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Abstract

The objective of this paper is to study capital market integration in the MENA countries and its implications for an international portfolio investment allocation. Using four co-integration methodologies, we significantly reject the hypothesis of a stable, long run bivariate relationship and between each of these markets and the European Monetary Union, the USA, and a regional benchmark. This indicates the existence of significant diversification opportunities for the three categories of investors. A time-varying analysis based on Barari (2004) suggests that the MENA markets have recently started moving towards international financial integration. They also seem to display heterogeneous reactions to financial, economic and political events, and should therefore not be treated as a block for global allocation purposes. Finally, adjusting these scores by market capitalization highlights that Israel and Turkey are the most promising markets in the region. They are followed by Egypt, Jordan and Morocco, while Tunisia and Lebanon seem to be lagging behind.

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1. Introduction

The decrease of benefits stemming from international portfolio diversification is now well documented. Recent empirical studies have indeed highlighted growing co-movements across developed and emerging financial markets. However, equity market linkages in the Middle East and North Africa (MENA[1]) and their subsequent portfolio implications remain largely under-explored. Having undergone capital markets reforms, these countries are nonetheless emerging on the global financial stage. Taken as a percentage of GDP, market capitalisation is indeed higher in this region (36%) than in Eastern Europe (26%) or Latin America (24%).

Market integration studies in the MENA are scarce and yield contradictory results. Neaime (2001) used weekly data from national stock exchanges in a VAR-VECM model, and found evidence of integration with the world financial markets for a mix of MENA and Gulf Cooperation Council countries. Hakim (2002) focused on the Cairo stock exchange and employed the same data and methodology. He found 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) investigated the relationships of the Istanbul Stock Exchange before and after the Turkish financial crisis, by dividing the dataset into two regimes before carrying as well a VAR-VECM analysis. They found no intra-MENA co-integration, nor evidence for short run linkages, but one co-integrating vector between the Istanbul Stock Exchange and the G7.

This paper extends this literature in the two following ways. First, we use an improved dataset based on a daily single currency homogenized index, and our sample includes all MENA

[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.

countries. Second, we use a comprehensive battery of econometric tests with a special emphasis on portfolio choice.

The rest of the paper is structured as follows. Section 2 presents the data, descriptive statistics and the methodology employed. Section 4 analyses the results, and section 5 draws together our conclusions.

3. Data and Methodology

3.1 Data

Data were obtained from Datastream International. There are several possible variants of MENA stock index: MSCI, IFC, and national indexes in particular. However, the use of a single index is generally recommended for cross-market comparisons, since it provides a homogenized framework. Using a common currency is also preferrable for segmented markets, since it allows the researcher to control for exchange rate variation and inflation trends (Liew, 1995). Taking the point of view of the international investor; our dataset relies therefore on the S&P IFC index, measured in US dollars. We use daily indices ranging from 1/1/1998 to 11/16/2004. The markets are those of Morocco, Tunisia, Egypt, Lebanon, Jordan, Turkey and Israel. However, we use national indices for Tunisia and Lebanon since these countries are not included in the S&P database. Taking into account these countries' trade structure, we investigate equity market integration with respect to the European Monetary Union (EMU), the extended arabic region (i.e the MENA countries plus the Gulf Countries), and the rest of the world. The regional benchmarks are also taken from the S&P IFC database. For the World markets we take the MSCI World Free Index, which proxies for the US stock market. Finally, market capitalization indexes are obtained from the Arab Monetary Fund for individual countries and from MSCI for the regional benchmarks.

3.2 Risk and Returns in the MENA markets

Transforming the series in logarithm difference allows us to report risks and returns information in Table 1.

INSERT TABLE 1 ABOUT HERE

The average daily rate of return for all countries in the sample (0.014%) is lower than the EMU's (0.037%) and than the regional benchmark (0.036%), but higher than the rest of the world's (0.009%). Turning to measures of risk, the sample's average standard deviation (1.44%) is also lower than the EMU's (1.75%) but higher than the rest of the world's (0.96%). The Jarque-Bera tests reject the hypothesis of normality in all markets. The world and the EMU are left-skewed. By contrast, the unconditional distribution of returns is rigth-skewed in Egypt, Jordan, Lebanon and Morocco. In left-skewed countries (Israel, Tunisia and Turkey), the coefficient is inferior to those of the benchmarks.

In most countries, market performance as measured by Sharpe and Jensen ratios is lower than in the EMU, but higher than in the rest of the world. Lebanon and Morocco are exceptions. This might be due to the fact that these two countries display negative mean returns (along with Turkey). On the other end of the spectrum, we find the highest returns in Jordan and Tunisia (0.045%). These are followed by Israel (0.035%) and Egypt (0.015%).

Overall, these results seem to suggest that the MENA stock markets are rather volatile and promise relatively high returns, in accordance with the emerging markets literature (Bekaert and Harvey, 1995; Harvey, 1995, Goetzamann and Jorion, 1999).

3.2 Empirical Methodology

We adopt a three steps empirical methodology. First, we first use a variety of bi-variate co-integration techniques between the stock markets and the international benchmarks in order to check whether the presence of a stable, long run relationship offsets the benefits stemming from international diversification. Second, we investigate the time varying nature of equity market integration through a recursive and event-based analysis of an extended version of the Akdogan (1996) financial integration score. Third, we adjust the latter by market capitalisation ratios in order to assess the portfolio allocation implications of market integration.

3.2.1 Co-integration analysis

The Johansen & Juselius (1988) co-integration analysis is now a standard methodology that can be easily implemented as long as the investigated series have a unit root and are I(1) processes. However, recent advances in econometric theory have further refined the concept of co-integration. In order to fully assess the presence of common stochastic processes in our sample, we thus complement the Johansen analysis with three alternative techniques.

The first of these techniques is Gregory-Hansen (1996) residual based co-integration analysis. Results of Monte Carlo experiments (Campos, Ericcson, and Hendry (1996) and Gregory and Hansen (1996)) have shown 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. The Gregory-Hansen test therefore 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 alternative. First, a *level* shift model allows for the change in the intercept only (C):

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

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

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

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

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

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

$$\varphi t \tau = [0, t \le n\tau]; [1, t > n\tau] \qquad 4.$$

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 and PP 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.

