Long run equity market linkages in the Middle East and North Africa: in search for diversification benefits[1]

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Abstract

The purpose of this paper is to investigate the Middle East and North African (MENA) stock markets' potential for portfolio diversification. Using daily data ranging from 1998 to 2004, we examine the degree and the dynamics of both intra and inter-regional long run equity linkages. At the inter-regional level, the analysis is based on two co-integration analyses and on coefficients of country-weight in regional systemic risk. Results indicate no common stochastic pattern and a decreasing weight of the MENA region in European and American systemic risk, suggesting increased market segmentation. Turning to a country level analysis, we find no stable long-run relationships with the regional benchmark, but a few co-integrating vectors with the EMU (Turkey) and the US (Turkey, Jordan and Tunisia). However, the dynamics of each country's contribution to systemic risk in the different regions appear diverging. Besides, results from the moving average analysis indicate that although economic integration seems to diminish market segmentation, the MENA capital markets respond differently to exogenous financial and political shocks. Turning to intra-regional linkages, a VAR-VECM analysis shows that local markets display a high sensitivity to intra-regional shocks. Taking these results together, our conclusions are (i) the MENA markets provide significant diversification opportunities, (ii) they should not be treated as a block for global strategic purposes, and (iii) local economic shocks might affect the value of a regional portfolio.

JEL classification: G11;G12;G15
Keywords: Stock Market Integration, Portfolio Diversification, MENA markets, Time-varying methods.

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1. Introduction

The concept of market segmentation is at the core of the international portfolio investment allocation process. By allowing investors to spread risk across projects, it helps neutralizing the negative effects of international market volatility, and ultimately leads to portfolio value stability and higher long-term returns (Bartrey & Dufey, 2001). However, recent empirical studies acknowledge the presence of growing co-movements across worldwide developed and emerging financial markets, whether they are located in Asia, Latin America, and to a lesser extent Eastern Europe. This has resulted in international investors facing increased difficulties to hedge against country-risk (Kearney and Lucey, 2003).

The objective of this paper is to assess portfolio diversification opportunities in the Middle East and North Africa (MENA) region[1] by focusing on inter and intra-regional long run equity market linkages. As part of a wide reform agenda, the MENA countries have recently revitalized their capital markets. However, political turmoil and institutional underdevelopments have traditionally been powerful obstacles to foreign capital investment in the region (Girard, 2004). Consequently, empirical analyses of equity market linkages in these countries are rather scarce.

Neaime (2001) focuses uses weekly data from national stock exchanges and implements a VAR model as well as a traditional Johansen-Juselius co-integration analysis, and finds evidence of integration with the world financial markets for a mix of MENA and Gulf Cooperation Counciloil countries. Hakim (2002) focuses on the Cairo stock exchange and employs the same methodology and data. He finds evidence of short-run causality linkages between the Egyptian equity market and the world's major financial markets, but not of co-integration. Erdal & Gundunz (2003) investigate the relationships of the Istanbul Stock Exchange before and after the Turkish financial crisis, by dividing the dataset into two regimes before carrying out VAR and traditional co-integration analysis. They find no intra-MENA co-integration, nor evidence for short run linkages, but the Istanbul Stock Exchange appears to be co-integrated with the G7. Finally, Girard (2004) examines co-integration and spillovers for a group of MENA countries and finds no common long-term movements, although sensitivity to intra-regional shocks increases through the period of study.

The rest of the paper is structured as follows. Section 2 discusses recent stock market developments in the sample countries. Section 3 presents the data, descriptive statistics and the methodology employed. Section 4 analyses the results and section 5 draws together our conclusions.

[1] Morocco, Egypt, Tunisia, Lebanon, Israel, Turkey, Jordan and Tunisia. Algeria and Syria are not studied here due to the embryonic size of their stock market. We alternatively use the terms MENA (Middle East and North Africa) countries and Mediterranean Partners to design this same group of countries.

2. Capital markets developments in the MENA.

As in most developing countries, the MENA capital markets are dominated by the banking sector, which represents 85% of the capital markets structure[2]. Besides, stock markets are very small and represent only 1% of the world's capitalization. This can explain the insignificant weight of the region in international portfolios, accounting only for 3.2% of J.P Morgan's EMBI, as shown in Table 1. Besides, although the average yield is in line with other regions, duration is lower, reflecting a lack of investor's willingness for long-term exposure (Abed & Soueid, 2005). However, Table 2 displays that indicators of market capitalization, value traded, market liquidity, as well as the number of listed companies have increased in all countries during the last decade. This reflects the impact of privatization programs and financial sector modernization, which have led to a successful revitalization of the region's stock markets. As a result, as shown in table 3, market capitalization as a percentage of GDP is now higher in MENA than in Emerging Europe and Latin America.

Table 1 Market capitalization: regional comparison

	MC % oF GDP	MC % of EMC	MC % of WMC
MENA	31	10	1
Emerging Europe	26	10	1
Latin America	24	17	2
Emerging Asia	47	55	6

Table 2 Selected market development indicators

Country	Market Capitalization (% GDP)		Number of Listed Companies		Value traded (US$ Millions)		Market Liquidity (VT/MC)	
	1994	2003	1994	2003	1994	2003	1994	2003
EGYPT	7	33	700	967	355.87	4349.12	0.08	0.15
MOROCCO	15	29	61	52	214.14	2443.46	0.04	0.18
TUNISIA	10	10	21	45	334.48	188.52	0.13	0.07
JORDAN	75	110	95	161	615.81	2607.14	0.13	0.23
LEBANON	0	7	0	14	0	130.99	0	0.08
ISRAEL	56	67	638	577	25136	19114.8	0.8	0.27
TURKEY	49	29	176	285	21667	98160.3	1.01	1.43

[2] See IMF, Global Financial Stability Report, September 2004.

3. Data and Methodology

3.1 Data

Our data were obtained from Datastream International. There are several possible sources for MENA data: MSCI, IFC, and national indexes. Taking the point of view of the U.S based investor; our dataset relies on the S&P IFC index taken in US dollars. This allows controlling for exchange rate variations. Besides, the use of a single index is generally recommended for cross-market comparisons as it provides a homogenized framework. Finally, the use of a common currency is adequate in the case of segmented markets, where inflation trends are incorporated through the Fisher equation (see Liew, 1995). We use daily data ranging from 1/1/1998 until 11/16/2004, and our sample includes stock market price indexes from Morocco, Tunisia, Egypt, Lebanon, Jordan, Turkey, Israel. We use national indices for Tunisia and Lebanon where homogenized data are unavailable. For the MENA and EMU regional benchmarks we use S&P indexes, and we retain the MSCI World Free Index as a benchmark for the USA and the world. Market capitalization indexes are obtained from the Arab Monetary Fund for individual countries and from MSCI for the regional benchmarks.

Table 3 reports descriptive statistics for daily returns. The average daily rate of return for all the countries in the sample is 0.014%. This is lower than the EMU S&P Index (0.037%) and than the MENA benchmark (0.036%), but higher than world returns as calculated from the Morgan Stanley World Free Index (0.009%). Jordan and Tunisia display the highest mean returns (0.045%), followed by Israel (0.035%) and Egypt (0.015%). Lebanon, Morocco and Turkey are lagging behind with close to zero negative returns over the whole period. Turning to risk analysis, the sample's average standard deviation is of 1.44%. This is higher than standard deviation for the world markets (0.96%), but lower than the EMU's (1.75%). Looking at the series' distribution properties, the Jarque-Bera tests reject the hypothesis of normality in all markets. Besides, with the exception of Israel, excess kurtosis in these countries is larger than in the world and the EMU, and the unconditional distributions of the weekly rate of returns are skewed to the right in Egypt, Jordan, Lebanon and Morocco. In left-skewed countries (Israel, Tunisia and Turkey), the skewness coefficient is inferior to that of EMU and World market. All things equal, this suggests that investments in these markets have a relatively higher probability to yield positive returns. Finally, performance is

measured by Sharpe ratios[3] using the MSCI US T-bill as the risk-less rate. All countries but Lebanon and Morocco outperform the world index, but not the EMU index. Overall, these preliminary results suggest that the MENA stock markets are rather volatile and promise relatively high returns. This corroborates the standard view on emerging market's properties (Bekaert and Harvey, 1995; Harvey, 1995, Goetzamann and Jorion, 1999).

Table 4 Selected descriptive statistics for the MENA capital markets

	Daily returns (%)								
The market	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Sharpe Ratios
EGYPT	0.01	0	6.81	-6.05	1.32	0.19	6.82	1108.43	-0.072
ISRAEL	0.03	0	6.45	-7.71	1.28	-0.19	6.15	757.15	-0.069
JORDAN	0.04	0	8.48	-8.34	0.87	0.53	17.87	16625.67	-0.109
LEBANON	-0.03	0	6.41	-5.52	1.12	0.42	7.14	1336.30	-0.162
MENA	0.03	0.08	5.05	-7.24	1.00	-0.99	9.85	3809.66	-0.068
MOROCCO	-0.001	0	5.02	-3.98	0.67	0.79	12.46	6881.71	-0.191
TUNISIA	0.04	0	15.02	-16.59	1.08	-1.59	80.65	451580.7	-0.109
TURKEY	-0.007	0	22.66	-27.02	3.74	-0.01	8.49	2260.53	-0.04
WORLD	0.009	0.05	4.60	-3.98	0.96	-0.06	4.63	200.091	-0.125
EMU	0.03	0.03	8.02	-10.55	1.75	-0.43	5.92	696.55	-0.052

3.2 Empirical Methodology

We aim at capturing both the robustness and the dynamics of inter and intra-regional stock market linkages. Co-integration analysis can be used in order to assess the level of equity market integration at both inter and intra-regional levels. However, turning to the dynamics of integration, inter and intra-regional linkages require different methodologies. At the inter-regional level, we compute the fraction of systematic risk in total country risk relative to different regional and global benchmarks over different periods. We use both recursive and moving average iterations, in order to capture the dynamic pattern of segmentation as well as the impact of specific events. Then, at the intra-regional level, we use a simple VAR-VEC model that gives information on the individual markets' sensitivity to regional shocks.

[3] Where $S_p = \left(\frac{r_p - r_f}{\sigma_p} \right)$, r_p being the portfolio return, r_f the risk-free rate and σ_p the portfolio standard deviation.

3.2.1 Co-integration analysis

We know that co-integration may offset international diversification benefits stemming from a low unconditional correlation between any two markets by giving evidence of a stable long-term relationship. Our analysis begins with the standard recursive Johansen & Juselius (1988) framework. However, results of Monte Carlo experiments (Campos, Ericcson, and Hendry (1996) and Gregory and Hansen (1996)) show that when a shift in parameters takes place standard tests for co-integration may lose power and falsely signal the absence of equilibrium in the system. Therefore, we implement the Gregory-Hansen (1996) residual based co-integration tests. The Gregory-Hansen test assumes the null hypothesis of no co-integration against the alternative hypothesis of co-integration with a single structural break of unknown timing. The timing of the structural change under the alternative hypothesis is estimated endogenously. Gregory and Hansen suggest three alternative models accommodating changes in parameters of the co-integration vector under the following alternatives.

A *level* shift model allows for the change in the intercept only (C):

$$y_{1t} = m_1 + m_2 j_{\pi} + a' y_{2t} + \lambda_t \tag{1}$$

The second model, accommodating a trend in data, also restricts shift only to the change in *level with a trend* (C/T):

$$\begin{cases} y_{1t} = m_1 + m_2 j_{\pi} + b_t + a' y_{2t} + \lambda_t \\ t = 1, \ldots, n \end{cases} \tag{2}$$

The third and most general specification allows for changes both in the intercept and slope of the co-integrating vector:

$$\begin{cases} y_{1t} = m_1 + m_{2 j \pi} + a'_1 y_{1t} + a' y_{2t} j_{\pi} + \lambda_t \\ t = 1, \ldots, n \end{cases} \tag{3}$$

Finally, the dummy variable that captures the structural change is represented as:

$$\varphi t \tau = [0, t \le n\tau], [1, t > n\tau] \tag{4}$$

Where t ε (0,1) is a relative timing of the change point. The trimming interval is usually taken to be (0.15*n*, 0.08*n*), as recommended in Andrews (1993). The models (1)-(3) are estimated sequentially with the break point changing over the interval t e (0.15n, 0.85n). A number of tests of unit roots under structural stability are available. Non-stationarity of the obtained residuals, expected under the null hypothesis, is checked by ADF tests. Setting the test statistics (denoted as ADF* (Za*, Zt*)) to the smallest value of the ADF (Za, Zt) statistics in the sequence, we select the value that constitutes the strongest evidence against the null hypothesis of no co-integration.

3.2.2. Inter-regional dynamic measures

To study the time-varying pattern of stock market linkages at the inter-regional level, we follow Akdogan (1996,1997) and calculate the fraction of systematic risk in total country risk relative to a global benchmark. We begin with the following simple international risk decomposition model:

$$R_i = \alpha + \beta R_g + \varepsilon_I \tag{1}$$

Where R_i is the rate of return on the i^{th} country, R_g is the global rate of return, b is the beta of the i^{th} country with respect to the global index, and ε_i is the error term. Then, the variance of the i^{th} country's portfolio can be decomposed into:

$$Var(R_i) = \beta^2 Var(R_g) + Var(\varepsilon_I) \tag{2}$$

$$\frac{VarR_i}{VarR_i} = \frac{\beta^2 VarR_g}{VarR_i} + \frac{Var\varepsilon_i}{VarR_i} \tag{3}$$

$$1 = p_i + q_i \tag{4}$$

In equation (4), p_i measures the country's contribution to worldwide systemic risk It is hence an appropriate measure of market integration, which increases as p_i grows. Following Barari (2004), we extend this measure assume to compare the degree of financial integration of a single country with respect to different zones. Looking at the region's trade links (see ERF report 2003), we consider that the three main potential zones for individual countries' financial integration are the EMU, the MENA as a region, and the US – which also proxies for the World. We therefore extend Akdogan's measure in the following way:

$$R_i = \alpha + \beta_1 U_1 + \beta_2 U_2 + \beta_g R_g + \varepsilon_i \quad (5)$$

Where U_1 and U_2 stand for European and MENA series of residuals as taken from the following regressions:

$$R_{mena} = \alpha + \beta R_g + U_1 \quad (6)$$

$$R_{UE} = \alpha + \beta R_g + U_2 \quad (6b)$$

The variance of R_i can be then decomposed as:

$$VarR_i = \beta_1^{\,2} VarU_1 + \beta_2^{\,2} Var(U_2) + \beta_g VarR_g \quad (6a)$$

$$\frac{VarR_i}{VarR_i} = \frac{\beta_1^{\,2} VarU_1}{VarR_i} + \frac{\beta_2^{\,2} VarU_2}{VarR_i} + \frac{\beta_g^{\,2} VarR_g}{VarR_i} \quad (6b)$$

$$1 = a + b + c + d \quad (7)$$

Where *a* measures country i's contribution to EMU systematic risk (ie integration with the EMU), *b* is the country's contribution to MENA systematic risk (regional integration), *c* measures global integration, and *d* is unsystematic risk. A growing systematic risk fraction would suggest that the market under consideration has become more integrated with the global market, since its contribution to global systematic risk has increased.

