or Ferderer (1993).

[xiii]The Boschen and Mills' index is constructed using the minutes of the FOMC (Federal Open Market Committee). It classifies monetary policy into five categories: strongly anti-inflationary (-2), anti-inflationary (-1), neutral (0), progrowth (1) and strongly pro-growth (2).

[xiv] See Fig .3.B.

[xv] See Annex.

[xvi] Omran (2005) identified the major risk factors in the Egyptian stock market. His results indicated that companies' returns in the materials, telecommunications, and industrial sectors contributed more to the variability of the general stock market index than companies' returns in consumer staples.

ANNEXURE

Table 1
Unit root tests

Global factors

ADF

Variables:	t-value	Critical value
MSCI world index	-3.675544	-3.4959 at the 1% level
U.S.3-month T-bill	-3.591775	-2.8900 at the 5% level
		-2.5818 at the 10 % level

PP

Variables:	t-value	Critical value
MSCI world index	-8.965274	-3.4922 at the 1% level
U.S.3-month T-bill	-7.751815	-2.8884 at the 5% level
		-2.5809 at the 10 % level

France

ADF

Variables:	t-value	Critical value
M1	-5.935794	-3.4959 at the 1% level
NEXRATE	-3.623463	-2.8900 at the 5% level
NMRATE	-3.586614	-2.5818 at the 10 % level
PI	-3.412833	
RINDEX	-4.643556	

PP

Variables:	t-value	Critical value
M1	-23.05116	-3.4922 at the 1% level
NEXRATE	-9.128299	-2.8884 at the 5% level
NMRATE	-13.78875	-2.5809 at the 10 % level
PI	-13.78875	
RINDEX	-10.98495	

Spain

ADF

Variables:	t-value	Critical value
M1	-4.253170	-3.4959 at the 1% level
NEXRATE	-3.343171	-2.8900 at the 5% level
NMRATE	-3.021228	-2.5818 at the 10 % level
PI	-3.477748	
RINDEX	-3.78664	

PP

Variables:	t-value	Critical value
M1	-20.43267	-3.4922 at the 1% level
NEXRATE	-9.010824	-2.8884 at the 5% level
NMRATE	-8.802884	-2.5809 at the 10 % level
PI	-17.06267	
RINDEX	-10.31355	

Portugal

ADF

Variables:	t-value	Critical value
M1	-4.441294	-3.4959 at the 1% level
NEXRATE	-4.222866	-2.8900 at the 5% level
NMRATE	-5.158003	-2.5818 at the 10 % level
PI	-3.220476	
RINDEX	-3.180601	

PP

Variables:	t-value	Critical value
M1	-12.18299	-3.4922 at the 1% level
NEXRATE	-11.52775	-2.8884 at the 5% level
NMRATE	-11.79532	-2.5809 at the 10 % level
PI	-16.98116	
RINDEX	-9.790410	

Tunisia

ADF

Variables:	t-value	Critical value
M1	-3.938548	-3.4959 at the 1% level
NEXRATE	-3.344394	-2.8900 at the 5% level
NMRATE	-3.106483	-2.5818 at the 10 % level
PI	-2.717034	
RINDEX	-2.890597	

PP

Variables:	t-value	Critical value
M1	-3.98440	-3.4922 at the 1% level
NEXRATE	-4.20367	-2.8884 at the 5% level
NMRATE	-5.909612	-2.5809 at the 10 % level
PI	-7.213251	
RINDEX	-9.656697	

Egypt

ADF

Variables:	t-value	Critical value
M1	-3.839960	-3.4959 at the 1% level
NEXRATE	-3.705899	-2.8900 at the 5% level
NMRATE	-4.575325	-2.5818 at the 10 % level
PI	-3.50043	
RINDEX	-5.031213	

PP

Variables:	t-value	Critical value
M1	-11.32144	-3.4922 at the 1% level
NEXRATE	-3.30850	-2.8884 at the 5% level
NMRATE	-6.24560	-2.5809 at the 10 % level
PI	-7.56460	
RINDEX	-7.730091	

Fig .1. (A) France to MSCI world index. (B) France to U.S. 3-month treasury T-bill yield. (C) France to Exchange rate. (D) France to money market rate. (E) France to production index. (F) France to M1.