The second technique is the stochastic co-integration analysis of Harris, McCabe and Leybourne (2002). It is based on the observation that bond and stock market prices are often too volatile to be compatible with a I(0)/I(1) framework. The stochastic cointegration procedure therefore replaces the stationarity requirement of first difference in individual series with a looser condition that these are simply free of I(1) stochastic trend terms. Accordingly, this approach induces a non linear form of heteroscedasticity that fits those of the data by giving rise to a volatile behaviour, both in the first differences of individual series and in the co-integrating error term. The procedure is based on nested hypotheses. First, it tests the null of stochastic co-integration against the alternative of no co-integration. Then, within stochastic co-integration, it tests the null of stationary co-integration against the heteroscedastic alternative. The analysis thus begins with the following regression model:

$$y_t = \alpha + k_t + x'_t \beta + \mu_t \qquad 5.$$

$$u_t = e_t + q' w_t + v'_t w_t \qquad 6.$$

Where the regression error term μ_t is composed of a stationary term e_t, an integrated term $q' w_t$ and a heteroscedastic component $v_t' w_t$. Testing the null hypothesis of stochastic co-integration against the alternative of no co-integration requires testing whether $q = 0$ in (3b). The null hypothesis is composite and encompasses both stationary and heteroscedastic co-integration. In

order to eliminate nuisance parameters from the distribution of the partial sum process $\{\mu_t\}$, the test is based on the statistic:

$$S_{NC} = \sum_{t=k+1}^{T} \mu_t \mu_{t-k} \qquad 7.$$

Where the lag k is allowed to increase with T. S_{NC} is asymptotically N(0,1). Then, if stochastic co-integration is established, H^0 can be decomposed into the null of stationary co-integration against the heteroscedastic alternative by considering:

$$u_t = e_t + \nu'_t \, w_t \qquad 8.$$

Where under the null $V(\nu_t) = 0$.

The N(0,1) distributed statistic is based on:

$$S_{HC} = \sum_{t=1}^{T} t\mu_t^2 \qquad 9.$$

The third approach of co-integration that we use is based on Bierens' (1997) criticism of traditional co-integration methodologies, which have the disadvantage of constructing test statistics that require the specification of the short-run dynamics or the estimation of nuisance parameters. We therefore also implement Breitung's (2001) tests for non-parametric co-integration. The process is as follows. Let $\{y_t\}_1^T$ be an observed time series that can be decomposed as $y_t = \mu_t + x$, where $\mu_t = E[y(t)] = \delta' d_t$ is the deterministic component modeled as a linear combination of a vector of nonrandom regressors d_t. Typical components of d_t are a constant, a time trend or dummy variables. Assuming a nonzero mean of the form $d_t = \delta' z_t$, y_t is regressed on z_t and the residuals $\hat{\mu}_t = y_t - \hat{\delta}' z_t$ are used to form the variance ratio statistic:

$$\hat{\Phi}_T = \frac{T^{-1}\sum_{t=1}^{T}\hat{U}_t^{\,2}}{\sum_{t=1}^{T}\hat{\mu}_t^2} \qquad 10.$$

Where $\hat{U}_t = \mu_1 + ... + \hat{\mu}_t$. Critical values are then simulated to test the null that y_t is $I(1)$ against the alternative $y_t \approx I(0)$.

3.2.2. Time-varying linkages analysis

Turning to the time-varying evolution of stock market linkages, our methodology is based on a computation of the individual countries' contribution to global and regional systematic. Following Akdogan (1996,1997) and Barari (2004), we consider the following international risk decomposition model:

$$R_i = \alpha + \beta R_g + \varepsilon_I \qquad 11.$$

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. The variance of the i^{th} country's portfolio can then be decomposed into:

$$Var(R_i) = \beta^2 Var(R_g) + Var(\varepsilon_I) \qquad 12.$$

$$\frac{VarR_i}{VarR_i} = \frac{\beta^2 VarR_g}{VarR_i} + \frac{Var\varepsilon_i}{VarR_i} \qquad 13.$$

$$1 = p_i + q_i \quad (14)$$

In equation (4), p_i measures the country's contribution to worldwide systemic risk and is the proposed measure of market integration. In order to fit our study's purpose, we extend this methodology to the following multivariate framework:

$$R_i = \alpha + \beta_1 U_1 + \beta_2 U_2 + \beta_g R_g + \varepsilon_i \quad (15)$$

Where U_1 and U_2 are residuals from the following regressions:

$$R_{mena} = \alpha + \beta R_g + U_1 \quad (16)$$

$$R_{UE} = \alpha + \beta R_g + U_2 \quad (17)$$

The variance of R_i can be then decomposed as:

$$VarR_i = \beta_1{}^2 VarU_1 + \beta_2{}^2 Var(U_2) + \beta_g VarR_g \quad (18)$$

$$\frac{VarR_i}{VarR_i} = \frac{\beta_1{}^2 VarU_1}{VarR_i} + \frac{\beta_2{}^2 VarU_2}{VarR_i} + \frac{\beta_g{}^2 VarR_g}{VarR_i} \quad (19)$$

$$1 = a + b + c + d \quad (20)$$

Where *a, b* and *c* measures integration with the EMU, the MENA and the World, respectively. *d* represents unsystematic risk. In order to observe the dynamics equity market integration, we compute each of these integration score score over incremental time windows, adding 80 observations at each iteration until the end of the sample is reached. We also analyze the impact

of financial events, trade liberalization, infrastructure privatisation and political shocks with a simple moving average methodology. Using each considered event as a breaking point, we divide the dataset into two sub-periods and observe the sign of the difference between the post and pre event integration scores. A positive sign suggests integration, a negative sign suggests segmentation.

