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On Risk and Return in MENA Capital Markets

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ABSTRACT

This paper investigates relationships between market risk premium, time-varying variance and time-varying covariance in eleven Middle Eastern and North African (MENA) markets and eight developed markets from 1990 to 2001. Following Pettengill, Sundaram and Mathur (1995), we argue that the Capital Asset Pricing Model has only been partially examined because the negative portion of the market risk premium distribution has not been priory fully investigated. This issue is addressed by implementing a state-dependent multivariate GARCH methodology to proxy for a risk-return relationship. As a result, significant positive and negative relationships between risk premiums and conditional variance (covariance) are found in MENA capital markets (developed markets). We conclude that MENA markets are highly segmented and provide diversification benefits to the global investor. We test for asymmetric patterns of reward to risk and observe that six out of the eleven MENA markets return series exhibit overly pessimistic reactions unwarranted by market variance alone. This finding supports the overreaction hypothesis and sets grounds for contrarian portfolio strategies.

JEL: G12; G15

Keywords: CAPM; Conditional risk; Market price of risk; Overreaction hypothesis; MENA markets.

I. INTRODUCTION

The Middle-Eastern and North African region (MENA) has recently witnessed significant economic and financial development. However, MENA countries' trade and capital flow remain marginal on a global level. Additionally, risk perceptions and institutional underdevelopment are powerful obstacles to an increased access to MENA capital markets. Many countries in this region have suffered wars, political turmoil or economic instability. Indeed, MENA countries have not yet emerged as economic powers and are rarely referred to as influential countries in the global financial scene, which might explain the lack of academic research on MENA capital markets. The purpose of this paper is to fill this void in the literature by addressing the issue of risk measurement in eleven MENA markets. The measurement of risk is important because it is the precept for predicting market returns and therefore, the tenet for country selection. Thus, the results of this paper are expected to contribute to the paradigm of asset pricing in emerging markets and, more generally, global asset allocation strategies.

Traditionally, the boundaries of the Middle East consist of all countries in an area extending from the Atlantic Ocean in the West to the Persian Gulf in the East and bound by the Mediterranean, Europe and Asia in the North, and the Sahara in the South. Most MENA capital markets are considered as "emerging" according to the World Bank[1]. Research on emerging markets shows that capital markets in Asia, Latin America and Eastern Europe are characterized with high returns and volatility, low correlation with the world market, and subject to shocks (Harvey, 1995a, 1995b, 1995c). Findings can be different with MENA equity markets: for instance, Erb, Harvey and Viskanta (1996) find that Egypt and Turkey fit the traditional mold of high returns and volatility, whereas Jordan exhibits typically low return and volatility as compared to industrialized markets.

While MENA markets returns have a low correlation with the world market (Erb et al., 1996), it is unclear whether they respond to economic and political shocks in the same manner as other emerging markets. A low correlation is an indication of market segmentation and, thus diversification potentials to the global investor. However, many MENA countries started successive privatizations, liberalization of foreign ownership, and "anti red tape laws" during the 90s. The effect of country liberalization could affect market sensitivity to local risk factors differently. Indeed, price sensitivity to local variance can either increase as trading volume and capital flight increases, or it can decrease as local markets are less sensitive to local economic shocks and move increasingly in tandem with the world market. During the same period, MENA countries have been subjected to multiple political and economic shocks, which affected correlation with the world portfolio. Indeed, if such disturbances are local, the correlation between markets is low and an argument for international diversification exists in that each MENA capital market can be considered as a "stand-alone" asset class in a globally diversified portfolio. However, if correlations between MENA capital markets increase after a shock, the benefit of international diversification will falter.

The first critical issue addressed in this paper is to define and measure risk for MENA markets. Although rejected by many academicians such as Harvey (1991), Fama and French (1992) and more recently Jan, Chou and Hung (2000), the beta relative to the world portfolio is still widely used as a measure of systematic risk. Moreover, Fletcher (2000) argues that beta explains the relationship between expected local market risk premiums and world market risk premiums in more integrated markets. However, this relationship does not hold in segmented emerging markets. Previous studies such as Bekaert and Harvey (1997), Erb, Harvey and Viskanta (1998), Harvey (1995a, 1995b, 1995c) and Harvey and Ferson (1993a, 1993b, 1994) indicate that only covariance[2] with the world portfolio matters in developed markets. Harvey (1998, 2000) reports that only local market variance explains the cross-section in emerging markets because correlation with the world portfolio is typically weaker in these less integrated markets; in this case, "market price of variance risk" reflects how risk is treated locally. Undeniably, emerging markets are characterized with barriers to portfolio investments across borders, and investors do not always have total freedom to choose and add stocks from any countries in their portfolio. Additionally, currency risk, transaction costs differentials, insider trading laws enforcement differentials, or infrequent trading contributes to segmentation and local market inefficiencies.