3.2.2.1 Recursive analysis

Weighting each of these scores by the country's share in EMU, MENA and USA market capitalization yields an adjusted measure of market integration, which is calculated over incremental time-windows covering two semesters of observations. These scores are then plotted in order to observe the dynamic time-variation of equity integration.

$$adja_i = \frac{\beta_1^{\,2} VarU_1}{VarR_i} \Big/ W_{iEMU} \qquad W_{iEMU} = \frac{MCi}{MC_{EMU}}$$

$$adjb_i = \frac{\beta_2{}^2 VarU_2}{VarR_i} \Big/ W_{iMENA} \quad W_{iMENA} = \frac{MC_i}{MC_{MENA}}$$

$$adjc_i = \frac{\beta_g{}^2 VarR_g}{VarR_i} \Big/ W_{iUS} \quad W_{iUS} = \frac{MC_i}{MC_{US}}$$

We also compute ratios based on these variables in order to compare the relative changes in integration with each zone. For instance, in any country, a/b gives European relative to MENA integration and a/c gives European relative to US integration.

3.2.2.2. Moving average analysis

Alternatively, we study the reaction of individual stock markets to a set of specific event by implementing a local windowing of the original dataset that calculates the integration scores over distinctive - rather than incremental - time windows (see Barari, 2004). We therefore calculate the Akdogan scores in different time windows for each country, and then take the obtained series in first difference. A positive sign indicates that a rise in integration followed the considered shock, whereas a negative one indicates segmentation. However, determining the breaking points imply to consider the main financial, economic and political news that occurred over the period. We therefore begin by establishing a consistent timeline for each country.

We first consider that the Turkish crisis and the implementation of the EMU are major financial events for all countries. Regarding economic news, we adopt a '*de jure*' approach that relates modifications in the legal system rather than actual economic changes - in an attempt to capture market anticipations. Our timeline refers to both regional integration agreements and to the implementation of privatisation programs. Regarding economic integration, we picked up the dates where the Euro-Mediterranean Association Agreements entered into force, except Tunisia, where it happened at the very beginning of the sample (1/3/1998, i.e 60 observations), and Turkey, where it dates back to 1963. We also retained the initialling of the Agadir agreements in January 2003, which created a free trade area between Egypt, Tunisia, Jordan and Morocco. Turning to privatisation programs, we take into account privatisation news as given by the WB-EC 'Private Participation on Mediterranean Infrastructure' monthly review. For Morocco, December 1998 coincides with the renewal of the privatisation program that was launched in 1993 and that comprised most infrastructures sectors (but electricity). In the case of Lebanon, we pick up the adoption of a Privatisation Law in May 2000, which established the Higher Privatization Council and set up the framework for the privatisation of many state owned enterprises. Regarding Turkey,

we retain the 2000 law, which laid the framework for privatisations in the telecom, airline and electricity sectors. For Jordan, we pick up the 2001 launching of the 'Economic Priority Program', which extended the previous 1996-privatisation reforms to the water and energy sectors. For Egypt, we retain the 2001 'New Privatisation Strategy', which focused on attracting domestic and foreign funds for investment and transferring the leadership of enterprises from public to private sector. For Tunisia, we pick up the privatisation of 26 state enterprises in 2002. Finally, for Israel, we retain the privatisation of the national airline El Al in 2003, where the government directly sold part of its shares on the stock market. We also make the assumption that emerging market dynamics are embedded in the local political context, following Bekaert (2000). This leads us observe the pattern of the integration scores in all countries after the beginning of the second Intifada in September 2000, the 2001 World Trade Centre Attacks, and the invasion of Iraq in March 2003.

Table 5 Major Events for the Mediterranean Partners

Financial Events		Economic Integration		Infrastructure Privatization		Political Events	
1/1/1999	EMU creation	1/3/2000	EuroMed, Morocco	12/31/1998	Morocco	9/1/2000	2nd Intifada
11/21/2000	Turkish Crisis	1/6/2000	EuroMed, Israel	5/1/2000	Lebanon	9/11/2001	WTC attacks
		6/1/2001	EuroMed, Egypt	12/14/2000	Turkey	3/17/2003	Iraq invasion
		5/1/2002	EuroMed, Jordan	11/23/2001	Jordan		
		3/1/2003	EuroMed, Lebanon	12/16/2001	Egypt		
		1/16/2003	Agadir Agreements	1/24/2002	Tunisia		
				3/1/2003	Israel		

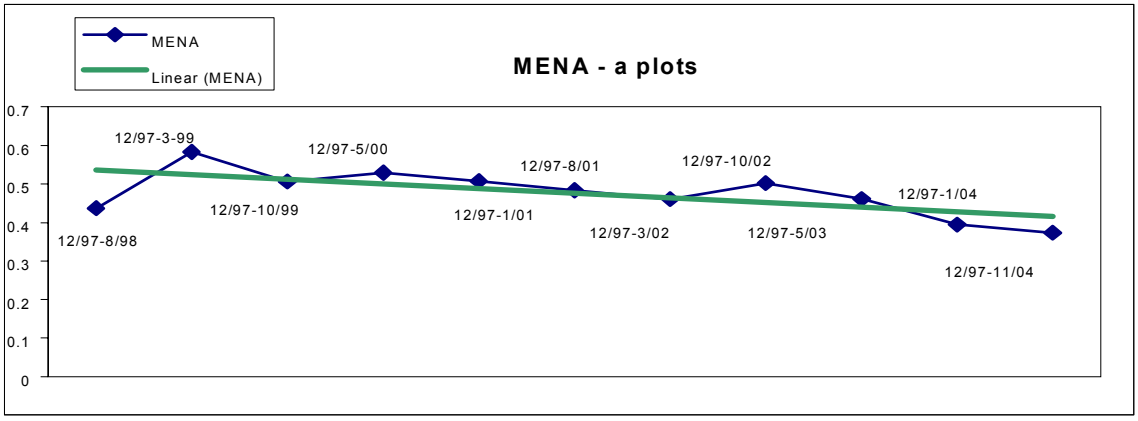
3.2.3. Intra-regional dynamic measures

Turning to intra-regional linkages, we cannot adopt the Akdogan methodology, which requires to be tested against a regional benchmark. After identifying the co-integrating vectors, we therefore set the parameters of these vectors as constraints in a Vector Error Co-integration Model. This allows us to derive, while addressing long-run equilibrium relations, the short-run dynamics of the system, using a standard impulse response functions and variance decomposition analysis.

4. Results and Analysis

After checking that all series are I(1) with ADF and KPSS tests[3], we implement the co-integration tests in a tri-variate framework at the regional level (MENA-EMU-US). The null hypothesis of co-integration is rejected, which indicates the absence of any long run stable relationship between the MENA taken as a block and the other two financial blocks[4]. The MENA region therefore remains segmented from other financial places, in spite of local market developments. Turning to the time-varying scores, both "a" (integration with the EMU) and "c" (integration with the US) plots reveal an overall stable but downward trend, indicating that the region's contribution to European and American systemic risk is continuously diminishing. This constitutes another dynamic time-varying evidence of the region's segmentation, the supplementary information here being that the latter actually increased over the period of study. Besides, monitoring the MENA's relative share in European and global systemic risk through the a/c scores displays a rising trend, suggesting that the MENA region is segmenting more slowly with the EMU than the US[5]. This tendency can be explained by the fact that the EMU is by far the region's first trading partner (see ERF, 2003). Overall, these results clearly indicate the presence of increasing diversification opportunities for both EMU and US investors. Besides, these benefits should increase relatively more for US investors in the future.

Figure 1 MENA benchmark: Time-varying integration with the EMU



[3] Results of the stationarity analysis are available on request.
[4] As a robustness check we also computed the stochastic co-integration framework. Results remain the same.
[5] A variance decomposition analyses, within a VAR framework, give the same results. However we don't report tables here for the sake of brevity. See annex for details.

Figure 2 MENA benchmark: Time-varying integration with the US

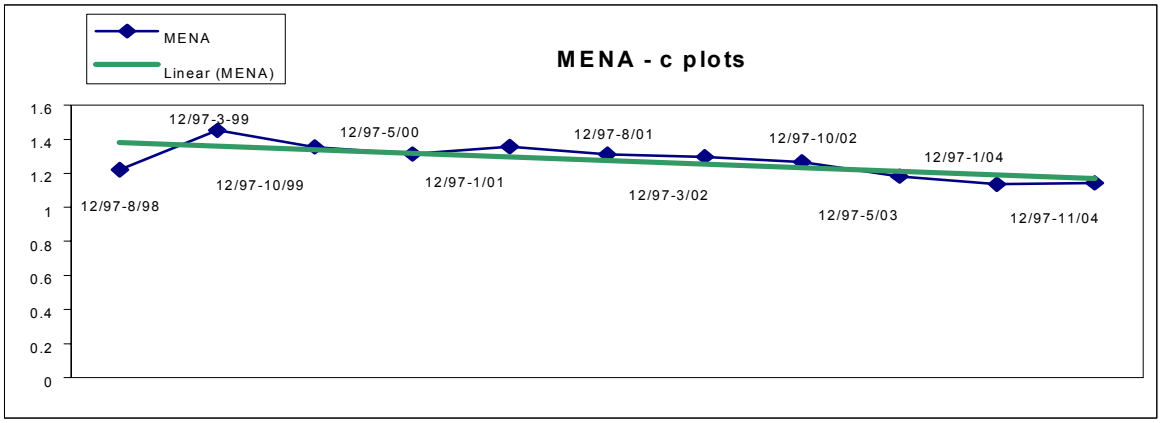
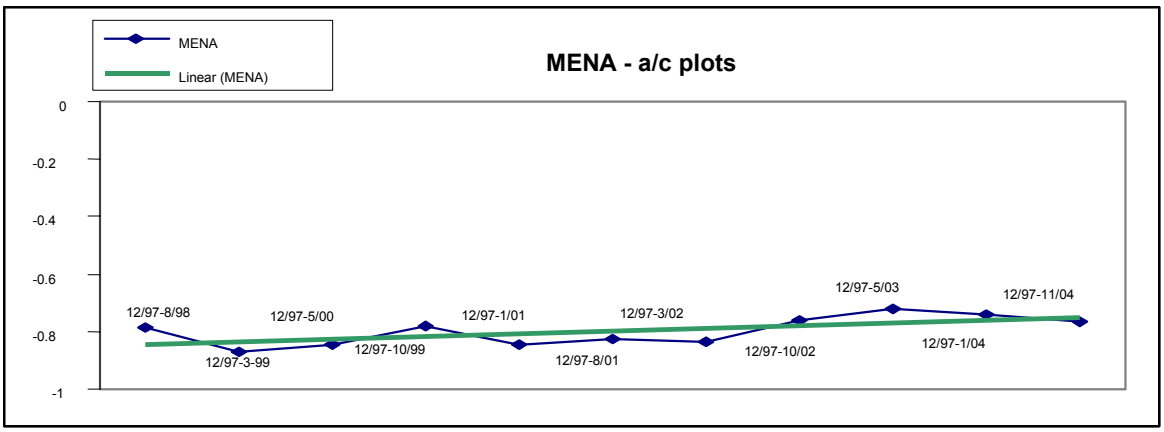


Figure 3 MENA benchmark: Relative time-varying integration scores



Turning to individual country analysis allows us to obtain a more detailed picture of the region's diversification opportunities. Regarding the European benchmark, the Gregory-Hansen co-integration analysis detects one co-integration vector between Turkey and the EMU, with a structural break at the end of 1999. This might reflect the long-established political and economic partnership between the two zones. Besides, our time-varying scores show that this integration is reinforcing over time, suggesting that the markets are responding positively to plans for a Turkish adhesion to the EU. The Egyptian and Lebanese stock market are also increasingly integrated with the EMU. On the other hand, Israel, Jordan, Tunisia and Morocco are increasingly segmented, suggesting the presence of diversification benefits for European investors.

We do not detect any co-integrating relationship with the MENA benchmark, which suggests intra-MENA long-run segmentation. Besides, this segmentation increases in all countries but Lebanon and Israel. In the case of Lebanon, this may be due to recent increases in

market capitalization and liquidity. Regarding Israel, the increased share in regional systemic risk might reflect this country's particular position in the region.

Finally, regarding the US benchmark, we find bi-variate co-integration with Jordan, Tunisia and Turkey[6]. However, time-varying evidence shows that integration is decreasing overtime with all of these countries. On the other hand, Israel, Lebanon and Morocco are growingly integrated with the US market. In the case of Israel, this may be due to the strong traditional ties between the two stock markets, which were recently reinforced by the implementation of a double quotation mechanism. Concurrently, the US government has encouraged an economic partnership with Morocco, with more than 120 American firms being operating in the country. Lebanon's increasing integration is due to recent capitalization increases in the Beirut exchange. Finally, the Egyptian stock exchange is the only market that is both non co-integrated and whose segmentation increases. American investors seeking diversification should therefore consider Egypt as a priority.

We also remark that Lebanon has witnessed the most spectacular market developments over the period and is the only country that displays a tri-directional integration with the US, the EMU and the MENA. On the opposite, Tunisia is the only market of our sample that has witnessed a contraction over the period, resulting in a growing segmentation with each of the three benchmarks. These two countries' diverging trajectories constitute an appropriate illustration of the impact of domestic market development dynamics in international financial integration.

Table 2 Co-integration and time-varying dynamics

Countries	**With the EMU**	**With the MENA**	**With the US**
Egypt	+	-	-
Jordan	-	-	- (*)
Morocco	-	-	+
Tunisia	-	-	- (*)
Lebanon	+	+	+
Israel	-	+	+
Turkey	+ (**)	-	- (*)

One star indicates Johansen-Juselius co-integration. Two stars indicate Gregory Hansen co-integration.