INSERT TABLE 5 ABOUT HERE

3.2.3 Portfolio Allocation Implications

Weak integration does not necessarily implies the existence of diversification opportunities if the markets are thinly traded. Following Akdogan (1996), we adjust each score by the corresponding measure of country contribution to capitalization in the benchmark area. The lower the contribution to systemic risk relative to compared market capitalisation, the higher the diversification benefits. The three underneath adjusted financial integration indicators are therefore negatively proportional to diversification benefits:

$$adja_i = \frac{\beta_1^{\,2} VarU_1}{VarR_i} \Big/ W_{iEMU} \quad W_{iEMU} = \frac{MCi}{MC_{EMU}} \tag{21.}$$

$$adjb_i = \frac{\beta_2^{\,2} VarU_2}{VarR_i} \Big/ W_{iMENA} \quad W_{iMENA} = \frac{MC_i}{MC_{MENA}} \tag{22.}$$

$$adjc_i = \frac{\beta_g^{\,2} VarR_g}{VarR_i} \Big/ W_{iUS} \quad W_{iUS} = \frac{MC_i}{MC_{US}} \tag{23.}$$

4. Results and Analysis

After the usual unit root analysis, all series being characterized as I(1) processes, we proceed to our co-integration tests. The null hypothesis of co-integration with the EMU, the World markets and the local regional benchmark is significantly rejected for all countries. By giving no evidence of a stable, long run relationship between the MENA stock markets and the various international benchmarks, this results clearly indicates that the studied markets provide some potential for international diversification.

INSERT TABLE 2 ABOUT HERE

Turning to the dynamic of the linkages, the recursive analysis reveals that although segmentation from MENA benchmark seem to increase for most countries (Egypt, Jordan, Morocco, Tunisia and Lebanon), the process of segmentation vis à vis the EMU is stabilised in Jordan (since 2000) as well as in Turkey and Tunisia (since 2001). Besides, the process of financial integration towards the EMU seems to have already begun for Israel and Lebanon (since 2001), Egypt (since 2002), and Morocco (since 2003). Moreover, with the exception of Jordan and Tunisia , our plots display a growing integration to the world for most countries: Morocco, Lebanon and Turkey (since 1999), and Egypt (since 2001). In the absence of common stochastic processes, evidence in favour of financial integration does not threatens the benefits derived from international diversification in the MENA. It should rather be seen as reflecting these market's gradual maturation through intensified international linkages.

INSERT CHART 1 ABOUT HERE

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Results from the moving average analysis help us to analyze the impact of financial events, trade liberalization, infrastructure privatizations and political shocks on this emerging integration process. Taking place at the beginning of the study period, the implementation of the Euro as the EMU's common currency does not seem to have impacted on financial integration. Occurring slightly later, the Turkish crisis seems on the contrary to have reinforced both intra-regional and global linkages. This result suggests that growing markets become increasingly sensitive to external financial shocks. However it does not say whether this can be attributed to contagion or interdependance. Turning to real economic news, both trade liberalization agreements and infrastructure privatization programs seem to have reinforced financial integration with the world markets, highlighting the relationship between real and financial integration. Finally, the successive increases of political risk in the region seem to have had a contrasted impact, as they appear to have led concomitantly to integration towards the world and the regional markets, but to segmentation from the EMU. This divergence might highlight the possible co-existence of multiple perceptions of political risk among categories of investors.

Overall, the moving average analysis suggests that the MENA markets display sensitivity to financial, economic and political events. However, this sensitivity seems to take different forms. Investors should therefore avoid to treat these markets homogeneously for global allocation purposes.

Finally, in order to assess country diversification potential, we observe the adjusted integration scores from the point of view of EMU, World and MENA investors. This permits us to rank the MENA countries in function of the expected diversification potential. We find that countries are ranked in a very similar way for all three categories of investors. A head group of countries gathers Israel and Turkey. A second group is constituted of Egypt, Morocco and Jordan. Finally, the third and least advantageous group is constituted of Tunisia and Lebanon. Portfolio choice differences among investors are only minor: Turkey seems preferrable to Israel for MENA investors, and Tunisia to Lebanon for EMU investors.

INSERT TABLE 2 ABOUT HERE

INSERT TABLE 3 ABOUT HERE

INSERT TABLE 4 ABOUT HERE

4. Conclusion

The objective of this paper was to study equity market integration of the MENA countries with an emphasis on international portfolio investment allocation. Using four co-integration methodologies, we significantly rejected the hypothesis of a stable, long run bivariate relationship and between each of these markets and the European Monetary Union, the USA, and a regional benchmark. This indicated the existence of significant diversification opportunities for the three categories of investors. A time-varying analysis based on Barari (2004) suggested that the MENA markets have recently started moving towards international financial integration. They also seem to display heterogeneous reactions to financial, economic and political events, and should therefore not be treated as a block for global allocation purposes. Finally, adjusting these scores by market capitalization highlighted that Israel and Turkey are the most appealing markets in the region. They are followed by Egypt, Jordan and Morocco, while Tunisia and Lebanon seem to be lagging behind.

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Table 1 Descriptive Statistics

The market	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Jensen ratios	Sharpe Ratios
EGYPT	0.0155	0	6.819	-6.052	1.322	0.199	6.829	1108.43	-0.021	-0.072
ISRAEL	0.0356	0	6.454	-7.717	1.289	-0.190	6.159	757.15	-0.004	-0.069
JORDAN	0.0456	0	8.481	-8.344	0.879	0.532	17.875	16625.67	-0.015	-0.109
LEBANON	-0.0343	0	6.417	-5.527	1.128	0.421	7.143	1336.30	-0.028	-0.162
MENA	0.0368	0.083	5.054	-7.248	1.000	-0.991	9.858	3809.66	-0.004	-0.068
MOROCCO	-0.0015	0	5.029	-3.983	0.678	0.792	12.463	6881.71	-0.023	-0.191
TUNISIA	0.0455	0	15.022	-16.592	1.080	-1.599	80.659	451580.70	-0.017	-0.109
TURKEY	-0.0079	0	22.669	-27.022	3.741	-0.009	8.499	2260.53	-0.01	-0.04
WORLD	0.00	0.057	4.603	-3.985	0.967	-0.063	4.631	200.091	-	-0.125
EMU	0.037	0.0352	8.022	-10.550	1.757	-0.437	5.924	696.55	-0.001	-0.052

Note: Jensen and Sharpe ratios are calculate using the US T-Bill montly rate as a proxy for the risk-free rate. The world market is the reference market for Jensen ratios.