To establish a relationship between risk and return is important for strategic asset allocation purposes. While it is usually easier to forecast volatility and correlation, most asset allocation products' efficiency relies mainly on the ability of portfolio managers to predict asset classes' returns. This leads to the second issue addressed in the paper: detecting overreaction in equity returns. Aside from well-known predictability coming from fundamental inefficiencies, predictability of emerging markets equity returns has been somewhat successfully addressed using other lagged instrumental variables such as market size, price-to-book value, or the size of the trade sector (Bekaert, Erb, Harvey and Viskanta, 1998). Furthermore, several alternative metrics such as GDP per capita, growth in GDP, inflation growth, the change of exchange rates versus a benchmark and its volatility, the government sector, number of years of schooling, the indebtness of the country, quality of life index, political risk indexes, and country credit rating have also been investigated to predict volatility and expected returns in segmented markets (Harvey, 1998). It is very likely that most of those attributes are somehow correlated with each other and related to return dispersion. Nevertheless, it is difficult to conclude on "systematic" measure(s) of risk that determine expected returns in more segmented markets. Whatever the factors of predictability, it has been recently established that the asymmetric effect of a change in volatility on mean-reverting behaviors of short horizon equity returns can be explained by the overreaction hypothesis. Indeed, Avard, Nam and Pyun (2001) used a "smooth-transition" model to detect overly pessimistic mean-reverting patterns in U.S. stock markets. The authors suggest that overreaction unwarranted by volatility alone is interesting to portfolio managers because it sets grounds for contrarian strategies.

In summation, our paper makes an in-depth analysis of eleven MENA capital markets in order to assess how they can benefit the global investor. We investigate the distributional characteristics of eleven MENA capital markets and compare them to those observed in eight industrialized markets. Then, we establish a relationship between risk premiums, volatility risk and covariance risk using the state-dependent approach of Pettengill, Sundaram and Mathur (1995) and Fletcher (2000). We demonstrate that a state-dependent multivariate GARCH methodology provides an explanation for a serial (over time) and cross-sectional relationship between country risk premium and market price of variance risk and covariance risk. Finally, as in Avard, Nam and Pyun (2001), we investigate country risk premium patterns as a result of asymmetric changes in conditional volatility and covariance. Our findings provide evidence of overreaction in several MENA capital markets.

The rest of the paper is outlined as follows. Section II presents the testing methodology and section III describes the data. Empirical findings are outlined in Section IV and the final conclusions and comments are presented in section V.

II. METHODOLOGY

In its original form, the Capital Asset Pricing Model states that more (less) uncertainty increases (decreases) risk, which increases (decreases) the ex-ante expected or required risk premium, and thus, decreases (increases) contemporaneous market prices. Simply stated, market price of variance risk shall be positive if investors' expectations are rational. Empirical evidence on the subject is mixed. Bollerslev, Engle and Woolridge (1988), Chou (1988), Scruggs (1998) report a significant positive relationship between market premium and conditional market volatility. Glosten, Jagannathan, and Runkle (1993) and Pettengill, Sundaram and Mathur (1995) report quite the opposite - a significant negative relationship. Many others such as French, Schwert and Stambaugh (1987) and Baillie and De Gennaro (1990) indicate that the relationship is not significant.

Pettengill, Sundaram and Mathur (1995) suggest that the contradictory findings regarding the relationship between market risk premium and risk might be the result of testing methodology. In empirical tests, realized market risk premium is used as an unbiased estimate of the expected market risk premium. Consistent with rational expectations, the ex-ante market price of risk should always be positive. However, ex-post, the market price of risk may be negative, particularly in downstate markets, and that would imply a negative risk premium. Thus, the authors suggest that a negative market price of risk is associated with downstate markets and a positive market price of risk is consistent with upstate markets. They develop a state-dependent CAPM that provides an explanation on the cross-sectional relationship between beta and risk premiums in the U.S. Fletcher (2000) used the same methodology to study cross-sections of betas and returns in eighteen developed countries. He also restores beta as being a useful tool in explaining cross-sectional differences in country index returns.

This method has not yet been used to test the serial (time series) relationship between expected risk premium and forecasted risk. The closest technique used in this matter is an ANST-GARCH model by Avard, Nam and Pyun (2001), who report a significant relationship between risk premium and future variance in the three US markets. Interestingly, the authors notice an asymmetric effect in stock return behaviors and suggest that the mere existence of this asymmetry can be explained by the overreaction hypothesis, which sets grounds for contrarian portfolio strategies.