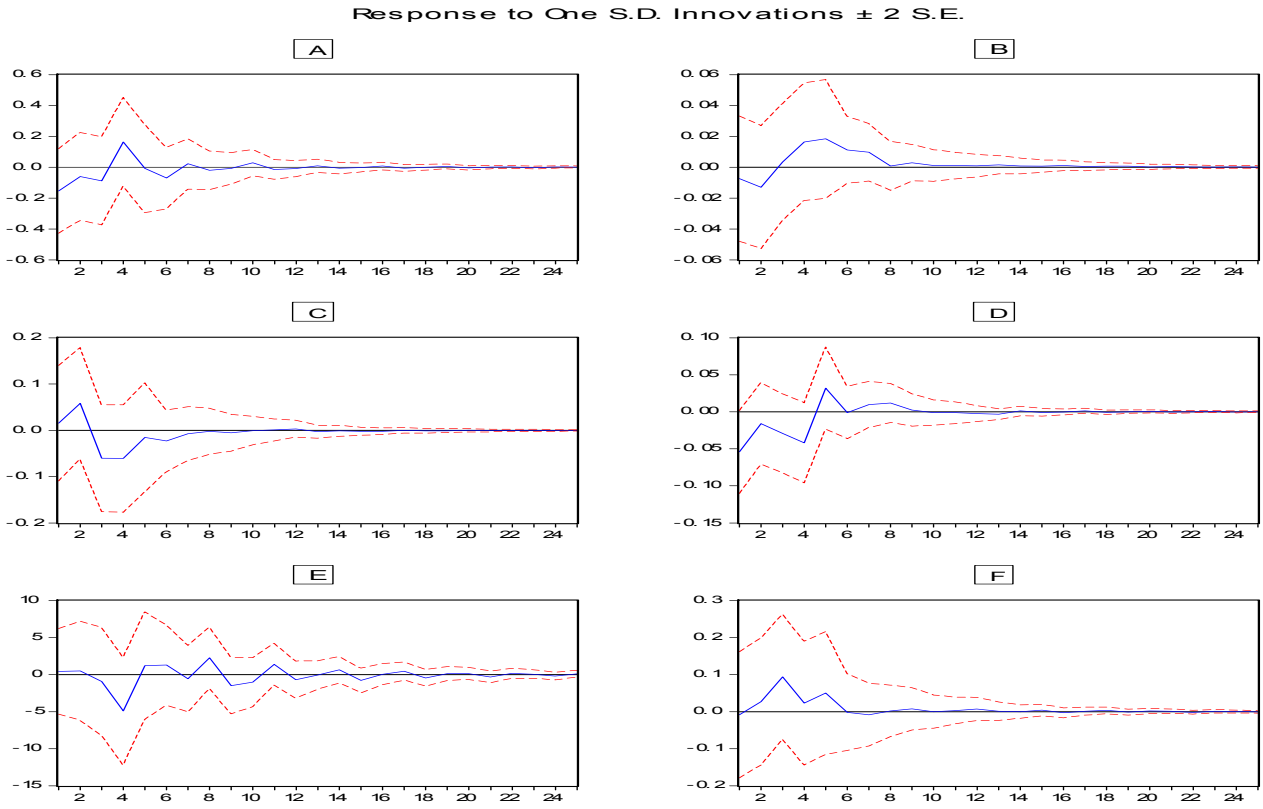

Fig.2. (A) Spain to MSCI world index. (B) Spain to U.S. 3-month treasury T-bill yield. (C) Spain to Exchange rate. (D) Spain to money market rate. (E) Spain to production index. (F)Spain to M1.