Table 2 Moving Average Analysis: Selected Events

Financial Events		Trade Liberalization		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		

Note: Financial events are the Turkish crisis and the implementation of the EMU. Turning to trade liberalization, we adopt a '*de jure*' approach that relates modifications in the legal system rather than actual economic changes. This is done in order to capture possible market anticipations. In all countries, we considered the dates where the Euro-Mediterranean Association Agreements entered into force – except for 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 considered the initialling of the Agadir agreements in January 2003, which created a free trade area between Egypt, Tunisia, Jordan and Morocco. Turning to infrastructure privatization announcements, the selected dates coincide with those published in the World Bank-European Commission 'Private Participation on Mediterranean Infrastructure' review. These dates vary for different countries. For Morocco, it corresponds to the renewal of a privatisation program which was launched in 1993 and comprised most infrastructures sectors but electricity. For Lebanon, it corresponds to the adoption of the May 2000 Privatisation Law which established a Higher Privatization Council and setted the framework for the privatisation of state owned enterprises. For Turkey, it corresponds to the adoption of a strategic law for privatisations in the telecom, airline and electricity sectors. For Jordan, it corresponds to the adoption of the 'economic priority program' which extended previous privatisation to the water and energy sectors. For Egypt, it correspond to the adoption of the 'new privatisation strategy' which officially aimed at attracting domestic and foreign funds for investment. For Tunisia, it corresponds to a series of 26 privatisations, mainly in the construction sector. For Israek, it corresponds tothe privatisation of the national airline El Al Finally, political events include the beginning of the second Intifada in September 2000, the 2001 World Trade Centre Attacks, and the invasion of Iraq in March 2003.

Table 3 Cointegration Analysis Results

Country	Benchmark	Johansen	Gregory-Hansen	Stochastic HML	Breitung NP
Egypt	MENA	11.32**	-3.50**	6.37**	78.46**
	EMU	10.16**	-2.84**	5.54**	78.09**
	WORLD	12.89**	-3.48**	5.97**	80.93**
Israel	MENA	5.51**	-2.84**	4.19**	114.67**
	EMU	7.72**	-3.76**	5.34**	109.83**
	WORLD	5.31**	-2.84**	5.35**	119.55**
Jordan	MENA	11.97**	-3.25**	5.64**	170.33**
	EMU	11.80**	-3.58**	5.28**	190.92**
	WORLD	8.22**	-3.77**	4.62**	101.83**
Morocco	MENA	9.26**	-4.01**	5.79**	78.79**
	EMU	12.20**	-4.11**	5.64**	78.53**
	WORLD	11.68**	-4.00**	4.67**	85.69**
Tunisia	MENA	3.96**	-2.95**	5.27**	67.91**
	EMU	3.75**	-3.05**	5.45**	75.02**
	WORLD	10.21**	-4.81**	5.45**	90.04**
Lebanon	MENA	4.53**	-3.87**	5.19**	73.33**
	EMU	6.14**	-3.53**	5.23**	73.84**
	WORLD	7.69**	-3.97**	4.13**	87.47**
Turkey	MENA	5.39**	-4.04*	4.80*	127.43**
	EMU	7.97**	-4.58*	5.59*	122.13**
	WORLD	15.79*	-4.72*	5.13*	199.48**

Table 4 Integration with the EMU

Date	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Turkey**
21/04/1998	3,505	1,871	4,082	1,218	5,844	1,748	1,332
11/08/1998	1,220	1,273	1,463	0,661	6,303	1,429	2,562
01/12/1998	2,053	3,121	4,285	1,603	3,920	2,867	4,117
23/03/1999	2,356	3,001	4,179	1,670	2,365	1,766	3,713
13/07/1999	1,772	2,509	3,921	1,628	1,738	1,097	3,386
02/11/1999	0,966	2,137	3,007	1,926	1,681	0,664	2,620
22/02/2000	1,056	1,684	2,945	2,077	1,287	0,659	2,146
13/06/2000	1,056	1,684	2,945	2,077	1,287	0,659	2,146
03/10/2000	1,632	0,691	2,004	2,064	0,381	0,679	1,715
23/01/2001	2,189	0,504	2,237	2,347	0,174	0,999	1,231
15/05/2001	2,868	0,508	2,418	2,514	0,114	1,651	1,383
04/09/2001	3,275	0,498	2,407	2,456	0,111	2,121	1,550
25/12/2001	3,016	0,488	2,367	2,187	0,106	2,168	1,460
16/04/2002	1,422	0,581	2,334	1,664	0,159	1,375	1,347
06/08/2002	0,844	0,652	2,423	1,277	0,245	0,959	1,104
26/11/2002	0,708	0,721	2,395	1,093	0,310	0,843	1,102
18/03/2003	0,657	0,743	2,415	1,047	0,338	0,829	1,132
08/07/2003	0,620	0,846	2,462	1,083	0,393	0,817	1,076
28/10/2003	0,667	0,951	2,347	1,241	0,452	0,867	1,104
17/02/2004	0,763	1,033	2,111	1,438	0,512	0,958	1,228
08/06/2004	0,894	1,130	2,083	1,704	0,590	1,105	1,389
28/09/2004	0,946	1,210	1,965	1,821	0,645	1,169	1,544
16/11/2004	0,971	1,281	1,909	1,923	0,680	1,223	1,629
Mean	**1,542**	**1,266**	**2,639**	**1,683**	**1,289**	**1,246**	**1,827**
Wi	**0,006**	**0,013**	**0,002**	**0,003**	**0,001**	**0,001**	**0,014**
Adjusted	**244,354** *(3)*	**100,023** *(1)*	**1646,967** *(5)*	**564,715** *(4)*	**2190,690** *(6)*	**2394,558** *(7)*	**126,338***(2)*