In order to study MENA capital market's return-generating process, we investigate four models: The first two models are geared toward the hypothesized segmented MENA countries, and relate predicted variance to realized risk premiums; the other two models are for the more integrated developed markets and relate forecasted covariance to realized risk premiums. Because conditional variance and covariance are not constant, we use a GARCH methodology to model time varying risk as in Bollerslev (1987) and Engle and Kroner (1995).

In model (1), we use a simple GARCH (1,1)-M; in model (2), we transform model (1) into a step-dependent-GARCH(1,1)-M, which is expected to capture the hypothesized "state-dependent" market price of variance risk. In model (3), we implement a bivariate GARCH(1,1)-M. In model (4), we transform model (3) into a bivariate state-dependent-GARCH(1,1)-M, which is expected to portray the hypothesized state-dependent market price of covariance risk.

Models (1) and (2) deliver time-varying variances for each index. The first equation forecasts risk premiums in a market-based CAPM framework and the second equation forecasts the variance of the return series. Formally, the two models are expressed as follows:

$$\begin{gathered} RP_{i,t} = \alpha_i + \mu_i RP_{i,t-1} + \beta_i \sigma^2_{i,t} + e_{i,t} \\ \sigma^2_{i,t} = \gamma_i + \omega_i \varepsilon^2_{t-1} + \psi_i \sigma^2_{i,t-1} \end{gathered} \tag{1}$$

$$\begin{gathered} RP_{i,t} = \alpha_i + \mu_i RP_{i,t-1} + \beta_i \delta_i \sigma^2_{i,t} + \phi_i (1-\delta_i) \sigma^2_{i,t} + e_{i,t} \\ \sigma^2_{i,t} = \gamma_i + \omega_i \varepsilon^2_{t-1} + \psi_i \sigma^2_{i,t-1} \end{gathered} \tag{2}$$

where $RP_{i,t}$ is the realized risk premium in a local market; $\sigma^2{}_{i,t}$ is the conditional variance in a local market; the coefficient α_i (abnormal return) is expected to be insignificant; the coefficients β_i and ϕ_i are up-state and down-state market price of variance risk[3]; δ_i is a dummy variable that takes the value of one in an upstate environment (positive risk premium) and zero in downstate conditions (negative risk premium); $e^2_{i,t-1}$ is the lag of the squared residual from the mean equation (the ARCH term) and provides news about volatility clustering; $\sigma^2{}_{i,t-1}$ is last period's forecast variance (GARCH term). If the sum of ω_i and ψ_i equals 1, it implies that a current shock persists indefinitely in conditioning the future variance. The sum of ω_i and ψ_i also represents the change in the response function of shocks to volatility per period, a greater value than one implies that the response function of volatility is explosive and a value less than unity implies that shocks decay with time (Wald test are performed to test for the null hypothesis of $\omega_i + \psi_i = 1$). Notice that we included a lagged risk premium in our mean equation to stabilize the models; the idea is to account for the well-known phenomenon of autocorrelation in equity returns[4].

The next two models consist of slightly modified BEKK (Baba, Engle, Kroner and Kraft) models. This approach provides time-varying variance of a market and the world portfolio, as well as time-varying covariance. For two markets, there are six equations that need to be solved simultaneously. The first equation relates risk premiums to forecasted covariance. The two following equations relate risk premiums for a market and the world to inherent forecasted variance. The next two equations forecast the variance of the two portfolios. The final equation forecasts the covariance between a market and the world. Models (3) and (4) can be formally expressed as follows:

$$\begin{gathered}
RP_{i,t} = \alpha_{i,m} + \mu_{i,m} RP_{i,t-1} + \beta_{i,m}\sigma_{i,m,t} + e_{i,m,t} \\
RP_{i,t} = \alpha_i + \beta_i \sigma^2_{i,t} + e_{i,t} \\
RP_{m,t} = \alpha_m + \beta_m \sigma^2_{m,t} + e_{m,t} \\
\sigma^2_{i,t} = \gamma_i + \omega_i e^2_{i,t-1} + \psi_i \sigma^2_{i,t-1} \\
\sigma^2_{m,t} = \gamma_m + \omega_m e^2_{m,t-1} + \psi_m \sigma^2_{m,t-1} \\
\sigma_{i,m,t} = \gamma_i \gamma_m + \omega_i \omega_m e_{i,t-1} e_{m,t-1} + \psi_i \psi_m \sigma_{i,m,t-1}
\end{gathered} \tag{3}$$