We now turn to the moving average analysis. Our first result is that MENA countries react independently to financial events. For instance, the implementation of the EMU has coincided with greater European integration for Egypt, Jordan and Lebanon, but to segmentation for Morocco, Tunisia, Israel and Turkey. It has corresponded to an increase of

[6] As a robustness check we also computed tests the stochastic co-integration (2002) framework. We do not detect any supplementary co-integrating vectors.

integration with the regional benchmark for Turkey, Israel and Egypt, but to segmentation for Jordan, Lebanon, Morocco and Tunisia. Regarding integration with the US, scores are increasing for Egypt, Morocco, Tunisia and Lebanon, and decreasing for Israel, Turkey and Jordan. A similar heterogeneous dynamic is observed when looking at the impact of the Turkish crisis. From the perspective of portfolio management, the finding that countries react independently to external financial shocks further reinforces the argument in favour of a MENA based diversification strategy.

Secondly, news related to economic integration seems to be associated with financial integration with all of our three regional benchmarks, whether the agreements are intra-regional (Agadir Agreements) or inter-regional (Barcelona Agreements). However, infrastructure privatisations have led to a greater integration only with the US benchmark.

Looking at the impact of political events, the beginning of the second Intifada has coincided with a general increase of the countries contribution to EMU and USA systemic risk. However, the WTC attacks seem to have reinforced most countries' segmentation with each of the three benchmarks, although this event seems to have increased Israel's weight in EMU and US systemic risk. Finally, the invasion of Iraq has reinforced the MENA's segmentation from the EMU, possibly reflecting negative anticipations about the war on the continent. The effect of this event on the countries' integration with the regional benchmark and with the US appears mixed. Overall, we find that different political shocks have different impacts on the stock market linkages dynamics, reflecting diverging perceptions of political risk on the investor's side. This heterogeneity also works in favor of the hypothesis diversification opportunities in the MENA.

Table 5 Moving average analysis: country reaction to financial events

	Creation of the EMU 1/1/1999			*Turkish crisis 11/21/2000*		
Country	**With the EMU**	**With the MENA**	**With the US**	**With the EMU**	**With the MENA**	**With the US**
Egypt	+	+	+	+	+	+
Jordan	+	-	-	-	-	-
Morocco	-	-	+	+	+	-
Tunisia	-	-	+	+	-	-
Lebanon	+	-	+	+	+	-
Israel	-	+	-	-	-	+
Turkey	-	+	-	+	-	+

Table 6 Moving average analysis: country reaction to economic news

	Economic Integration			*Infrastructure Privatization*		
Country	**With the EMU**	**With the MENA**	**With the US**	**With the EMU**	**With the MENA**	**With the US**
Egypt	- (+)	-(-)	+(+)	-	-	-
Jordan	+ (+)	-(+)	+(+)	+	-	+
Morocco	+(+)	+(+)	+(-)	-	-	+
Tunisia	(+)	(+)	(-)	-	+	+
Lebanon	+	+	+	+	-	+
Israel	+	+	-	-	-	+
Turkey	NA	NA	NA	+	-	-

Note: signs between brackets indicate results for the Agadir Agreements.

Table 7 Moving average analysis: country reaction to political events

	Intifada			*WTC attacks*			*Iraq invasion*		
Country	**With the EMU**	**With the MENA**	**With the US**	**With the EMU**	**With the MENA**	**With the US**	**With the EMU**	**With the MENA**	**With the US**
Egypt	+	-	-	+	-	-	-	-	-
Jordan	+	+	+	-	+	-	-	+	+
Morocco	+	-	+	-	-	+	-	+	-
Tunisia	+	+	+	-	-	-	-	-	-
Lebanon	+	-	+	-	-	-	+	+	+
Israel	-	+	+	+	-	+	-	-	+
Turkey	+	+	+	-	-	-	-	+	-

Finally, in order to approach intra-regional equity markets linkages; we implement a VAR-VECM model that approaches both long run and short run dynamics. A recursive Johansen & Juselius co-integration analysis suggests a weak rise towards integration, with a gradual move from 0 to 2 co-integrating vectors. Using a bi-variate analysis, we identify these relationships as Turkey-Jordan and Israel-Tunisia, suggesting that the most developed markets are fostering the region's financial integration. We then normalize our VECM restrictions with respect to these two countries, setting the parameters of the co-integrating vectors as beta VECM constraints. Using a variance decomposition analysis, we find that all stock markets are responding to each other in the short run, with the exception of Turkey. This suggests that intra-regional shocks have an impact on the value of a regional portfolio. Besides, residuals are weakly correlated, which allows for impulse response functions analysis. We find that most markets are responding positively to each other, with exceptions of Egypt to Jordan, Morocco to Turkey, Tunisia to Israel, which display negative inter-reactions.

Table 8 VAR results – Causality Relationships

	TURKEY	EGYPT	ISRAEL	MOROCCO	JORDAN	TUNISIA	LEBANON
TURKEY	0.024	0.008	0.009	0.005	0.005	0.006	0.007
EGYPT	0.065*	0.023	0.025	0.013	0.015	0.018	0.019
ISRAEL	0.062*	0.022	0.024	0.013	0.017	0.017	0.018
MOROCCO	0.111*	0.040	0.043	0.023	0.026	0.032	0.033
JORDAN	0.101*	0.036	0.039	0.021	0.023	0.029	0.030
TUNISIA	0.082*	0.029	0.031	0.017	0.019	0.023	0.024
LEBANON	0.079*	0.028	0.030	0.016	0.018	0.022	0.023

* indicates no causality at the 5% level

4. Conclusion

The objective of this paper was to investigate diversification benefits in the MENA by looking at long-run equity market linkages. At the inter-regional level, our analysis was based on two co-integration analyses and on coefficients of country-weight in regional systemic risk. Results indicated no common stochastic pattern and a decreasing weight of the MENA region in European and American systemic risk, suggesting increased market segmentation. Turning to a country level analysis, we found no stable long-run relationships with the regional benchmark, but a few co-integrating vectors with the EMU (Turkey) and the US (Turkey, Jordan and Tunisia). However, the dynamics of each country's contribution to systemic risk in the different regions appeared diverging. Besides, results from the moving average analysis indicated that although economic integration seems to diminish market segmentation, the MENA capital markets respond differently to exogenous financial and political shocks. Turning to intra-regional linkages, a VAR-VECM analysis showed that local markets display a high sensitivity to intra-regional shocks. Taking these results together, our conclusions are (i) the MENA markets provide significant diversification opportunities, (ii) they should not be treated as a block for global strategic purposes, and (iii) local economic shocks might affect the value of a regional portfolio.

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Statistical Appendix

1. Gregory-Hansen Results

Relationship	Model	ADF	Break Date	Relationship	Model	ADF	Break Date
Egypt-Israel	C	-1.667	12/1/1999	Israel-Egypt	C	-3.12286	1999:07:28
	C/T	-2.1235	11/5/2003		C/T	-2.79849	1999:07:28
	C/S	-1.7894	11/5/2003		C/S	-3.40507	2000:01:21
Egypt-Jordan	C	-3.8156	27/8/2001	Israel-Jordan	C	-3.03108	2003:08:07
	C/T	-3.5148	27/8/2001		C/T	-3.11153	2003:09:18
	C/S	-3.8525	27/8/2001		C/S	-3.55024	2000:12:05
Egypt-Morocco	C	-2.1006	2003:11:05	Israel-Morocco	C	-3.36197	2000:01:21
	C/T	-1.9786	2000:07:11		C/T	-3.96823	1999:12:28
	C/S	-2.2427	2003:11:05		C/S	-3.67923	2000:01:21
Egypt-Tunisia	C	-1.2703	2003:11:05	Israel-Tunisia	C	-3.77346	2003:07:16
	C/T	-2.1114	2003:11:05		C/T	-3.93353	2000:08:15
	C/S	-2.7365	2003:04:01		C/S	-3.88309	2002:03:27
Egypt-Lebanon	C	-2.321	2003:10:24	Israel-Lebanon	C	-2.4667	2003:09:29
	C/T	-3.7246	1999:02:03		C/T	-3.11747	1999:03:17
	C/S	-2.7188	2003:07:18		C/S	-3.01519	2000:01:21
Egypt-Turkey	C	-1.5112	2003:11:05	Israel-Turkey	C	-3.54449	2000:10:04
	C/T	-2.7635	1999:12:01		C/T	-3.68471	2001:12:31
	C/S	-2.6599	2001:04:03		C/S	-3.97812	2000:10:06
Egypt-MENA	C	-4.1004	2000:07:05	Israel-MENA	C	-2.36054	1999:07:28
	C/T	-4.2288	2000:07:05		C/T	-2.46019	2001:12:28
	C/S	-4.3871	2000:07:05		C/S	-2.29678	2003:11:06
Egypt-EMU	C	-2.6523	1999:05:20	Israel-EMU	C	-2.97326	1999:12:28
	C/T	-2.7816	1999:05:20		C/T	-3.45867	2000:03:28
	C/S	-2.6453	1999:05:20		C/S	-2.95851	1999:12:28
Egypt-US	C	-2.29728	2003:11:05	Israel-US	C	-2.96355	2001:06:26
	C/T	-3.1914	1999:05:19		C/T	-3.59737	2000:03:28
	C/S	-2.8209	2003:10:24		C/S	-2.95502	2001:06:26

Note: * indicates significance at the 5% level
** indicates significance at the 1% level

Relationship	Model	ADF	Break Date	Relationship	Model	ADF	Break Date
Morocco-Israel	C	-3.6563	2000:01:21	Tunisia-Egypt	C	-2.03563	1999:11:11
	C/T	-4.1979	1999:12:28		C/T	-2.94217	2000:02:08
	C/S	-4.4619	2001:05:28		C/S	-2.58666	2001:07:23
Morocco-Jordan	C	-3.6937	2001:07:27	Tunisia-Jordan	C	-2.30917	2003:09:24
	C/T	-4.1314	2001:07:27		C/T	-2.8407	2001:07:23
	C/S	-4.2339	2001:09:25		C/S	-4.86332	2001:11:21
Morocco-Egypt	C	-3.2322	2001:07:27	TunisiaMorocco	C	-2.87963	1999:12:27
	C/T	-4.1018	2003:09:16		C/T	-3.50643	2000:02:09
	C/S	-3.2806	2003:10:17		C/S	-4.3423	2001:07:23
Morocco-Tunisia	C	-3.2178	2000:03:06	Tunisia-Israel	C	-3.15708	2003:07:16
	C/T	-4.215	2003:09:16		C/T	-3.78774	2000:08:15
	C/S	-3.6983	2001:09:28		C/S	-3.22933	2002:01:16
Morocco- Lebanon	C	-3.5233	1999:03:04	Tunisia Lebanon	C	-2.19256	1999:09:21
	C/T	-4.1794	2003:09:16		C/T	-2.95481	2001:07:23
	C/S	-3.5954	1999:04:23		C/S	-3.1492	2000:01:28
Morocco-Turkey	C	-3.5736	1999:11:19	Tunisia-Turkey	C	-3.36109	2000:06:30
	C/T	-4.2681	2003:09:16		C/T	-4.60484	2000:06:30
	C/S	-3.6736	2000:12:13		C/S	-3.47434	2000:06:30
Morocco-MENA	C	-3.1305	2000:08:16	Tunisia-MENA	C	-2.03901	1999:11:11
	C/T	-4.0456	2003:09:16		C/T	-3.09917	2000:02:09
	C/S	-3.2821	2001:01:31		C/S	-2.03817	1999:11:11
Morocco-EMU	C	-3.0478	2000:08:16	Tunisia-EMU	C	-2.04279	1999:11:11
	C/T	-4.2106	2003:09:16		C/T	-3.14425	2000:04:18
	C/S	-3.2936	2000:12:13		C/S	-2.09563	2000:08:18
Morocco-US	C	-3.3559	1999:04:22	Tunisia-US	C	-4.98183*	2000:07:04
	C/T	-4.0022	2003:09:16		C/T	-5.16563*	2000:07:04
	C/S	-3.5817	2000:10:17		C/S	-5.01186*	2000:07:04

Note: * indicates significance at the 5% level
** indicates significance at the 1% level

Relationship	Model	ADF	Break Date	Relationship	Model	ADF	Break Date
EMU-Israel	C	-2.9979	2003:10:17	US-Israel	C	-3.63686	2001:06:26
	C/T	-3.5311	2000:06:01		C/T	-3.74749	2001:06:26
	C/S	-3.0468	2003:10:17		C/S	-3.59989	2001:07:25
EMU-Jordan	C	-2.6821	2003:10:17	US-Jordan	C	-3.10582	2001:10:02
	C/T	-3.7441	1999:07:27		C/T	-3.70818	1999:07:27
	C/S	-4.1462	2000:07:24		C/S	-3.53748	2001:04:12
EMU-Morocco	C	-3.1638	2003:10:17	US-Morocco	C	-3.02903	1999:03:23
	C/T	-3.5314	2000:09:28		C/T	-3.64963	1999:04:22
	C/S	-2.8134	2003:10:17		C/S	-4.06716	2001:01:11
EMU-Tunisia	C	-3.1575	2003:10:17	US-Tunisia	C	-5.16859**	2000:07:04
	C/T	-3.2928	2000:06:02		C/T	-5.23159*	2000:07:04
	C/S	-3.1428	2002:03:26		C/S	-5.14383*	2000:07:04
EMU-Lebanon	C	-3.1876	2003:10:17	US-Lebanon	C	-3.69832	1999:02:01
	C/T	-3.7825	1999:02:26		C/T	-3.7115	1999:02:01
	C/S	-3.1959	2003:10:17		C/S	-3.61782	2001:04:02
EMU-Turkey	C	-3.6735	2003:10:17	US-Turkey	C	-4.28474	2001:10:02
	C/T	-5.1896*	1999:11:19		C/T	-4.46047	2001:10:02
	C/S	-4.5251	2002:04:05		C/S	-4.7579	2001:10:02
EMU-MENA	C	-2.8955	2000:10:06	US-MENA	C	-3.14855	2001:10:02
	C/T	-4.3056	2000:10:06		C/T	-3.65391	1999:02:01
	C/S	-2.7589	2000:07:24		C/S	-3.11155	2001:10:02
EMU-Egypt	C	-3.2731	2003:10:17	US-Egypt	C	-3.12947	2002:05:16
	C/T	-3.5472	2000:10:03		C/T	-4.26892	1999:05:19
	C/S	-3.2167	2003:10:17		C/S	-3.24316	2001:04:12
EMU-US	C	-3.34063	2003:10:17	US-EMU	C	-3.894	2002:03:04
	C/T	-3.5331	2000:05:03		C/T	-3.88771	2002:03:04
	C/S	-4.3917	2002:05:09		C/S	-4.22896	2002:03:04