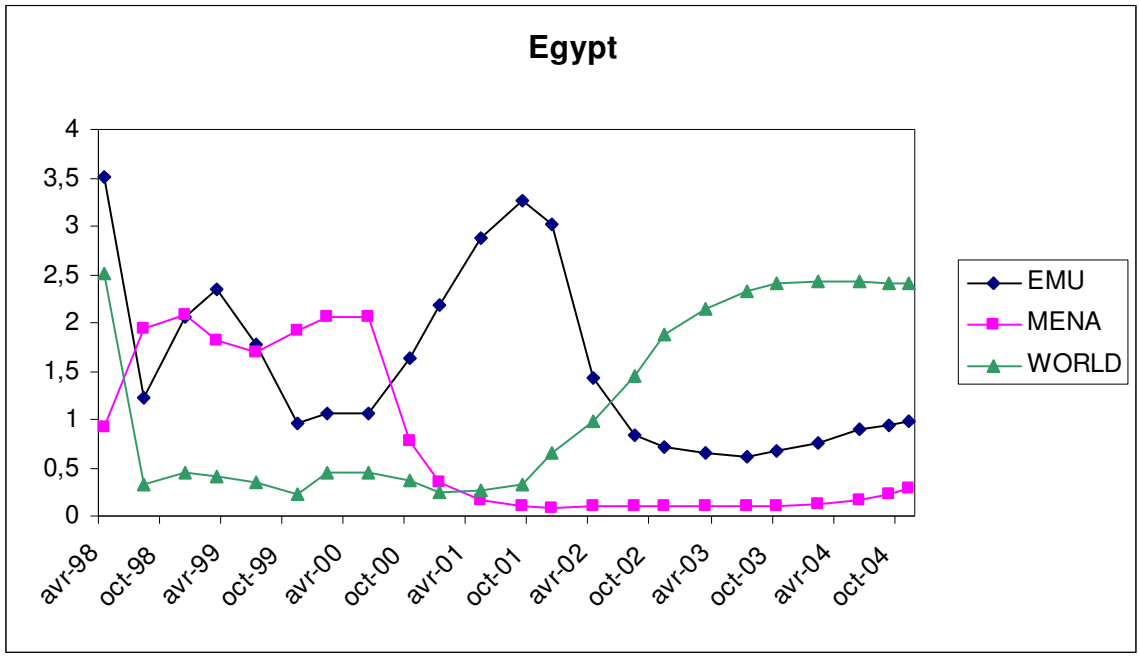
Table 5 Integration with the MENA

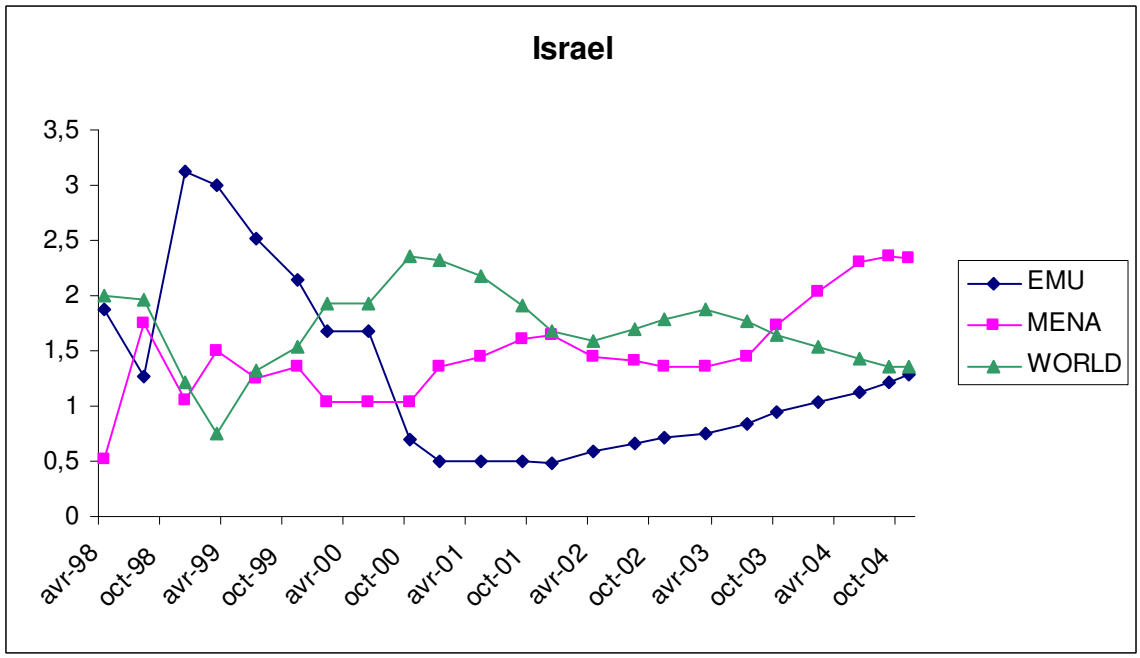
Date	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Turkey**
21/04/1998	0,920	0,525	1,545	0,487	3,214	1,964	0,672
11/08/1998	1,940	1,746	1,772	0,994	10,659	2,985	0,773
01/12/1998	2,084	1,057	2,266	1,418	5,252	3,269	0,291
23/03/1999	1,812	1,497	2,639	2,199	2,562	2,566	0,405
13/07/1999	1,693	1,245	2,653	2,179	1,601	1,573	0,426
02/11/1999	1,923	1,352	2,716	1,952	0,590	1,594	0,538
22/02/2000	2,058	1,042	2,620	2,058	0,434	1,554	0,458
13/06/2000	2,058	1,042	2,620	2,058	0,434	1,554	0,458
03/10/2000	0,782	1,043	0,976	1,464	0,558	1,066	0,367
23/01/2001	0,342	1,355	0,617	0,927	1,009	0,674	0,547
15/05/2001	0,173	1,454	0,517	0,768	1,512	0,323	0,466
04/09/2001	0,099	1,603	0,526	0,577	1,615	0,194	0,363
25/12/2001	0,078	1,640	0,519	0,476	1,674	0,152	0,313
16/04/2002	0,110	1,452	0,508	0,474	1,245	0,197	0,331
06/08/2002	0,108	1,415	0,502	0,406	1,210	0,198	0,326
26/11/2002	0,104	1,356	0,508	0,357	1,157	0,199	0,312
18/03/2003	0,098	1,351	0,516	0,338	1,221	0,195	0,310
08/07/2003	0,093	1,446	0,518	0,342	1,314	0,193	0,292
28/10/2003	0,097	1,738	0,585	0,426	1,633	0,198	0,261
17/02/2004	0,120	2,044	0,772	0,580	1,956	0,214	0,257
08/06/2004	0,160	2,303	0,909	0,791	2,264	0,277	0,254
28/09/2004	0,234	2,359	1,079	1,041	2,423	0,404	0,270
16/11/2004	0,289	2,334	1,161	1,120	2,486	0,465	0,284
Mean	**0,755**	**1,496**	**1,263**	**1,019**	**2,088**	**0,957**	**0,390**
W	**0,167**	**0,397**	**0,051**	**0,095**	**0,019**	**0,016**	**0,438**
Adjusted	**4,5145** *(3)*	**3,763** *(2)*	**24,801** *(5)*	**10,716** *(4)*	**112,447** *(7)*	**59,810** *(6)*	**0,891** *(1)*