$$\begin{gathered}
RP_{i,t} = \alpha_{i,m} + \mu_{i,m} RP_{i,t-1} + \beta_{i,m}\delta_i\sigma_{i,m,t} + \phi_{i,m}(1-\delta_i)\sigma_{i,m,t} + e_{i,m,t} \\
RP_{i,t} = \alpha_i + \beta_i \sigma^2_{i,t} + e_{i,t} \\
RP_{m,t} = \alpha_m + \beta_m \sigma^2_{m,t} + e_{m,t} \\
\sigma^2_{i,t} = \gamma_i + \omega_i e^2_{i,t-1} + \psi_i \sigma^2_{i,t-1} \\
\sigma^2_{m,t} = \gamma_m + \omega_m e^2_{m,t-1} + \psi_m \sigma^2_{m,t-1} \\
\sigma_{i,m,t} = \gamma_i \gamma_m + \omega_i \omega_m e_{i,t-1} e_{m,t-1} + \psi_i \psi_m \sigma_{i,m,t-1}
\end{gathered} \tag{4}$$

where $RP_{m,t}$ is the realized risk premium in the world market; $RP_{i,t}$ is the realized risk premium in a market; $\sigma_{i,m,t}$ is the covariance between the world and a given market; $\beta_{i,m}$ and $\phi_{i,m}$ are up-state and down-state market price of covariance risk and $\sigma^2_{m,t}$ is the variance of the world market. The other variables have the same definitions as in models (1) and (2).

Models (1), (2), (3) and (4) are tested on the nineteen country indices starting from January 1st, 1990 and ending in June 1st, 2001. We use a Bollerslev-Wooldridge heteroskedasticity consistent covariance to compute the Quasi Maximum Likelihood (QML) covariances and standard errors as described by Bollerslev and Wooldridge (1992).

The second issue addressed in our paper is overreaction to a change in risk unwarranted by variance (or covariance) alone. We use the results of the state-dependent CAPM (equations (2) and (4)) to infer on the change on the return generating process in response to a change in volatility. Under rational expectations, positive and negative market price of variance risk (β_i and ϕ_i) and covariance risk ($\beta_{i,m}$ and $\phi_{i,m}$) should be equal in intensity. If not, the market overreacts to a change in variance or covariance[5] (Avard et al., 2001). For example, if the negative market price of risk associated with an expected negative risk premium is greater than the positive market price of risk associated with an expected positive risk premium, it indicates that risk premiums tend to be reduced by an increase in risk. This would imply that investors have an overly optimistic behavior unwarranted by variance or covariance alone or, equivalently, that negative risk premiums revert to the mean faster than positive risk premiums. To investigate overreaction, we conduct Wald tests for the null hypotheses of $\beta_i + \phi_i = 0$ and $\beta_{i,m} + \phi_{i,m} = 0$.

III. DATA

We obtained our return series from Datastream. There are several possible sources for MENA market returns: MSCI, IFC and local index. Each of these sources started to cover MENA markets at different dates. In our study, we choose the provider that started the coverage the earliest. For instance, Jordan and Turkey were covered by MSCI in the late 80s. Egypt, Israel, and Morocco are also covered the earliest by MSCI during the 90s. Saudi Arabia, Bahrain and Oman[6] are only covered by IFC. Kuwait, Lebanon and Tunisia[7] price series are only available in local indices, which coverage started in the 90s. The price series for developed markets are available since the 60s or 70s through MSCI.

We use daily, weekly and monthly market index data for observation periods within the January 1990 through June 2001 range. We chose a starting date of January 1st, 1990 because nine of the eleven MENA return series are only available after 1990. The observation periods for all countries are not the same, but the construction of the indices is based on value-weighted portfolios. MSCI and IFC indices are usually highly correlated and reflect a constant methodology across markets; they capture the spirit of an all-share index by including replicable subsets of shares and targeting sixty percent of total market capitalization. These indices do not take into consideration restrictions on foreign ownership. A summary of the source, study range and observations for each series is provided in Table 1.

All reported tests use daily returns data calculated from the percent logarithmic difference between closing prices. We use daily data to capture potential short-lived interactions because it is well known in the literature that using monthly data may not be appropriate in describing the effect of capital movement (an intrinsically short-term occurrence). In addition, many of our series have less than eight years in coverage; thus, the univariate and bivariate GARCH models might not converge with too few data points. Finally, it might be argued that high frequency data can be problematic when infrequent trading occurs. Therefore, we repeat the tests using weekly and monthly data and report the results only if they are different from those obtained from the analysis using daily data.