Note: * indicates significance at the 5% level
** indicates significance at the 1% level

Relationship	Model	ADF	Break Date	Relationship	Model	ADF	Break Date
Jordan-Egypt	C	-3.72143	2001:08:27	Lebanon-Egypt	C	-3.20626	1999:05:12
	C/T	-3.95683	1999:10:27		C/T	-4.88226	1999:02:03
	C/S	-3.57775	2001:09:14		C/S	-4.08159	1999:12:22
Jordan-Israel	C	-3.3434	2003:09:24	Lebanon-Jordan	C	-3.03559	1999:05:12
	C/T	-3.5223	2003:09:18		C/T	-3.53306	1999:01:21
	C/S	-3.13204	2003:10:17		C/S	-3.48251	2001:09:25
JordanMorocco	C	-3.00443	2003:10:17	Lebanon-Morocco	C	-4.23702	1999:03:04
	C/T	-2.89595	2001:09:25		C/T	-3.89302	1999:03:04
	C/S	-2.62643	2003:10:17		C/S	-4.32038	1999:03:04
Jordan-Tunisia	C	-3.51204	2003:09:24	Lebanon-Israel	C	-3.249	1999:05:12
	C/T	-3.64632	2003:10:17		C/T	-3.61874	1999:03:17
	C/S	-4.3144	2002:03:27		C/S	-3.37467	2001:04:03
Jordan-Lebanon	C	-2.93526	2003:10:17	Lebanon-Tunisia	C	-3.11796	1999:05:12
	C/T	-2.91054	2003:10:17		C/T	-2.77553	2003:11:06
	C/S	-3.0914	2003:08:06		C/S	-2.77827	2000:08:10
Jordan-Turkey	C	-3.20796	2003:10:17	Lebanon-Turkey	C	-4.31577	1999:03:08
	C/T	-3.2605	1999:11:19		C/T	-4.03112	1999:03:08
	C/S	-3.79495	2002:04:05		C/S	-4.33885	1999:03:08
Jordan-MENA	C	-2.70196	2003:09:24	Lebanon-MENA	C	-3.23401	1999:05:12
	C/T	-3.31245	1999:10:28		C/T	-5.01046	1999:03:08
	C/S	-3.26717	2003:07:14		C/S	-3.27624	1999:05:12
Jordan-EMU	C	-2.71766	2003:09:30	Lebanon-EMU	C	-3.30221	1999:05:20
	C/T	-3.68768	1999:07:27		C/T	-4.18879	1999:03:15
	C/S	-3.48055	2000:11:08		C/S	-3.47965	1999:05:20
Jordan-US	C	-3.26407	2003:10:17	Lebanon-US	C	-4.52927	1999:03:04
	C/T	-3.18459	2003:10:17		C/T	-4.18293	1999:03:04
	C/S	-4.2698	2002:05:23		C/S	-4.18879	1999:03:15

Note: * indicates significance at the 5% level
** indicates significance at the 1% level

Relationship		ADF	Break Date	Relationship	Model	ADF	Break Date
Turkey-Israel	C	-3.76928	2000:10:06	MENA-Israel	C	-2.09518	2003:10:21
	C/T	-3.72653	2000:07:26		C/T	-2.09902	2003:10:21
	C/S	-4.61308	2000:07:26		C/S	-2.50556	2003:11:03
Turkey-Jordan	C	-2.37604	2001:04:19	MENA-Jordan	C	-2.22657	2003:09:15
	C/T	-3.62076	1999:11:19		C/T	-2.89362	2001:10:10
	C/S	-3.84487	2000:07:27		C/S	-3.35601	2003:07:11
				MENA-Morocco	C	-2.61178	2003:10:28
Turkey-Morocco	C	-3.24952	1999:11:19				
	C/T	-3.43566	1999:11:19		C/T	-2.19499	2003:10:28
	C/S	-3.35228	2000:12:13		C/S	-2.00533	2003:11:04
Turkey-Tunisia	C	-3.51915	2000:06:30	MENA-Tunisia	C	-2.55074	2003:10:20
	C/T	-4.68565	2000:06:30		C/T	-2.44129	2003:10:20
	C/S	-4.30041	2000:06:30		C/S	-3.87221	2003:04:01
				MENA-Lebanon	C	-2.51523	2003:09:15
Turkey-Lebanon	C	-3.54289	1999:03:08				
	C/T	-3.50808	1999:03:08		C/T	-3.86086	1999:03:04
	C/S	-3.59107	2000:01:13		C/S	-3.164	2003:07:11
Turkey-EMU	C	-2.72078	2003:07:11	MENA-Turkey	C	-2.63212	2003:09:15
	C/T	-5.43537*	1999:11:19		C/T	-2.49949	2003:09:15
	C/S	-3.66293	2002:03:27		C/S	-3.79169	2001:02:08
Turkey-MENA	C	-2.30497	2001:01:02	MENA-US	C	-2.50925	2003:10:28
	C/T	-2.5779	2001:04:19		C/T	-2.62793	1999:01:29
	C/S	-3.15023	2001:01:02		C/S	-3.37806	2002:06:07
Turkey-Egypt	C	-2.21347	2001:04:19	MENA-Egypt	C	-4.13744	2000:07:05
	C/T	-3.62831	1999:10:04		C/T	-4.09048	2000:07:05
	C/S	-2.30497	2001:01:02		C/S	-3.75268	2000:07:05
Turkey-US	C	-4.013213	2002:06:28	MENA-EMU	C	-2.44332	2000:10:10
	C/T	-4.02759	2002:05:16		C/T	-3.05018	2000:08:31
	C/S	-4.25087	2002:07:01		C/S	-2.99311	2003:09:30

Note: * indicates significance at the 5% level
** indicates significance at the 1% level

2. Akdogan Integration Scores – Statistics for the Recursive Analysis

EGYPT	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.142630548	0.006933078	0.001844799	0.213489	0.11494	1.236162
12/31/97-3/15/1999	0.17209872	0.006272448	0.001827154	0.244454	0.201406	0.965977
12/31/97-10/21/1999	0.162324559	0.006104147	0.001843864	0.118221	0.121218	2.44982
12/31/97-5/26/2000	0.163485048	0.006078547	0.001860387	0.01805	0.184463	0.623801
12/31/97-1/29/2001	0.166966514	0.006001746	0.001909958	0.196864	0.107189	1.48538
12/31/97-8/7/2001	0.163802105	0.005978712	0.001820113	0.619267	0.131982	0.117805
12/31/97-3/14/2002	0.173357692	0.006293119	0.001890935	0.743545	0.133224	0.01292
12/31/97-10/21/2002	0.22113563	0.007865156	0.002245046	0.732006	0.10173	0.018701
12/31/97-5/28/2003	0.16935717	0.006206842	0.001875112	0.854727	0.113938	0.002666
12/31/97-1/2/2004	0.145354033	0.005689177	0.001780174	0.958324	0.116204	0.003288
12/31/97-11/16/2004	0.157355601	0.00594801	0.001827643	0.669022	0.093826	0.006042

MOROCCO	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.097601041	0.004067968	0.001082432	3.607101	0.059669	5.152442
12/31/97-3/15/1999	0.129608096	0.003830491	0.001120493	0.44827	0.001299	5.228445
12/31/97-10/21/1999	0.1094286	0.00335096	0.001006509	1.465531	0.004589	10.41482
12/31/97-5/26/1999	0.099768805	0.003043192	0.000923537	2.27	0.016119	4.40287
12/31/97-1/29/2000	0.070789419	0.002119888	0.00067462	3.828943	0.011812	15.99312
12/31/97-8/7/2001	0.094503412	0.002849109	0.000862096	0.011852	0.005473	0.233456
12/31/97-3/14/2002	0.094137374	0.002800494	0.000840079	9.55E-05	0.00861	0.592094
12/31/97-10/21/2002	0.092307179	0.00255742	0.000729995	0.351352	0.017511	0.967437
12/31/97-5/28/2003	0.092074404	0.002781298	0.000839246	0.080268	0.030484	2.955762
12/31/97-1/2/2004	0.079696585	0.002666123	0.000834244	0.273317	0.0599	2.181072
12/31/97-11/16/2004	0.085885494	0.00272371	0.000836745	0.148234	0.070601	0.674495

JORDAN	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.043475869	0.001812055	0.000482163	5.16705	0.072404	0.052848
12/31/97-3/15/1999	0.052086161	0.001580727	0.000458636	0.431122	0.023091	4.314387
12/31/97-10/21/1999	0.044528336	0.001393341	0.000416269	0.438172	0.022832	0.823568
12/31/97-5/26/1999	0.041439847	0.001285882	0.000388857	0.354836	0.002376	0.98747
12/31/97-1/29/2000	0.032174381	0.000963507	0.00030662	0.063405	0.043058	0.678566
12/31/97-8/7/2001	0.043421699	0.001318555	0.000397271	0.153866	0.023124	0.019895
12/31/97-3/14/2002	0.048915655	0.001451512	0.00043174	0.248697	0.004985	0.333632
12/31/97-10/21/2002	0.07638543	0.0021163	0.000604081	0.641958	0.00046	4.49E-06
12/31/97-5/28/2003	0.051492012	0.001564112	0.000470179	0.224481	0.010239	0.665706
12/31/97-1/2/2004	0.066950156	0.002239711	0.000700818	0.308185	0.016311	1.643814
12/31/97-11/16/2004	0.059221084	0.001901912	0.000585499	0.315688	0.014408	2.491282

LEBANON	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.023144128	0.000964637	0.000256677	0.797753	0.408775	1.830471
12/31/97-3/15/1999	0.024127682	0.000761454	0.000218345	0.051304	0.070605	8.433997
12/31/97-10/21/1999	0.019313604	0.000619439	0.000181954	2.088052	6.94E-05	2.706225
12/31/97-5/26/1999	0.017060274	0.000541693	0.000161006	2.034445	0.001596	6.56065
12/31/97-1/29/2000	0.010300285	0.000308456	9.81612E-05	2.420276	0.045891	4.542299
12/31/97-8/7/2001	0.015678502	0.000490656	0.000145843	13.96136	0.096165	7.382982
12/31/97-3/14/2002	0.015571815	0.000478321	0.000141357	10.11227	0.192465	1.781551
12/31/97-10/21/2002	0.015038382	0.000416647	0.000118928	8.605212	0.18221	7.818277
12/31/97-5/28/2003	0.014658515	0.000453855	0.000134889	4.346582	0.094588	5.064161
12/31/97-1/2/2004	0.009178711	0.000307059	9.60805E-05	6.252171	0.100574	4.868102
12/31/97-11/16/2004	0.011918613	0.000380457	0.000115485	3.291704	0.037537	5.497026

TURKEY	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.486819372	0.020290416	0.005399007	22.21902	0.013066	24.38145
12/31/97-3/15/1999	0.41757709	0.014017283	0.00394804	29.91621	0.009852	27.14061
12/31/97-10/21/1999	0.467783304	0.015903773	0.004766893	24.57717	0.003906	14.88635
12/31/97-5/26/1999	0.464187644	0.015322259	0.004655392	30.64972	0.00984	8.263398
12/31/97-1/29/2000	0.453400663	0.013577717	0.004320888	32.82318	0.005838	10.25787
12/31/97-8/7/2001	0.448038177	0.014422201	0.004367891	40.44482	0.028107	9.150644
12/31/97-3/14/2002	0.43483086	0.013721442	0.004126	39.71808	0.023648	12.05435
12/31/97-10/21/2002	0.368794273	0.010217645	0.002916545	50.80046	0.017112	13.64139
12/31/97-5/28/2003	0.432367467	0.01375691	0.004161029	35.3892	0.009031	7.87123
12/31/97-1/2/2004	0.41758711	0.013969715	0.0043712	30.63561	0.003605	7.698971
12/31/97-11/16/2004	0.424977289	0.013863312	0.004266114	30.87074	0.003543	7.698971

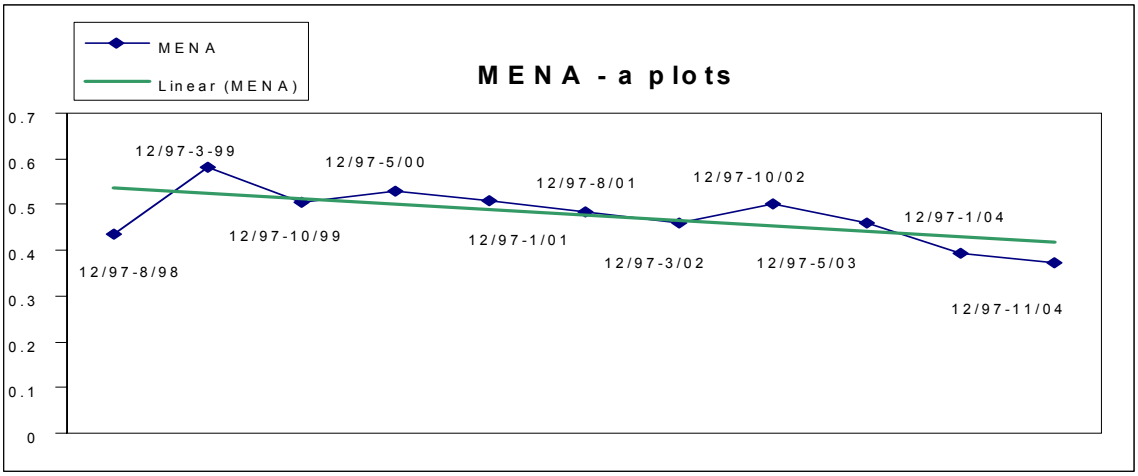
ISRAEL	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.353556224	0.014736067	0.003921069	5.227877	0.168667	26.60393
12/31/97-3/15/1999	0.37985384	0.011882796	0.003416303	2.80751	0.190942	31.95393
12/31/97-10/21/1999	0.359889648	0.011615309	0.003479717	1.631879	0.237443	27.83382
12/31/97-5/26/1999	0.376235545	0.011895332	0.003622997	1.479115	0.323934	25.11994
12/31/97-1/29/2000	0.425273236	0.012735401	0.004052835	1.216015	0.22811	24.33119
12/31/97-8/7/2001	0.395696319	0.01218924	0.0036932	0.829901	0.345124	26.75126
12/31/97-3/14/2002	0.402992399	0.012187005	0.003656916	0.881131	0.34252	31.29526
12/31/97-10/21/2002	0.439472796	0.012175832	0.003475494	0.971947	0.303929	36.46216
12/31/97-5/28/2003	0.405535585	0.012457007	0.003763753	0.856854	0.297127	38.21722
12/31/97-1/2/2004	0.420794705	0.01407702	0.004404776	0.713426	0.284073	33.53341
12/31/97-11/16/2004	0.413165145	0.013267014	0.004084264	0.891891	0.266095	36.77582