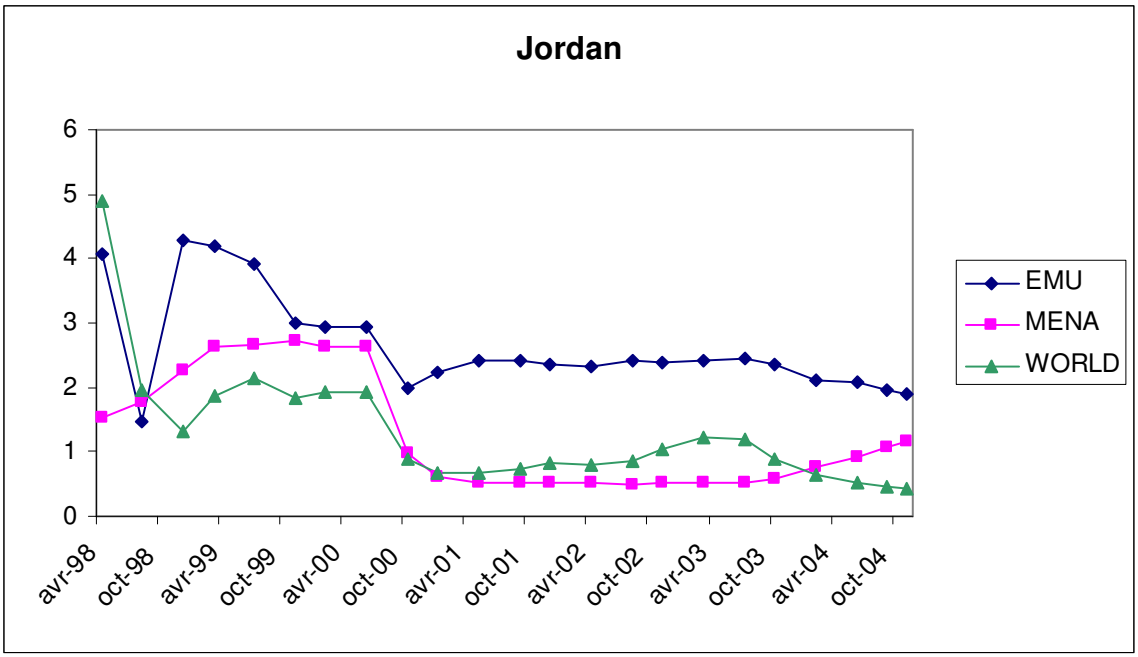
Table 6 Integration with the World

	Egypt	Israel	Jordan	Morocco	Tunisia	Lebanon	Turkey
21/04/1998	2,515	1,998	4,886	2,602	7,591	1,950	0,251
11/08/1998	0,331	1,962	1,946	2,296	5,481	0,837	0,537
01/12/1998	0,440	1,213	1,312	0,961	1,354	0,895	0,849
23/03/1999	0,400	0,754	1,861	1,226	1,573	0,314	0,125
13/07/1999	0,338	1,324	2,139	1,211	1,998	0,141	0,327
02/11/1999	0,224	1,531	1,830	1,416	2,034	0,096	0,525
22/02/2000	0,449	1,928	1,941	1,706	2,560	0,139	1,713
13/06/2000	0,449	1,928	1,941	1,706	2,560	0,139	1,713
03/10/2000	0,369	2,365	0,875	1,437	3,564	0,138	3,055
23/01/2001	0,247	2,326	0,682	1,151	3,448	0,125	3,050
15/05/2001	0,257	2,182	0,685	1,105	2,534	0,138	3,378
04/09/2001	0,329	1,918	0,741	1,090	1,921	0,176	3,997
25/12/2001	0,644	1,673	0,820	1,288	1,324	0,343	4,988
16/04/2002	0,976	1,597	0,804	1,383	1,118	0,473	4,770
06/08/2002	1,439	1,697	0,842	1,576	1,040	0,690	4,625
26/11/2002	1,871	1,783	1,052	1,856	1,016	0,964	3,913
18/03/2003	2,148	1,867	1,233	2,004	1,047	1,126	3,397
08/07/2003	2,335	1,770	1,202	2,073	1,014	1,231	3,336
28/10/2003	2,418	1,649	0,893	2,090	0,966	1,277	3,278
17/02/2004	2,429	1,532	0,655	2,091	0,942	1,271	3,230
08/06/2004	2,424	1,425	0,534	2,073	0,926	1,261	3,213
28/09/2004	2,404	1,360	0,462	2,051	0,904	1,257	3,185
16/11/2004	2,398	1,353	0,435	2,048	0,900	1,257	3,180
Mean	**1,210**	**1,702**	**1,294**	**1,671**	**2,079**	**0,706**	**2,636**
W	**0,002**	**0,004**	**0,000**	**0,001**	**0,000**	**0,000**	**0,004**
Adjusted	**641,830** *(3)*	**450,271** *(1)*	**2716,274** *(5)*	**1885,465** *(4)*	**11909,526** *(7)*	**4653,529** *(6)*	**613,111** *(2)*