Table 1
Sources, period covered and observations

Country	Source (a)	Period		Observations		
		Start	End	Daily	Weekly	Monthly
Australia	MSCI*	1/1/90	6/1/01	2975	596	138
Canada	MSCI	1/1/90	6/1/01	2975	596	138
France	MSCI	1/1/90	6/1/01	2975	596	138
Germany	MSCI	1/1/90	6/1/01	2975	596	138
Japan	MSCI	1/1/90	6/1/01	2975	596	138
Switzerland	MSCI	1/1/90	6/1/01	2975	596	138
United Kingdom	MSCI	1/1/90	6/1/01	2975	596	138
United States	MSCI	1/1/90	6/1/01	2975	596	138
G7 Index (b)	MSCI	1/1/90	6/1/01	2975	596	138
Bahrain	International Finance Corporation	4/20/00	6/1/01	290	59	15
Egypt	MSCI	12/30/94	6/1/01	1671	334	78
Israel	MSCI	1/1/93	6/1/01	2192	438	102
Jordan	MSCI	1/1/90	6/1/01	2975	596	138
Kuwait	"KIC" (local market index) (e)	12/28/94	6/1/01	1673	334	78
Lebanon	"BLOM" (local market index) (e)	1/22/96	6/1/01	1394	280	66
Morocco	MSCI	1/2/95	6/1/01	1671	334	78
Oman	International Finance Corporation	4/20/00	6/1/01	290	59	15
Saudi Arabia	International Finance Corporation	1/2/98	6/1/01	891	178	42
Tunisia	"TUNINDEX" (local market index) (e)	1/1/98	6/1/01	892	178	42
Turkey	MSCI	1/1/90	6/1/01	2975	596	138
Emerging Market (EM) Index (c)	MSCI	1/1/90	6/1/01	2975	596	138
World Index All Countries "AC" (d)	MSCI	1/1/90	6/1/01	2975	596	138
U.S. Treasury Bill (3-month)	Datastream	1/1/90	6/1/01	2975	596	138

* MSCI = Morgan Stanley Capital International
(a) Data providers of daily, weekly and monthly index prices in U.S. Dollars (or returns for the U.S. Treasury Bill series).
(b) Market Index combining Canada, France, Germany, Italy, Japan, United Kingdom and USA.
(c) All emerging markets in the MSCI universe (26 countries including Egypt, Israel, Jordan, Morocco and Turkey).
(d) All developed and emerging markets in the MSCI universe (49 countries, including Egypt, Israel, Jordan, Morocco, Turkey, and the eight developed markets used in the study).
(e) Local market series are converted into U.S. Dollars using the corresponding exchange rate series provided by Datastream.

Table 2

Descriptive statistics for each daily return series

Country (a)	Obs.	Mean(a)	Std. Dev(a)	Max. (a)	Min. (a)	Correlation (a)		β (b)	Skew	Kurt	JB(c)
Australia	2974	4.52%	17.28%	1824.82%	-1757.53%	0.580	0.39**	-0.00	5.54	801.5**	0.02
Canada	2974	5.13%	16.54%	1318.29%	-2449.23%	0.586	0.79**	-0.76	11.57	9384.7**	0.07**
France	2974	7.43%	18.83%	1856.22%	-2565.93%	0.625	0.96**	-0.26	6.43	1493.3**	0.05**
Germany	2974	5.97%	20.69%	1772.00%	-3479.25%	0.605	1.02**	-0.48	9.33	5083.3**	0.01
Japan	2974	-4.20%	24.10%	3092.64%	-2119.46%	0.585	1.15**	0.43	7.35	2432.4**	0.06**
Switzerland	2974	11.17%	17.17%	1702.72%	-2376.36%	0.568	0.80**	-0.30	7.40	2441.8**	0.05**
UK	2974	6.44%	15.95%	1831.09%	-1356.37%	0.624	0.81**	-0.01	5.46	751.5**	0.06**
US	2974	11.24%	15.14%	1230.60%	-1755.64%	0.746	0.92**	-0.26	7.72	2798.9**	0.01
G7	2974	5.89%	12.78%	1191.27%	-1221.97%	0.992	1.03**	-0.17	6.36	1411.1**	0.16**
Bahrain	289	-17.38%	8.63%	723.69%	-773.31%	0.009	0.01	-0.30	11.28	823.8**	0.10**
Egypt	1670	3.66%	22.09%	1845.14%	-1708.08%	0.003	0.01	0.41	7.27	1317.3**	0.08**
Israel	2191	5.01%	26.39%	2087.76%	-2467.94%	0.387	0.86**	-0.31	7.21	1648.8**	0.02
Jordan	2974	-0.80%	12.28%	1857.56%	-1597.69%	0.016	0.02	1.37	17.27	5615.8**	0.10**
Kuwait	1672	6.07%	11.23%	983.43%	-806.85%	0.002	0.01	0.23	6.13	689.1**	0.11**
Lebanon	1393	-13.01%	15.90%	1571.91%	-1194.43%	0.006	0.01	0.29	7.26	1062.1**	0.16**
Morocco	1670	6.35%	11.73%	1575.18%	-1021.02%	0.002	0.01	0.38	10.44	3891.0**	0.13**
Oman	289	-26.64%	13.38%	1950.38%	-908.44%	-0.009	-0.01	3.18	34.11	7205.3**	0.25**
Saudi Arabia	890	4.32%	14.45%	1617.09%	-1511.25%	0.056	0.05	0.62	13.13	3817.5**	0.03
Turkey	2974	-1.06%	54.05%	5547.73%	-6909.72%	0.132	0.58**	-0.11	8.48	3724.5**	0.11**
Tunisia	891	2.41%	10.88%	1188.11%	-857.60%	-0.008	0.01	0.73	8.56	1195.0**	0.18**
EM	2974	-0.55%	16.27%	1512.59%	-1767.63%	0.494	0.66**	-0.37	7.14	2171.7**	0.26**
World	2974	6.02%	12.29%	1201.69%	-1312.76%	1.000	1	-0.21	6.58	1610.2**	0.19**
T-Bill	2974	5.07%	0.08%	8.26%	2.65%	-0.039	0	0.32	3.21	58.40	0.99**