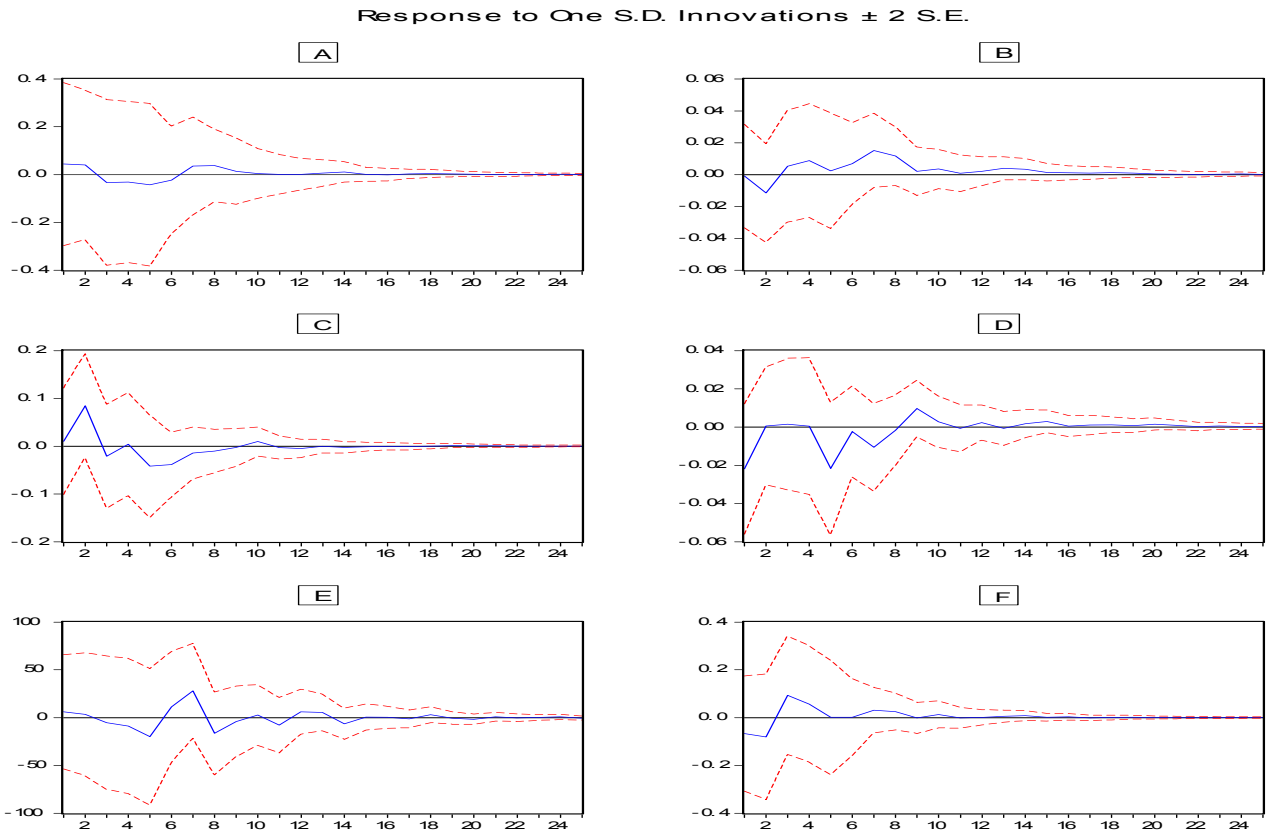

Fig.3. (A) Portugal to MSCI world index. (B) Portugal to U.S. 3-month treasury T-bill yield. (C) Portugal to Exchange rate. (D) Portugal to money market rate. (E) Portugal to production index. (F) Portugal to M1.