Charts 1 to 7: Time-varying Market Integration



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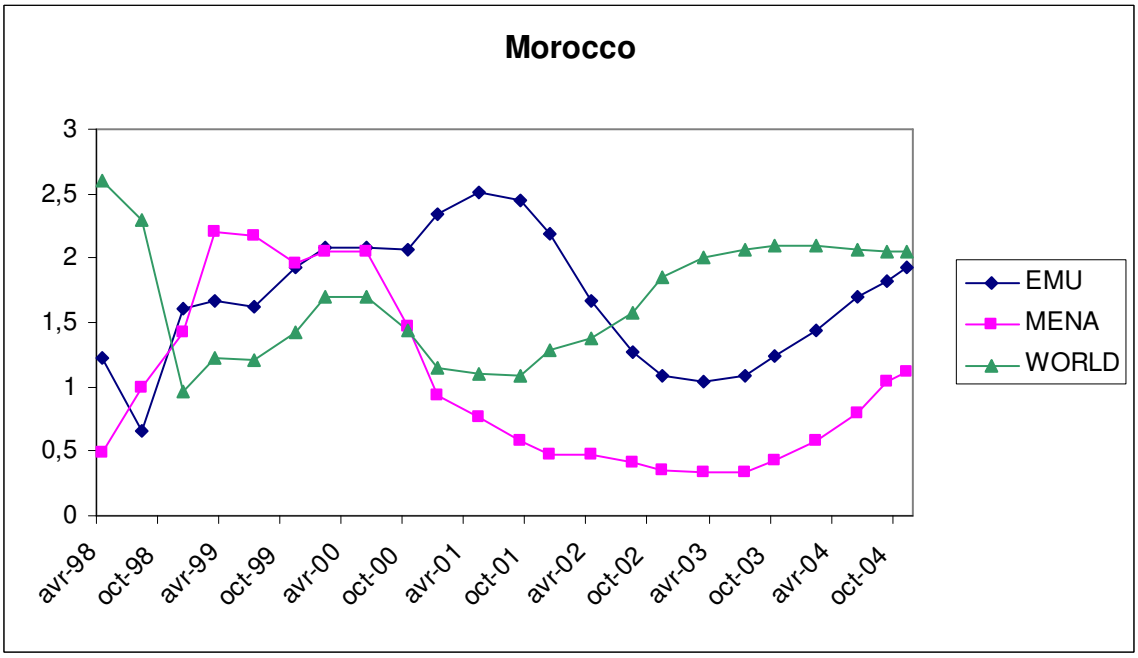
avr-04
oct-04
EMU
MENA
WORLD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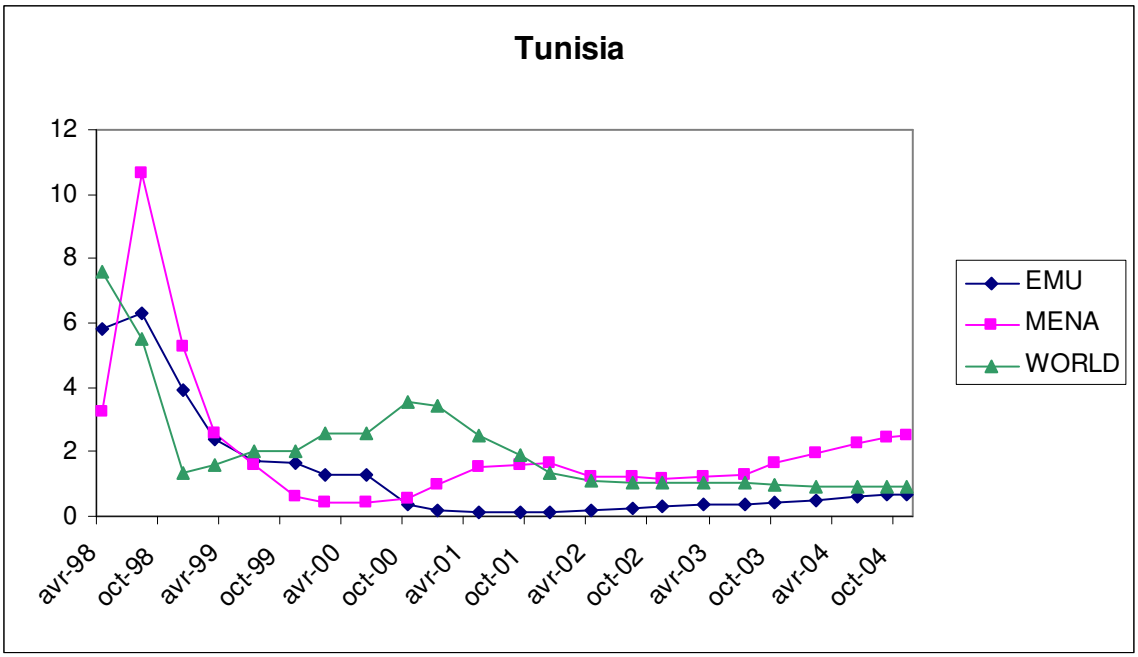
EMU
MENA
WORLD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EMU
MENA
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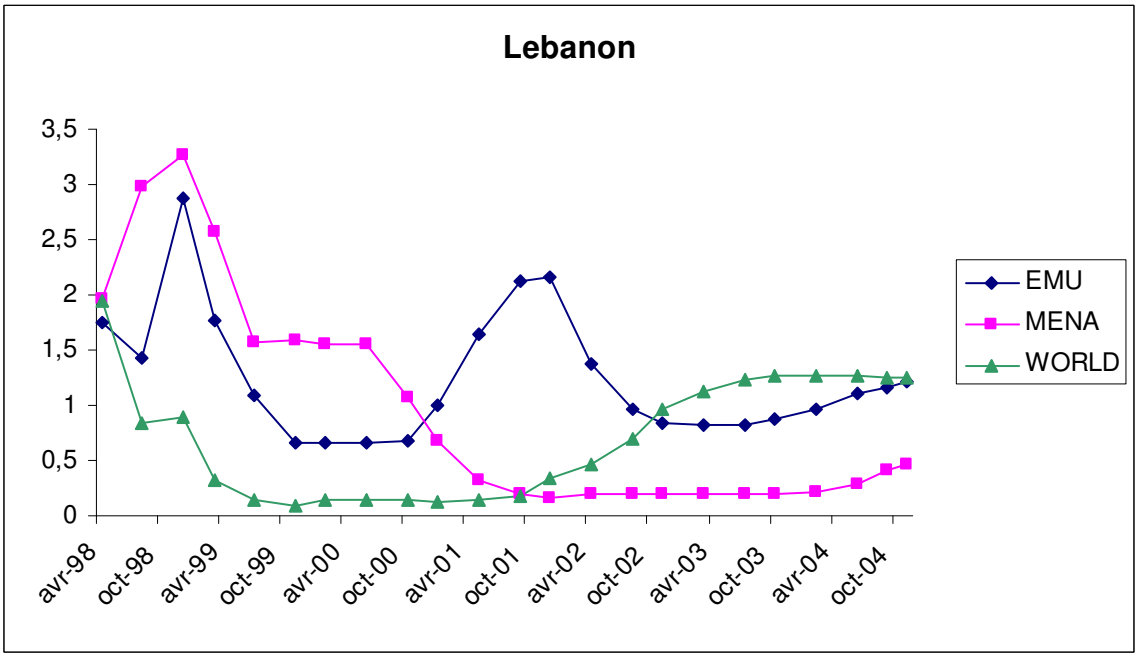
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EMU
MENA
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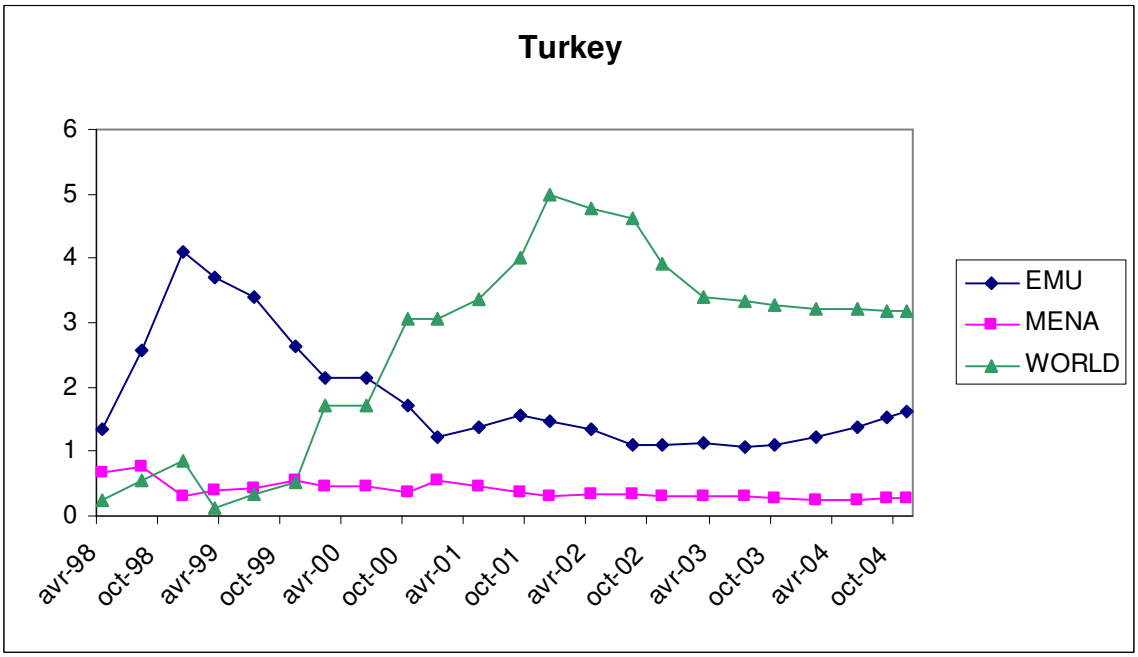
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oct-01
avr-02
oct-02
avr-03
oct-03
avr-04
oct-04
EMU
MENA
WORLD