(a) All series are in U.S. Dollars. Daily mean, maximum and minimum returns are annualized by multiplying by 252 and daily standard deviations are annualized by multiplying by $252^{1/2}$. Correlations with the world portfolio (MSCI AC World) are also reported. (b) Betas are estimated using the following OLS: $R_{i,t}=\alpha+\beta RP_{m,t}+\varepsilon_t$ where $R_{i,t}$ is the return of a market and $RP_{m,t}$ is the world risk premium (MSCI AC WORLD return minus the T-Bill rate); Ljung-Box $Qres_{12}$ and $Qres^2_{12}$ are computed on the residuals of this regression. (c) Test of normality for the return series:$JB=[(n-k)/6]x[S^2+(K-3)^2/4]$, where S is the skewness, K is the kurtosis, and k represents the number of estimated coefficients used to create the series. Under the null hypothesis of a normal distribution, the Jarque-Bera statistic is distributed as χ^2 with 2 degrees of freedom. (d) Ljung-Box tests for serial correlation in returns (1 and 12 lags). *, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively.

The equity returns presented in Table 1 are calculated in U.S. Dollars. This is more appropriate in segmented markets because inflation trends are taken into account through Fisher equation (Liew, 1995). Also, it provides uniformity in the comparison of one market to another. When we use local series (Kuwait, Lebanon and Tunisia), prices are converted in Dollars using the exchange rate series provided by Datastream. When calculating risk premiums, we use the three-month T-Bill rate as a proxy for the risk-free rate.

IV. EMPIRICAL FINDINGS

A. Analysis of the Data

Descriptive statistics for each series' daily returns are presented in Table 2. Mean, maximum, minimum, standard deviation, correlation with the world portfolio (MSCI AC World), skewness (the chance of an unexpected large positive or negative movement in returns) and kurtosis (the likelihood of big positive or negative returns), Jarque-Bera tests (test of normality), and Ljung-Box serial correlation of returns (predictability in one lag and twelve lags) are described. Using a simple OLS regression of a market return with the world risk premium, we compute the beta of each market (relative to the world portfolio); inherent serial correlation of residuals (Qres 12) and squared residuals tests are also estimated ($Qres^2$ 12).

Developed countries' markets seem to have positive average returns, except for Japan. On the other hand, MENA markets' annualized returns are much lower and negative for Bahrain, Lebanon, Oman, Turkey and Jordan. The remaining MENA markets show average (low) positive returns.

With the exception of Israel, Egypt and Turkey, MENA markets' volatility is lower than in developed markets. Egypt and Israel's standard deviation are in the same range as for Germany and Japan. Only Turkey (54%) fits the high volatility stigma that characterizes emerging markets.

With the exception of Bahrain, Israel and Turkey, each MENA country's return series is characterized by positive skewness, while most developed markets have negative skewness (except for Japan). Furthermore, the excess kurtosis in MENA markets' return series is much larger than the one observed in industrialized markets. As a result, the distribution of returns for each of the markets in both developed and MENA countries have fat tails, indicating non-normality. This observation is confirmed by the Jarque-Bera tests for normality in all markets[8]. These results have severe consequences in portfolio management in that returns cannot be completely characterized in terms of mean and variance.