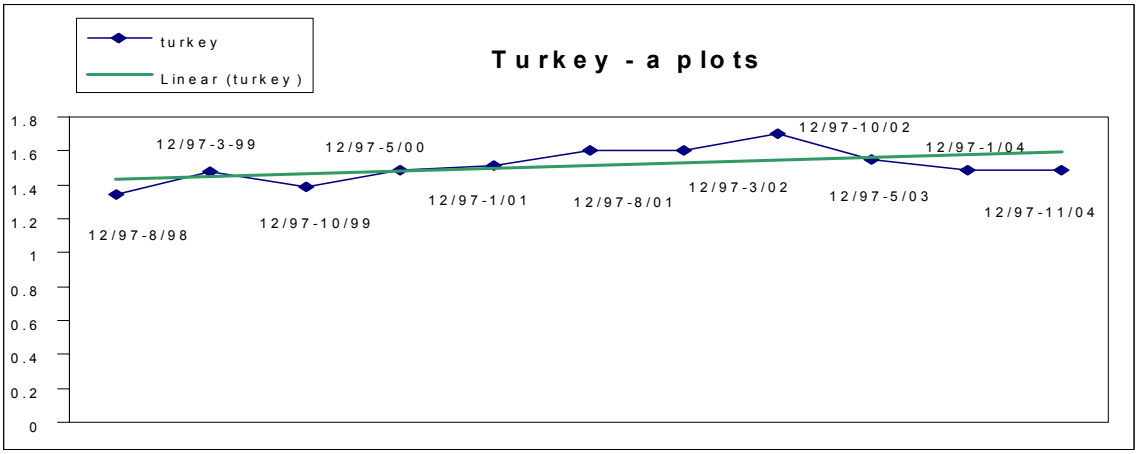
TUNISIA	MENA MC Share	EMU MC Share	US MC Share	a	b	c
12/31/97-08/06/1998	0.018451875	0.000769066	0.000204638	15.35316	0.35843	2.000457
12/31/97-3/15/1999	0.020764885	0.000641066	0.000185037	34.24141	0.172358	18.71488
12/31/97-10/21/1999	0.018276663	0.000580907	0.000173331	2.296473	0.110353	0.04101
12/31/97-5/26/1999	0.018278546	0.000572567	0.00017356	0.709546	0.077177	13.04564
12/31/97-1/29/2000	0.018284194	0.000547546	0.000174248	0.206373	4.18E-06	5.691072
12/31/97-8/7/2001	0.018249184	0.000560401	0.000169281	0.151632	0.039415	0.637482
12/31/97-3/14/2002	0.01902615	0.000572794	0.000171265	0.029465	0.022578	2.222445
12/31/97-10/21/2002	0.022910983	0.000634761	0.000181188	0.137568	0.01474	0.216545
12/31/97-5/28/2003	0.018436437	0.000562166	0.000169077	0.897031	0.028529	0.40126
12/31/97-1/2/2004	0.014898161	0.000498394	0.00015595	0.866351	0.031431	0.353828
12/31/97-11/16/2004	0.016667299	0.00053028	0.000162514	0.58185	0.022996	0.026528

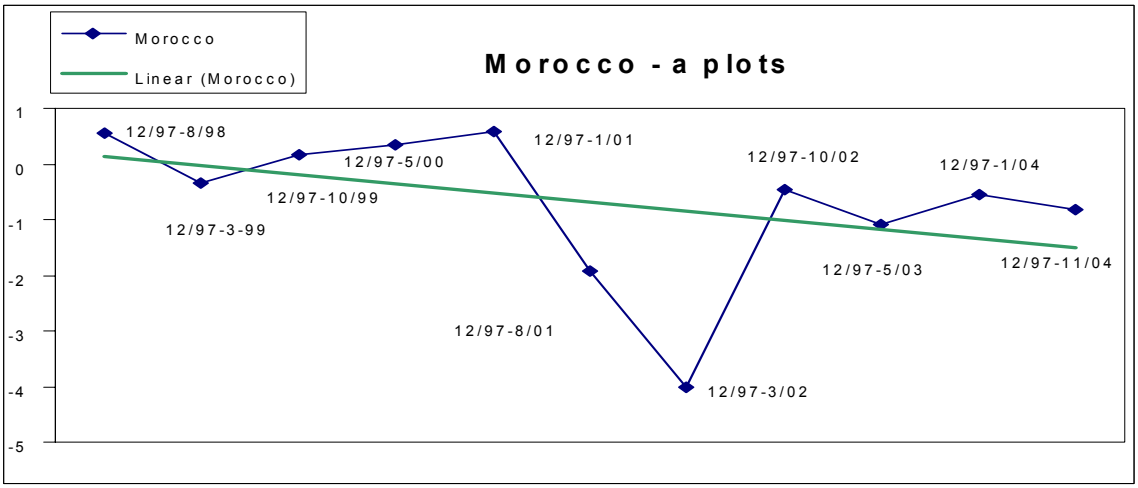
MENA	EMU MC Share	US MC Share	a	b	a/b
12/31/97-08/06/1998	0.04860865	0.012934108	2.734827821	16.62103	0.16454
12/31/97-3/15/1999	0.038224811	0.010955663	3.827295713	28.33313	0.135082
12/31/97-10/21/1999	0.038948436	0.011686583	3.206437434	22.60397	0.141853
12/31/97-5/26/1999	0.038197778	0.011624729	3.379781883	20.50889	0.164796
12/31/97-1/29/2000	0.035945804	0.011439168	3.217751566	22.67185	0.141927
12/31/97-8/7/2001	0.037318217	0.011309853	3.044162507	20.39858	0.149234
12/31/97-3/14/2002	0.037026367	0.011116935	2.886085551	19.7721	0.145968
12/31/97-10/21/2002	0.035567115	0.010152349	3.174922729	18.42008	0.172362
12/31/97-5/28/2003	0.037328334	0.011278396	2.89040608	15.18178	0.190387
12/31/97-1/2/2004	0.039140141	0.012247162	2.482401247	13.63271	0.182092
12/31/97-11/16/2004	0.038234238	0.011762779	2.362732464	13.85781	0.170498

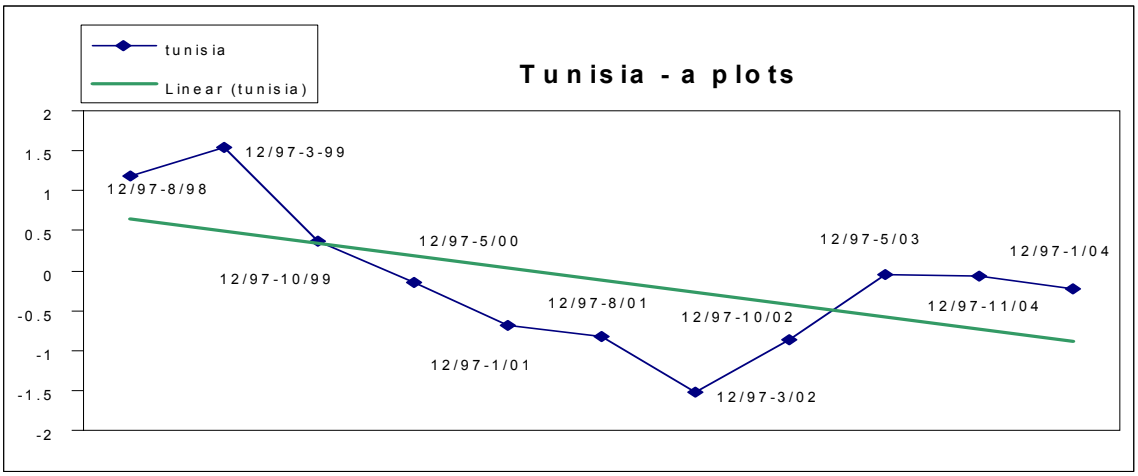
3. Akdogan Integration Scores – Plots for the Recursive Analysis

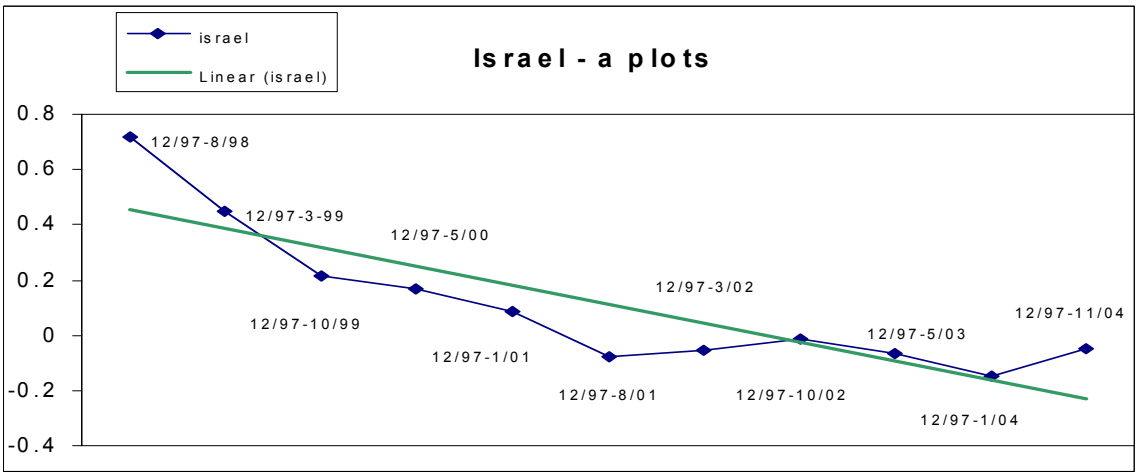
3.1 Integration with the EMU

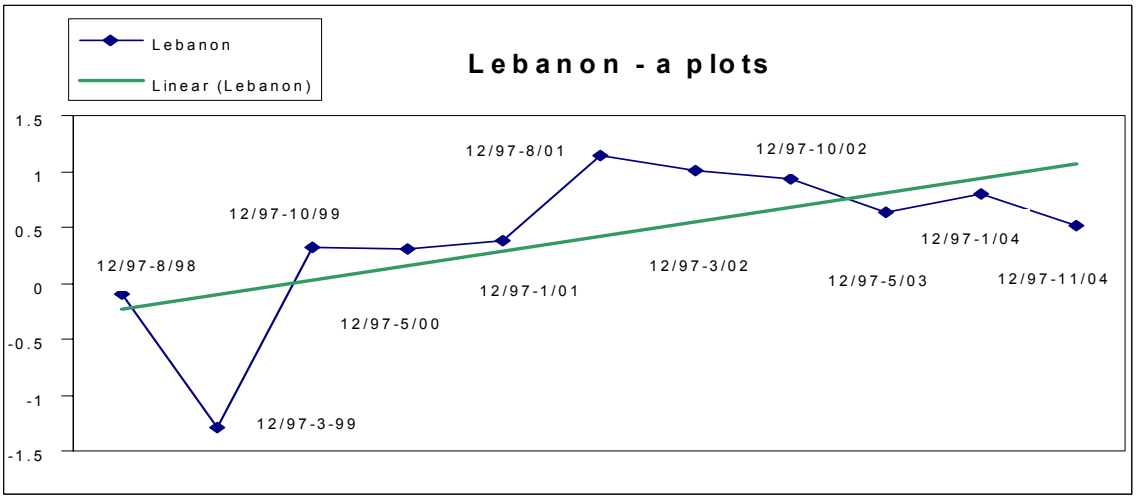


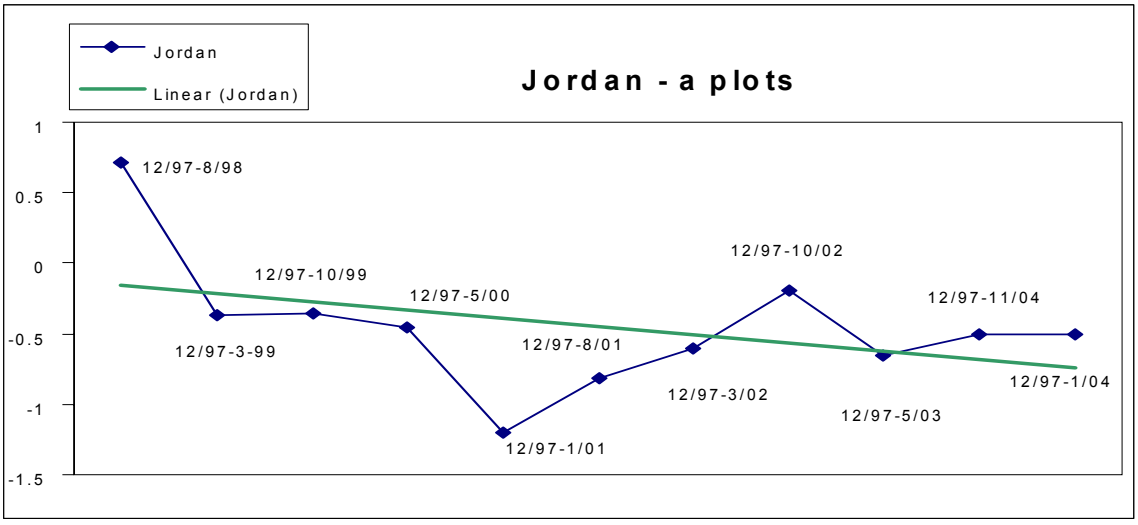


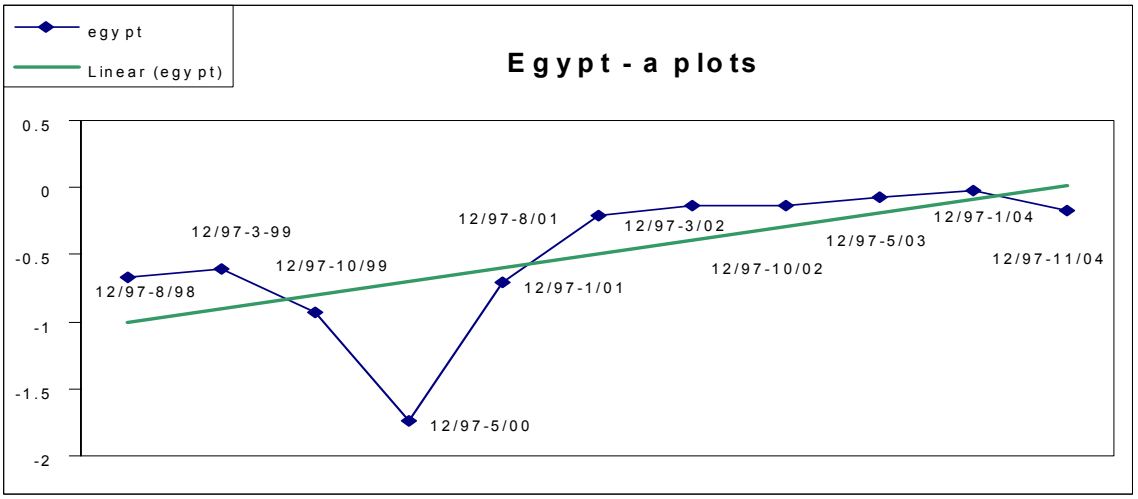



tunisia
Linear (tunisia)
Tunisia - a plots
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-11/04
12/97-1/04