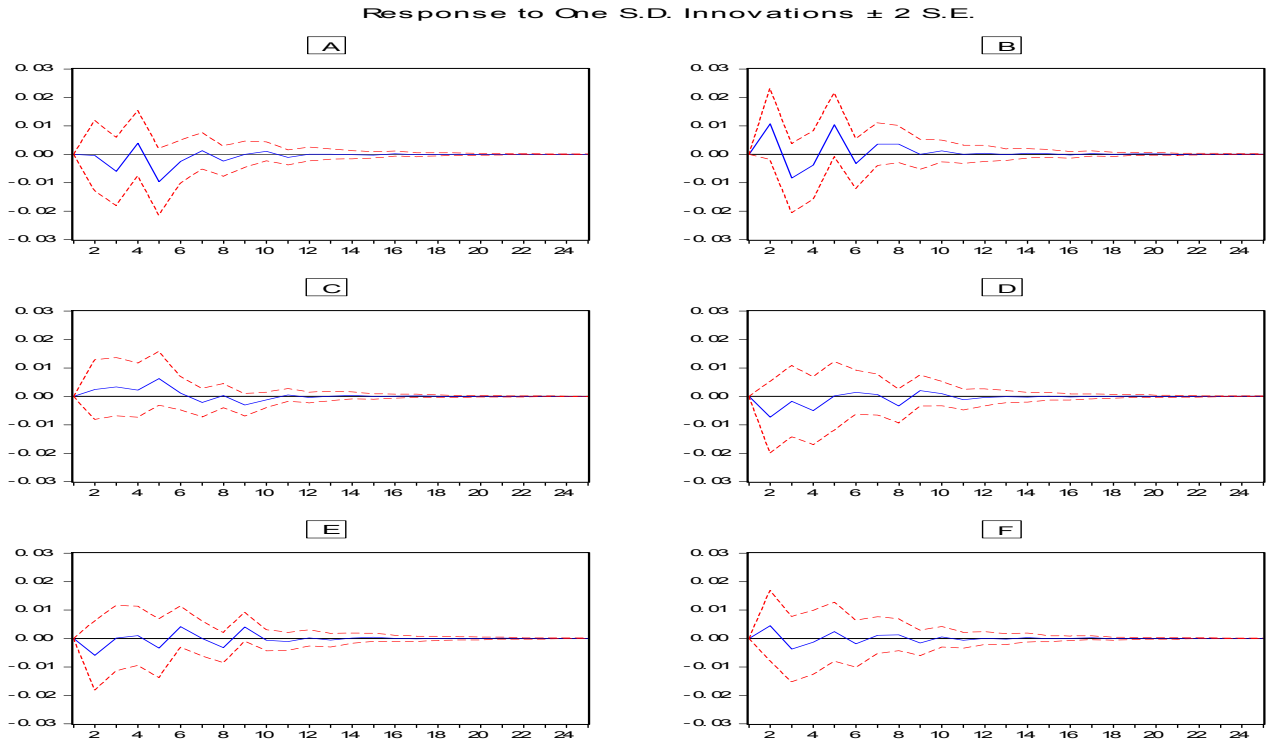

Fig.4. (A) Tunisia to MSCI world index. (B) Tunisia to U.S. 3-month treasury T-bill yield. (C) Tunisia to Exchange rate. (D) Tunisia to money market rate. (E) Tunisia to production index. (F). Tunisia to M1.

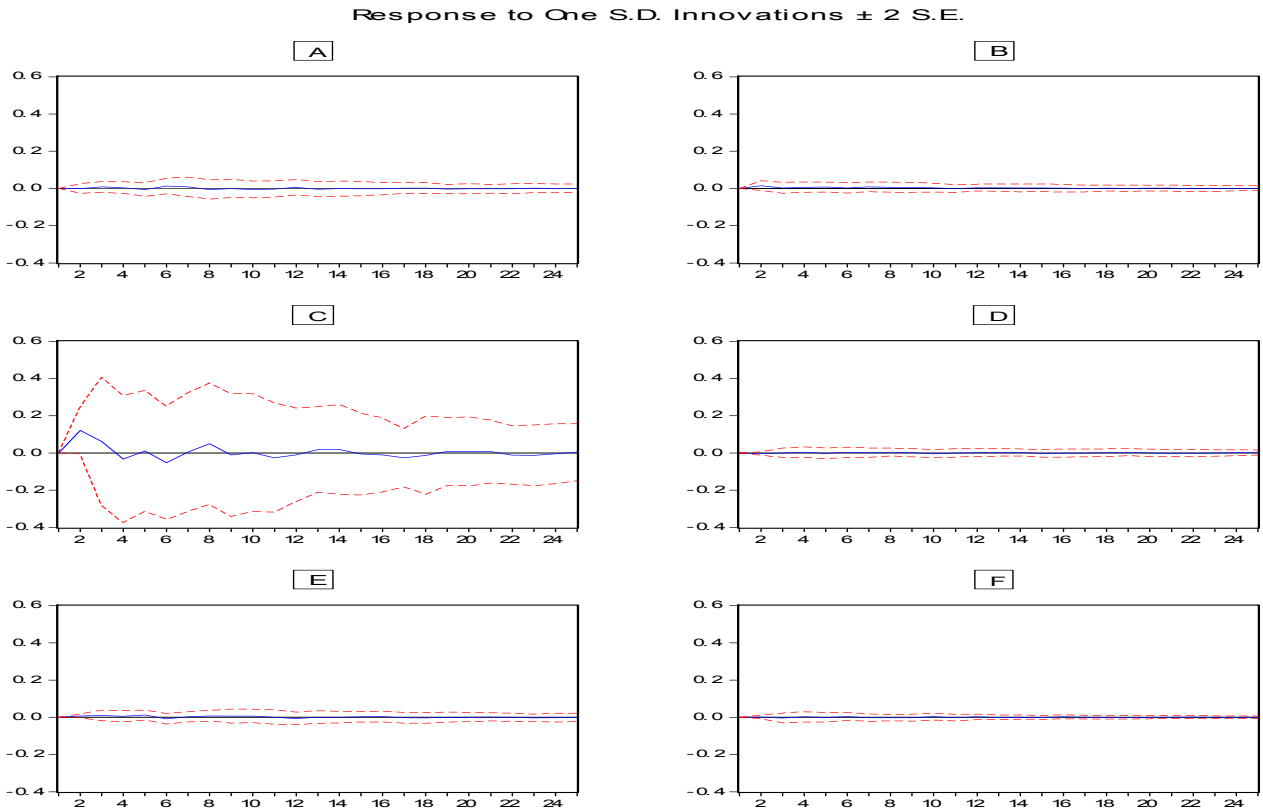

Fig.5. (A) Egypt to MSCI world index. (B) Egypt to U.S. 3-month treasury T-bill yield. (C) Egypt to Exchange rate. (D) Egypt to money market rate. (E) Egypt to production index. (F). Egypt to M1.