Most markets (except for Israel, Saudi Arabia and Australia) demonstrate some level of serial correlation in returns. Moreover, serial correlation in returns (mostly one lag) is much greater in MENA markets than in the more developed markets. This observation supports that MENA market returns are more persistent or predictable than returns in the industrialized group.

During the overall period, each country's market return series is characterized by residual serial correlation (significant Q_{res} 12), and volatility clustering (significant Q_{res}^2

12), which strongly suggests that a GARCH parameterization might be appropriate to model the behavior of daily risk premiums.

The estimated betas from the regression of individual market returns with the world risk premiums are significant for all the industrialized markets, thus suggesting that developed markets are integrated. These findings support the notion that beta is an appropriate measure of risk in developed markets. Among the MENA markets, only Israel and Turkey show significant betas; thus, indicating some level of integration with the world market. Alternatively, the estimated betas for the remaining MENA markets are not significant, thus suggesting market segmentation.

The correlation matrix in Table 3 provides further information on the level of integration in each market. All developed countries have returns that are highly contemporaneously correlated (0.2 to 0.7). The global indices are correlated with each other (especially MSCI G7 and MSCI AC World) and all developed markets; MSCI EM (emerging market index) is more modestly correlated with the two other global indices and the developed countries indices. With the exception of Israel and Turkey, MENA markets are not correlated with the world, developed countries, the emerging market index, and themselves. It reinforces the belief that most MENA markets are highly segmented and share little similarity with each other and other emerging markets. This finding suggests that the benefits of diversification might be extremely high with Middle Eastern and North African markets.

Table 3
Pairwise correlation of daily market return series[a]

	AU	CA	FR	GE	JA	SW	UK	US	BA	EG	IS	JO	KU	LE	MO	OM	SA	TU	TN	G7	EM	WORLD	TB
Australia	1																						
Canada	0.19	1																					
France	0.20	0.34	1																				
Germany	0.26	0.32	0.68	1																			
Japan	0.29	0.14	0.26	0.27	1																		
Switzerland	0.19	0.25	0.64	0.67	0.27	1																	
UK	0.20	0.31	0.63	0.55	0.26	0.57	1																
US	0.16	0.60	0.31	0.26	0.18	0.25	0.31	1															
Bahrain	0.05	0.05	-0.04	-0.05	0.11	-0.06	-0.06	0.01	1														
Egypt	0.09	-0.01	0.02	0.03	0.04	0.02	0.02	-0.04	0.04	1													
Israel	0.15	0.33	0.26	0.31	0.12	0.18	0.24	0.31	0.06	0.10	1												
Jordan	0.00	0.02	0.00	0.02	0.00	0.02	-0.01	0.02	0.08	0.06	-0.03	1											
Kuwait	0.00	-0.02	0.02	0.03	0.07	0.03	0.04	-0.03	-0.04	0.05	-0.01	-0.03	1										
Lebanon	-0.02	0.01	0.03	0.03	-0.04	0.01	0.03	0.00	-0.08	0.02	-0.01	-0.02	0.00	1									
Morocco	-0.03	-0.04	0.08	0.06	0.06	0.11	-0.01	-0.04	-0.02	0.05	-0.05	0.01	0.03	0.02	1								
Oman	0.02	0.00	0.02	-0.01	0.01	-0.06	-0.04	-0.03	-0.05	0.00	-0.08	-0.05	-0.01	-0.02	-0.11	1							
Saudi Arabia	0.06	0.07	0.06	0.06	0.03	0.07	0.06	0.02	-0.10	0.02	0.07	0.02	0.05	0.02	0.00	-0.04	1						
Turkey	0.08	0.09	0.14	0.14	0.10	0.12	0.09	0.05	0.11	0.08	0.11	0.05	-0.01	-0.05	0.01	0.00	0.10	1					
Tunisia	0.07	-0.08	0.10	0.11	0.06	0.18	0.03	-0.08	0.00	0.04	-0.06	-0.01	-0.01	0.00	0.27	-0.02	-0.03	0.00	1				
G7 index	0.53	0.59	0.57	0.54	0.58	0.50	0.58	0.78	0.01	-0.01	0.37	0.02	0.00	0.00	0.00	-0.02	0.04	0.12	-0.03	1			
EM index	0.34	0.33	0.35	0.37	0.29	0.31	0.33	0.32	0.07	0.09	0.34	0.05	-0.03	-0.01	-0.07	0.02	0.10	0.26	-0.04	0.46	1		
World Index	0.58	0.59	0.63	0.61	0.59	0.57	0.62	0.75	0.01	0.00	0.39	0.02	0.00	0.01	0.00	-0.01	0.06	0.13	-0.01	0.99	0.49	1	
Tbill	-0.02	-0.01	-0.02	-0.01	-0.05	-0.02	0.00	-0.01	-0.06	-0.04	0.01	-0.05	0.04	0.03	0.00	0.09	0.04	-0.01	-0.02	-0.04	-0.07	-0.04	1

(a) "Pairwise" indicates that each correlation coefficient is calculated with the maximum number of observations using all non-missing observations for the relevant series. Also, as for the whole study, the eight developed markets, eleven MENA markets, and three regional indices series are in U.S. Dollars.