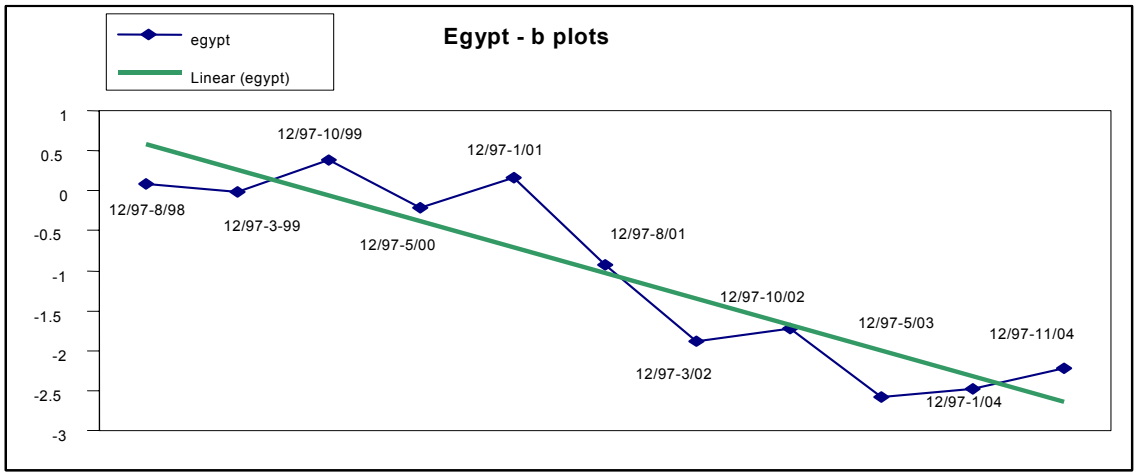

israel
Linear (israel)
Israel - a plots
0.8
0.6
0.4
0.2
0
-0.2
-0.4
12/97-8/98
12/97-3-99
12/97-5/00
12/97-10/99
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-11/04
12/97-1/04

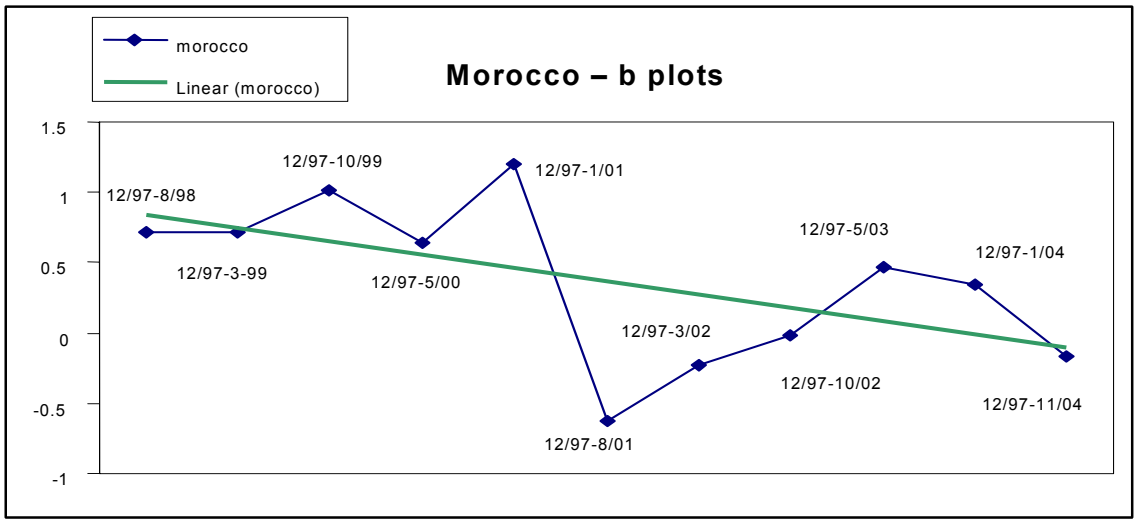

Lebanon
Linear (Lebanon)
Lebanon - a plots
1.5
1
0.5
0
-0.5
-1
-1.5
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-11/04
12/97-1/04

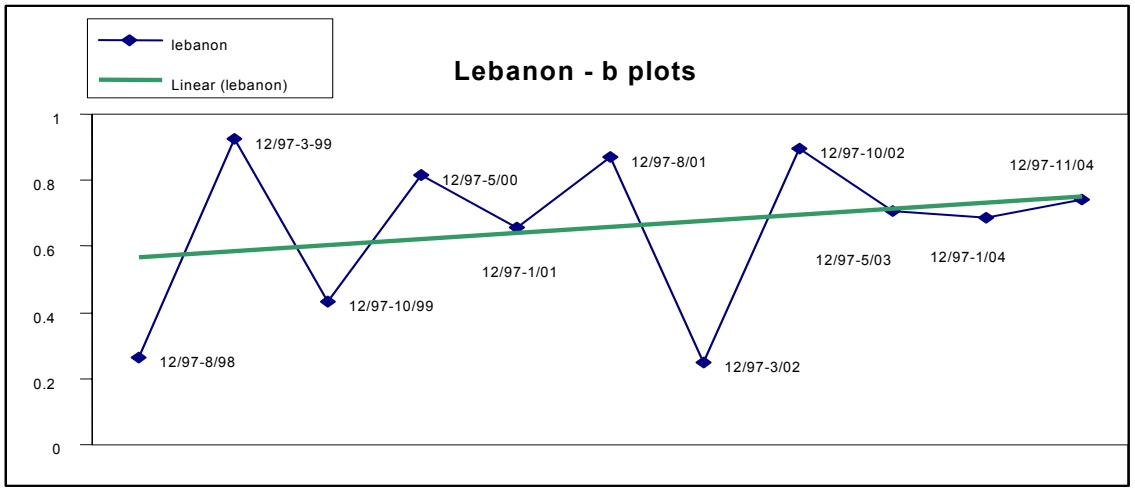

Jordan
Linear (Jordan)
Jordan - a plots
1
0.5
0
-0.5
-1
-1.5
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-11/04
12/97-1/04

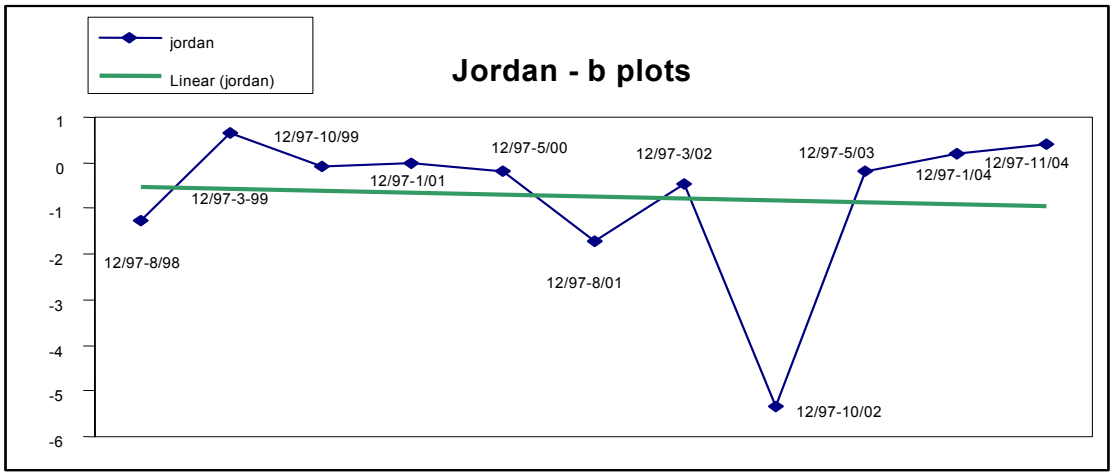

egypt
Linear (egypt)
Egypt - a plots
0.5
0
-0.5
-1
-1.5
-2
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-11/04
12/97-1/04