Table 6 Moving Average Analysis

	Egypt	Israel	Jordan	Morocco	Tunisia	Lebanon	Turkey	Positive	Negative
Creation of the EMU									
EMU	-0,92	-1,86	-2,84	0,40	-3,31	-0,99	-2,30	*1*	*6*
MENA	-1,69	1,29	-1,55	-0,67	-2,35	-2,62	-0,12	*1*	*6*
WORLD	2,83	0,62	-1,00	1,35	-0,31	1,36	3,12	*5*	*1*
Turkish Crisis									
EMU	-1,00	1,33	-0,14	0,14	1,61	1,66	1,09	*5*	*1*
MENA	2,56	0,60	0,54	1,33	1,17	1,91	-0,06	*5*	*1*
WORLD	2,03	-0,48	-0,24	0,81	-1,20	1,67	-0,81	*3*	*4*
EuroMed Agreements									
EMU	-2,16	-0,23	-1,73	0,19	NA	0,54	NA	*3*	*2*
MENA	3,21	0,61	0,23	0,09	NA	-2,23	NA	*4*	*1*
WORLD	2,12	0,22	2,31	0,82	NA	-0,41	NA	*4*	*1*
Agadir Agreements									
EMU	-0,41	NA	-2,10	-0,49	0,19	NA	NA	*1*	*3*
MENA	1,14	NA	-0,04	0,30	-0,64	NA	NA	*2*	*2*
WORLD	2,04	NA	2,23	0,55	1,52	NA	NA	*4*	*0*
Infrastructure Privatisation									
EMU	-2,68	-0,32	-1,38	0,44	1,37	1,72	1,13	*4*	*3*
MENA	2,46	-1,18	0,95	-0,44	-0,27	0,18	-0,08	*3*	*4*
WORLD	2,15	0,88	1,46	1,37	1,04	1,99	-0,80	*6*	*1*
Intifada									
EMU	0,11	-0,21	-1,45	0,16	0,05	1,56	-0,15	*4*	*3*
MENA	-1,22	0,61	-0,90	0,10	1,79	-0,16	-0,37	*3*	*4*
WORLD	2,49	0,21	-1,52	0,79	-0,09	2,11	2,70	*5*	*2*
World Trade Center Attacks									
EMU	-2,71	0,92	-1,06	-0,71	1,79	-0,26	0,32	*3*	*4*
MENA	3,18	-0,26	0,90	1,58	0,46	2,84	0,08	*6*	*1*
WORLD	2,25	0,35	1,36	1,14	0,39	1,33	-0,91	*6*	*1*
Invasion of Irak									
EMU	-0,36	-0,33	-2,09	-0,50	0,29	-0,55	-0,63	*1*	*6*
MENA	1,17	-1,03	0,01	0,32	-0,39	2,21	-0,13	*4*	*3*
WORLD	2,72	0,60	2,22	0,43	1,46	0,37	1,81	*7*	*0*

Note: The first column reports the events and the regional benchmark under analysis. In columns 2 to 8, for each country we report the difference between post event and pre event integration scores. Then, for each event and benchmark, columns 9 and 10 give the overall number of positive –i.e integration - and negative – i.e segmentation - results.