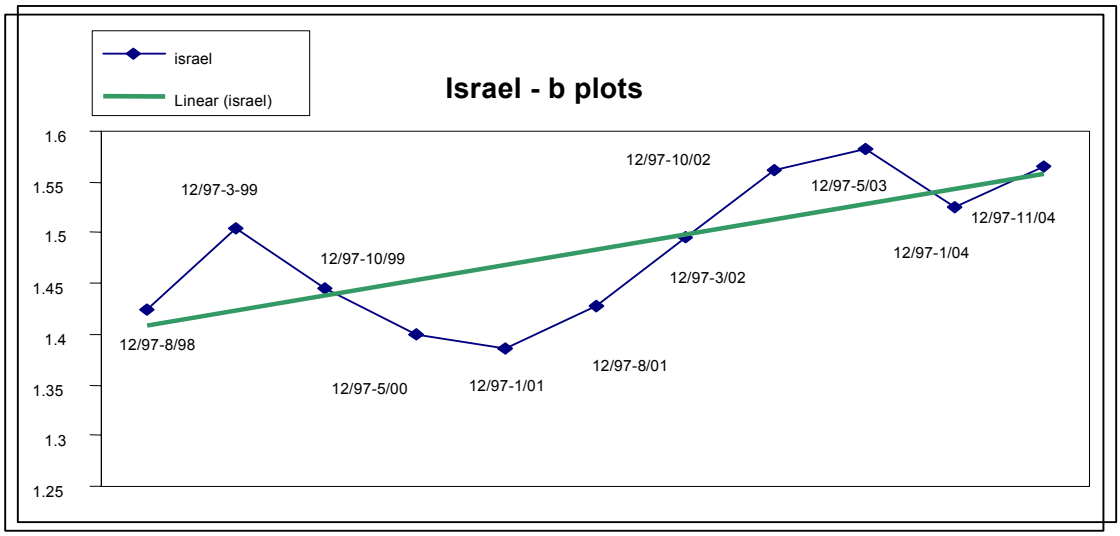
3.2 Integration with the MENA

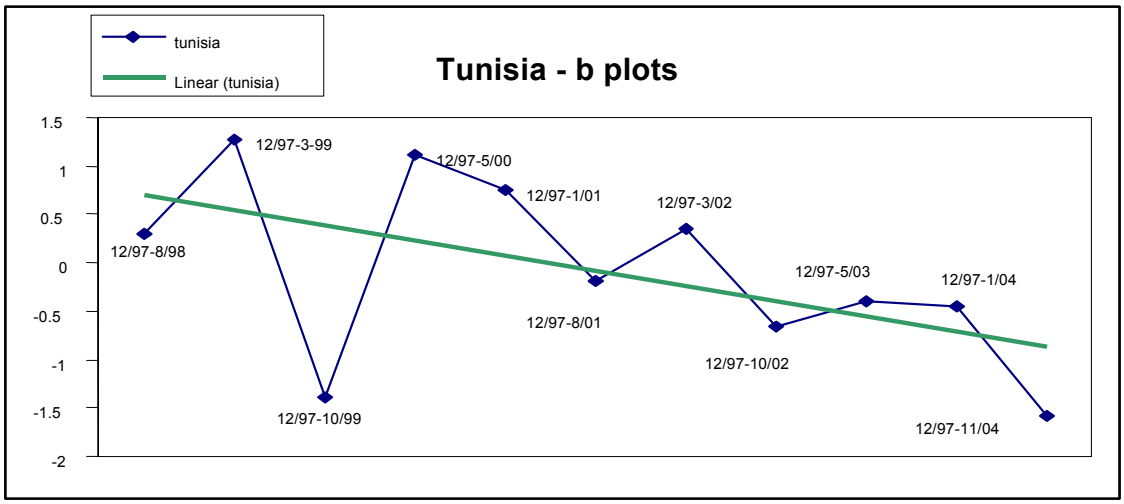


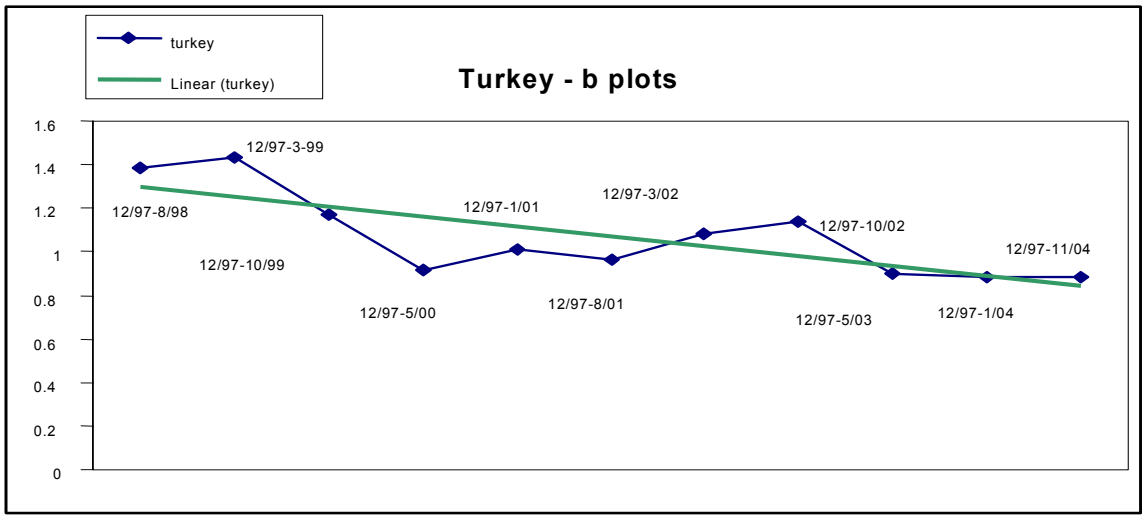


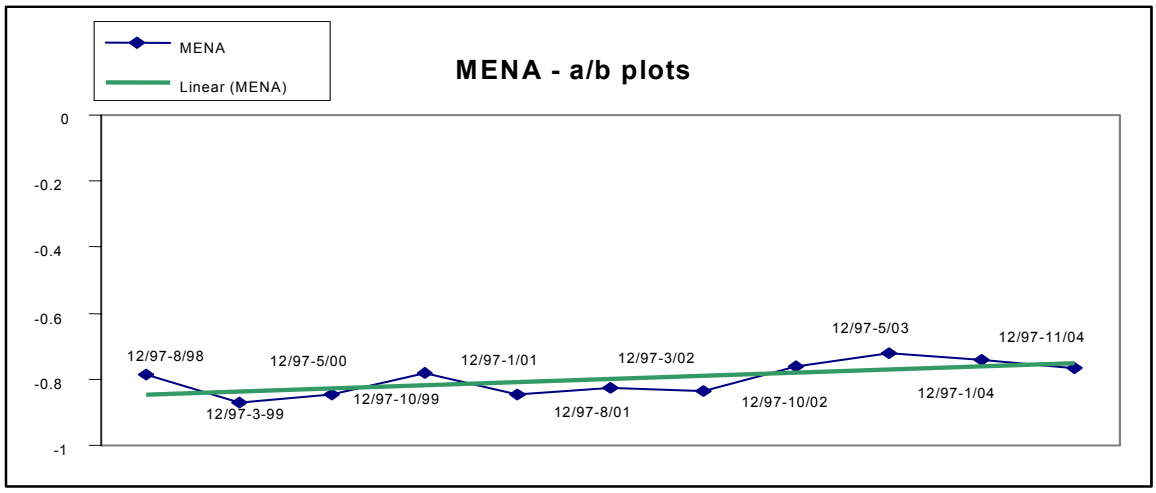



jordan
Linear (jordan)
Jordan - b plots
1
0
-1
-2
-3
-4
-5
-6
12/97-8/98
12/97-3-99
12/97-10/99
12/97-1/01
12/97-5/00
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-1/04
12/97-11/04

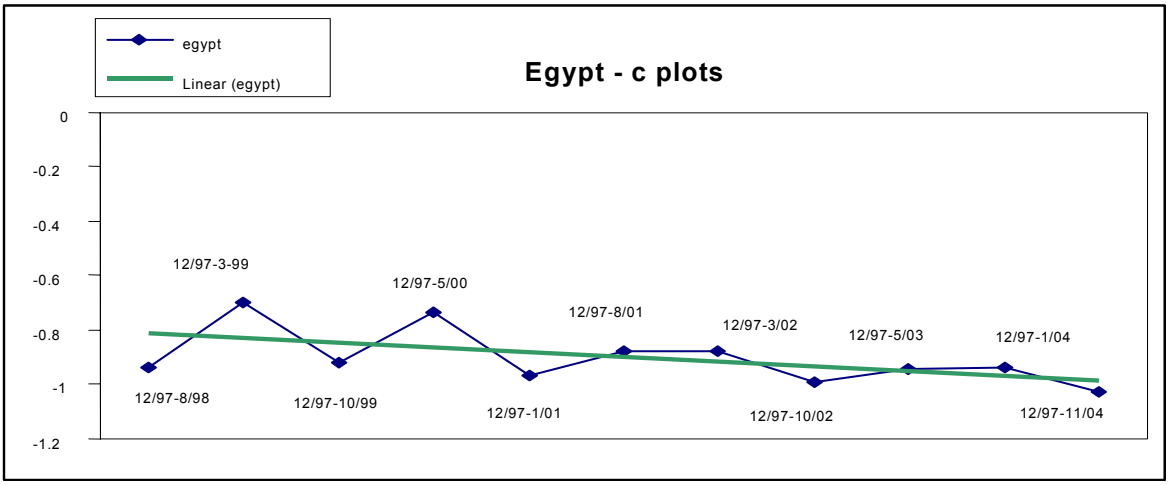

israel
Linear (israel)
Israel - b plots
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-1/04
12/97-11/04

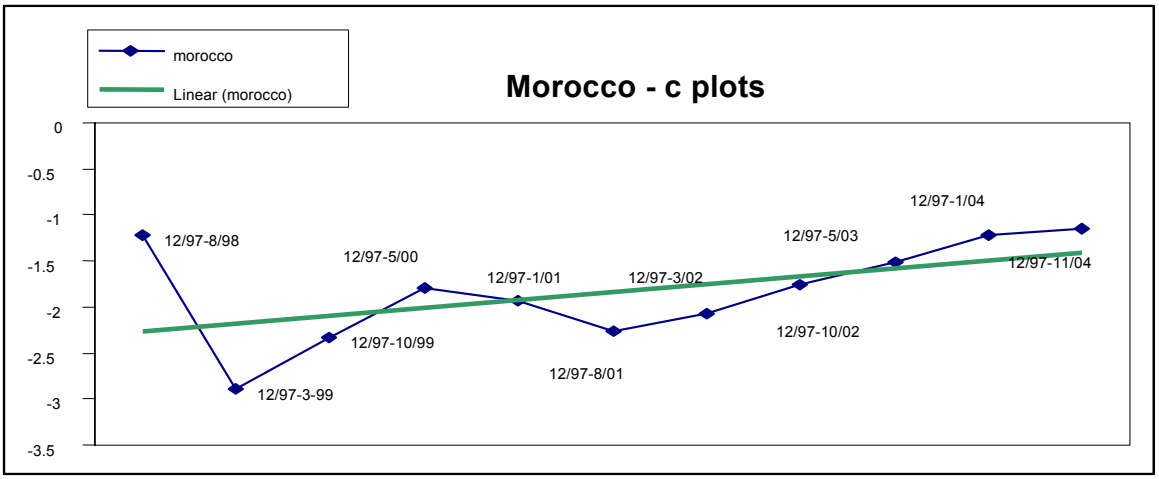

tunisia
Linear (tunisia)
Tunisia - b plots
1.5
1
0.5
0
-0.5
-1
-1.5
-2
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-1/04
12/97-11/04

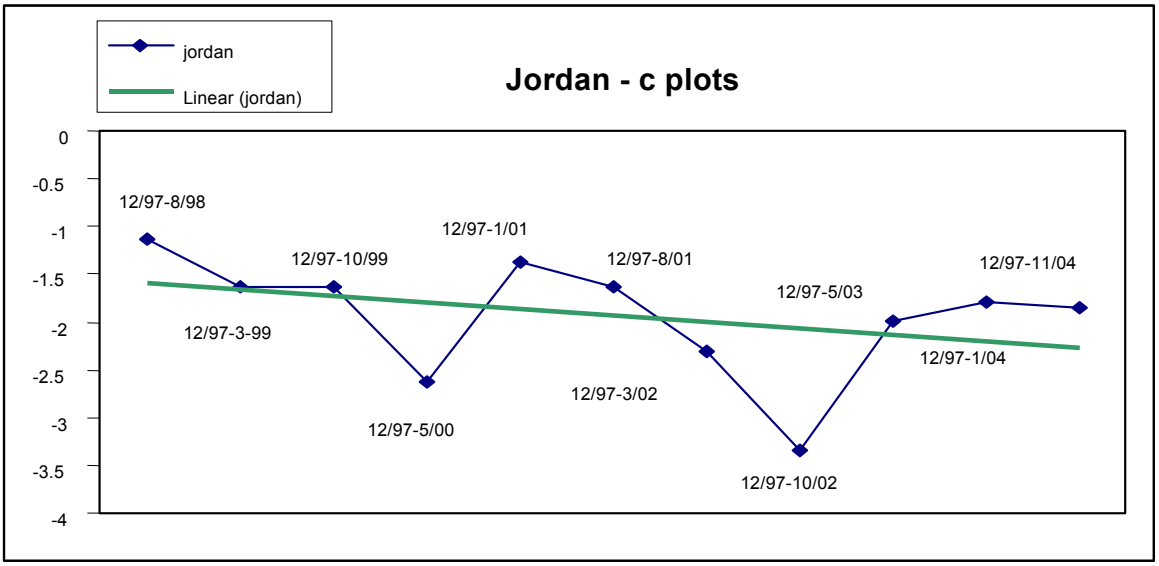

turkey
Linear (turkey)
Turkey - b plots
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-5/03
12/97-10/02
12/97-1/04
12/97-11/04

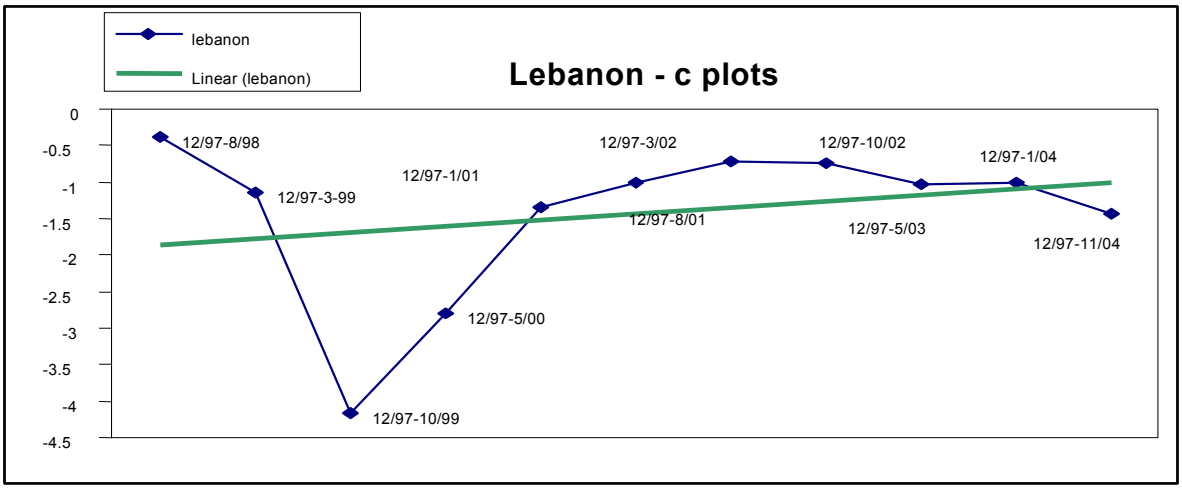

MENA
Linear (MENA)
MENA - a/b plots
0
-0.2
-0.4
-0.6
-0.8
-1
12/97-8/98
12/97-3-99
12/97-5/00
12/97-10/99
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-1/04
12/97-11/04

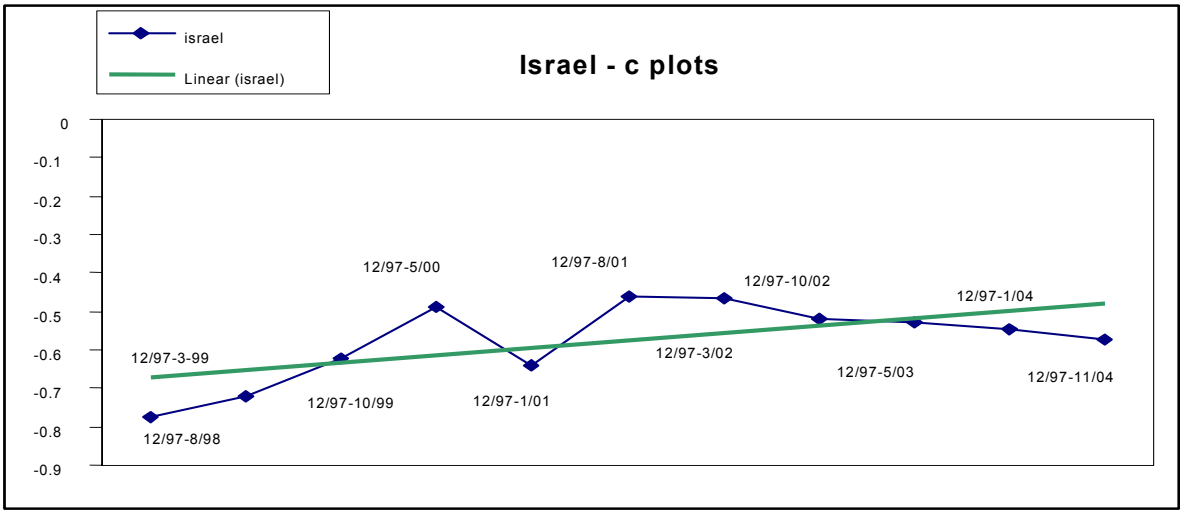
3.3 Integration with the USA

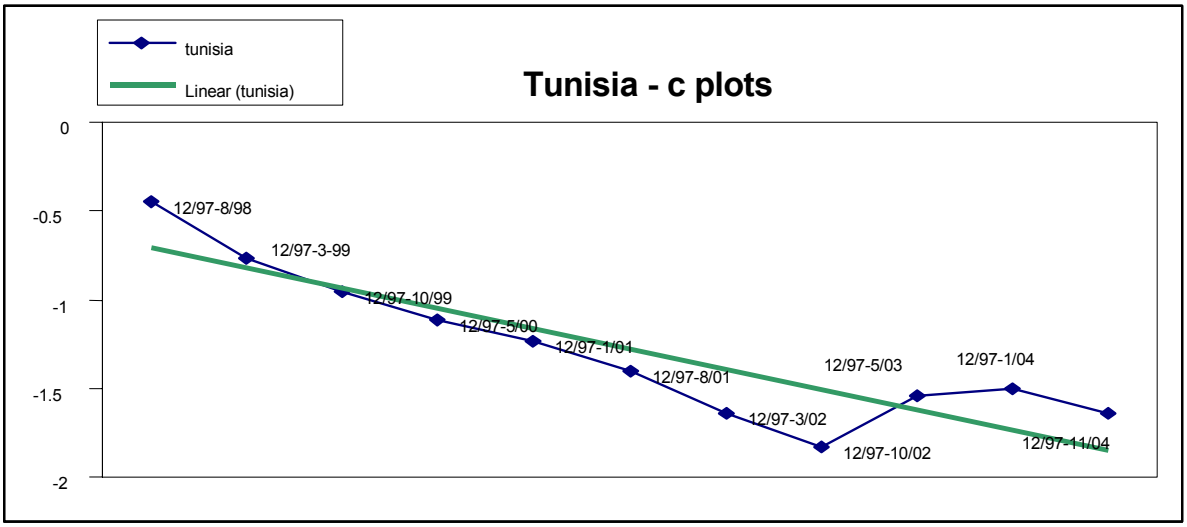


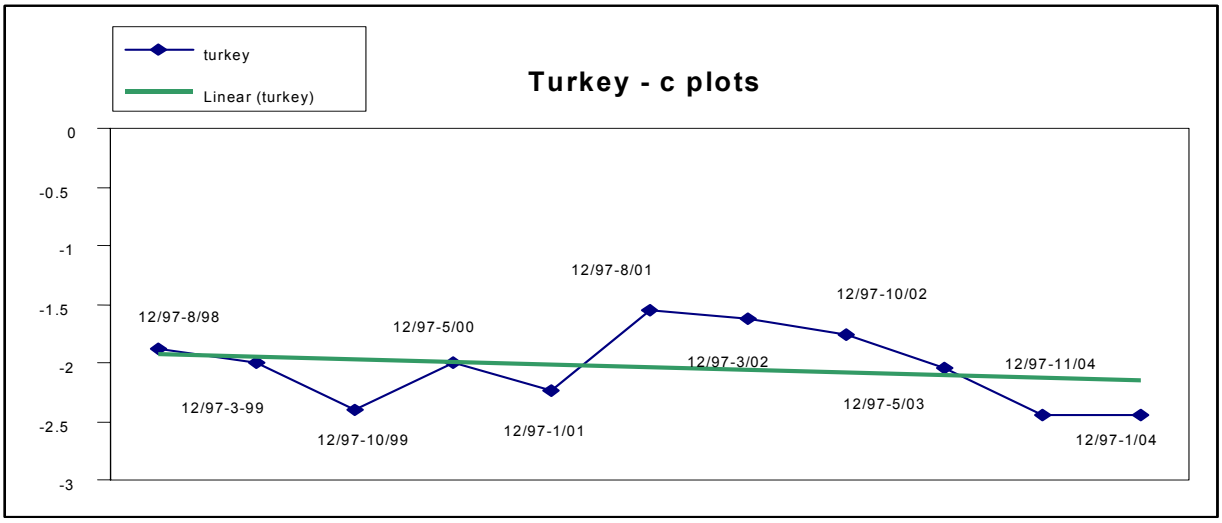





lebanon
Linear (lebanon)
Lebanon - c plots
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
-4.5
12/97-8/98
12/97-3-99
12/97-1/01
12/97-3/02
12/97-10/02
12/97-1/04
12/97-8/01
12/97-5/03
12/97-11/04
12/97-5/00
12/97-10/99


israel
Linear (israel)
Israel - c plots
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
12/97-5/00
12/97-8/01
12/97-10/02
12/97-1/04
12/97-3-99
12/97-3/02
12/97-5/03
12/97-11/04
12/97-10/99
12/97-1/01
12/97-8/98


tunisia
Linear (tunisia)
Tunisia - c plots
0
-0.5
-1
-1.5
-2
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-5/03
12/97-1/04
12/97-3/02
12/97-10/02
12/97-11/04


turkey
Linear (turkey)
Turkey - c plots
0
-0.5
-1
-1.5
-2
-2.5
-3
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
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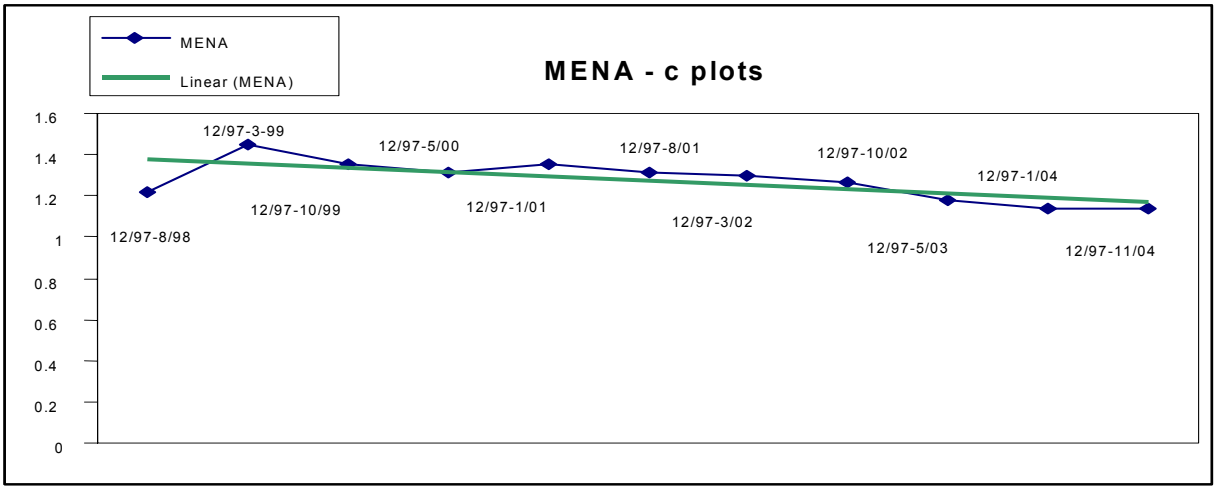
12/97-10/02
12/97-11/04
12/97-1/04


MENA
Linear (MENA)
MENA - c plots
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
12/97-8/98
12/97-3-99
12/97-10/99
12/97-5/00
12/97-1/01
12/97-8/01
12/97-3/02
12/97-10/02
12/97-5/03
12/97-1/04
12/97-11/04

4. Akdogan integration scores around country-specific breaking dates

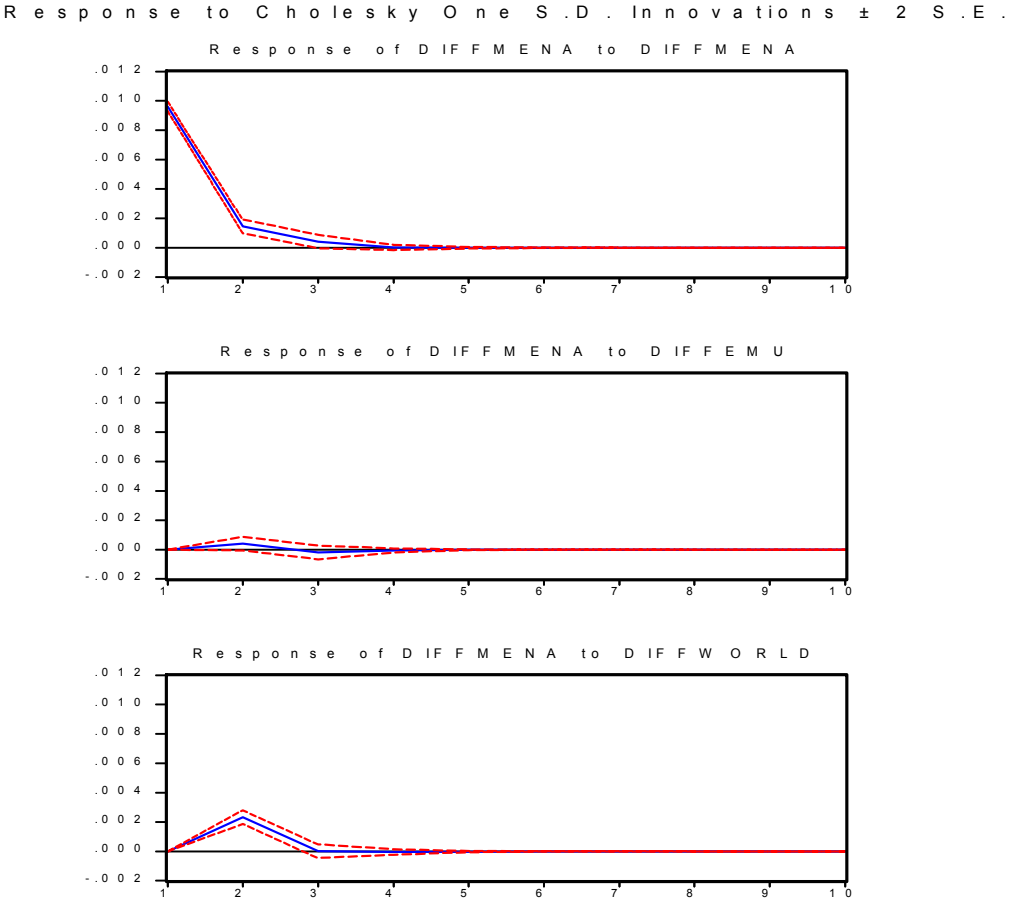
a plots - Integration with the EMU								
Financial Events	**Egypt**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Israel**	**Turkey**	**MENA**
Implementation of the EMU	2.201569	1.516017	-1.97929	-3.59219	1.693424	-0.50758	-0.32372	0.040173
Turkish Crisis	0.257109	-0.58988	0.728845	2.702664	0.134837	-0.86344	0.229337	0.340642
Economic Events								
EuroMed Agreements	-0.82555	0.50374	0.006807	-	-	0.454926	-	-
Agadir Agreements	1.976012	0.296822	1.120184	2.607495	-	-	-	-
Internal Reforms	-0.64135	1.020396	-	-1.13776	2.986531	-	0.101871	-
Political Events								
Beginning of the 2nd Intifada	0.206326	2.544496	2.349604	0.228789	2.986531	-0.12898	0.236886	9.593687
Attacks on the World Trade Center	0.72601	-0.9118	-1.01407	-0.00617	-3.79614	0.712233	-0.49527	0.105149
US invasion of Iraq	-2.19808	-2.24422	-2.76979	-1.55175	1.242212	-0.63334	-0.66809	-47.2802
b plots - Integration with the MENA								
Financial Events	**Egypt**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Israel**	**Turkey**	**MENA**
Implementation of the EMU	0.545892	-0.2253	-1.04476	-0.74121	-0.07256	0.734034	1.10737	-
Turkish Crisis	0.372925	-0.89537	3.516918	-0.18192	3.131041	-0.58227	-0.05831	-
Economic Events								
EuroMed Agreements	-0.16198	-1.21128	2.011448	-	-	0.083152	-	-
Agadir Agreements	-3.68309	0.365595	3.199048	0.113679	-	-	-	-
Internal Reforms	-0.26147	-1.23137	-	0.221862	-1.87396	-0.58227	-0.23803	-
Political Events								
Beginning of the 2nd Intifada	-0.15446	2.213261	-3.49085	2.26064	-1.87396	0.47295	1.10737	-
Attacks on the World Trade Center	-0.11962	1.694076	-3.03999	-1.23374	-0.42362	-0.3656	-1.1623	-
US invasion of Iraq	-0.90523	0.501739	0.000652	-1.32504	0.176319	-0.33294	0.241895	-
c plots - Integration with the USA								
Financial Events	**Egypt**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Israel**	**Turkey**	**MENA**
Implementation of the EMU	3.91508	-0.6588	0.597594	1.140281	0.458978	-0.21129	-4.22533	0.655288
Turkish Crisis	0.570995	-0.68845	-1.35967	-0.06679	-0.45719	0.237957	0.557425	0.864713
Economic Events								
EuroMed Agreements	1.323205	0.676962	0.324836	-	-	-0.53184	-	-
Agadir Agreements	0.16175	0.244391	-0.2779	-0.59888	-	-	-	-
Internal Reforms	-0.75505	0.195793	-	0.332197	0.965842	-	-	-
Political Events								
Beginning of the 2nd Intifada	-0.93451	2.111434	1.095204	0.563214	0.965842	0.325094	3.249061	1.300429
Attacks on the World Trade Center	-0.83545	-1.00105	0.218357	-0.40303	-0.47551	0.244352	-0.50859	0.649956
US invasion of Iraq	-0.45583	0.540982	-2.13261	-1.50672	0.334652	0.000178	-0.19695	0.946514

5. VAR-VECM analysis

5.1 Inter-regional model: Residual Correlation Matrix

	DIFFMENA	DIFFEMU	DIFFWORLD
DIFFMENA	1	0.388834790212195	0.378664668046385
DIFFEMU	0.388834790212195	1	0.360372474987674
DIFFWORLD	0.378664668046385	0.360372474987674	1

5.2 Inter-regional model: Impulse Response Functions



5.3 Intra-regional model: p-values

	TURKEY	EGYPT	ISRAEL	MOROCCO	JORDAN	TUNISIA	LEBANON
TURKEY	0.02415	0.00876	0.00934	0.0051	0.0057	0.00693	0.00722
EGYPT	0.0656*	0.02379	0.02536	0.01385	0.01549	0.01882	0.01961
ISRAEL	0.06234*	0.02261	0.02415	0.01317	0.01472	0.01788	0.01863
MOROCCO	0.11221*	0.0407	0.04339	0.0237	0.0265	0.03219	0.03354
JORDAN	0.1011*	0.03667	0.03908	0.02135	0.02388	0.029	0.03022
TUNISIA	0.08236*	0.02987	0.03184	0.01739	0.01945	0.02363	0.02462
LEBANON	0.07909*	0.02869	0.03057	0.01671	0.01868	0.0227	0.02365

* denotes rejection at the 5% level

5.4 Intra-regional model: Residual Correlation Matrix

	TURKEY	EGYPT	ISRAEL	MOROCCO	JORDAN	TUNISIA	LEBANON
TURKEY	1	0.050872*	0.175887	-0.0214203*	0.08075*	0.000437*	-0.0324552*
EGYPT		1	0.058015*	0.03023866*	0.076166*	0.027889*	-0.0462193*
ISRAEL			1	-0.0649698*	0.05042*	-0.03589*	-0.0124517*
MOROCCO				1	-0.00419*	0.013202*	-0.0110916*
JORDAN					1	0.032144*	0.00248435*
TUNISIA						1	-0.0185156*
LEBANON							1

*denotes acceptance at the 10% level

5.5 Intra-regional model: Impulse Response Functions