At this point it is informative to look at the cross-sections of returns and the different statistical measures of risk (standard deviation, beta, skewness and kurtosis). Figures 1 to 8 depict these cross-sectional relationships.

Interestingly, cross-sections of average returns and standard deviation are statistically flat for MENA markets and developed markets (F statistics are insignificant in Figures 1 and 2). The wide range of standard deviations, returns and correlations indicates that a better efficient frontier can be reached by including MENA markets in a global asset allocation strategy.

The relationship between average returns and betas is flat (F statistics are insignificant in Figures 3 and 4) in developed markets and MENA markets. This result is consistent with Fama and French (1992), but quite puzzling as one expects more return with an increase in systematic risk.

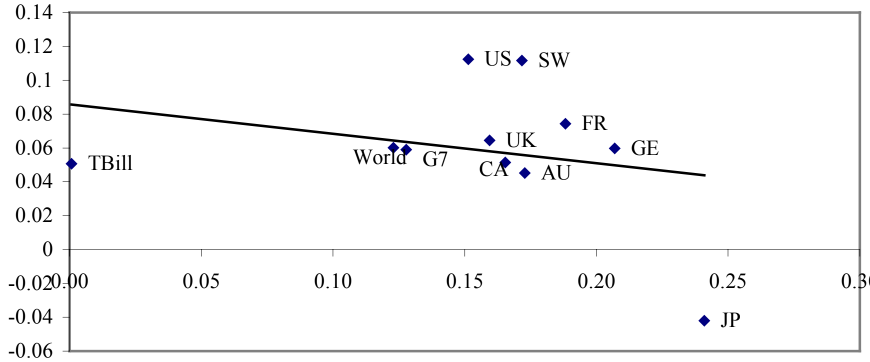
The relationship between skewness and average returns is flat in developed markets (F statistic is insignificant in Figure 5). The same relationship is significantly negative in MENA markets (F statistic is significant in Figure 6). Both results are inconsistent with the theory, as investors prefer positively skewed distributions to the negatively skewed ones.

The relationship between kurtosis and average returns is flat in developed markets (F-statistic is insignificant in Figure 7). The same relationship is significantly negative in MENA markets (F-statistic is significant in Figure 8). In theory, this relationship must be positive because investors seek more reward for a greater likelihood of big positive or negative returns.

In conclusion, we reject beta, local standard deviation, skewness and kurtosis as explanatory variables of returns' cross-sections in developed markets. For MENA countries, standard deviation and beta do not explain the cross-sections of average returns. However, we find significant negative relationships between skewness and kurtosis and average returns. These relationships cannot be explained by the theory and might stem from a small number of cross-sectional observations.

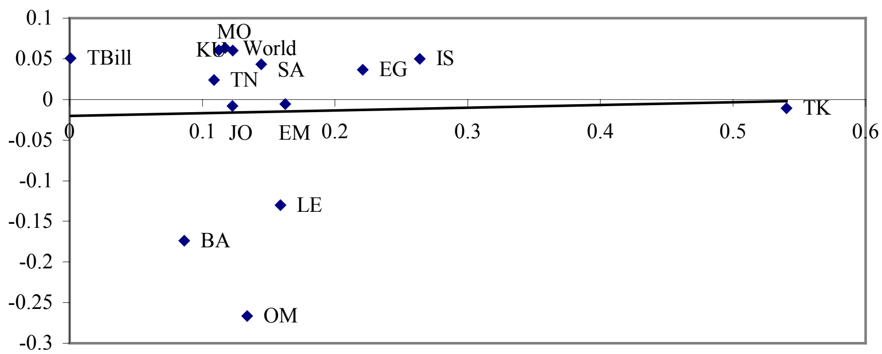
In summary, our findings indicate that MENA markets, like other emerging markets, have low correlation with the world markets and show signs of predictability. Second, MENA capital markets are less volatile than other emerging markets or even developed markets (except for Turkey). Third, while MENA markets seem to be highly segmented, developed markets' returns are serially connected to the beta relative to the world portfolio. Fourth, as in Bekaert et al. (1998), we only find skewness and kurtosis to be instrumental in explaining cross-sections of returns in more segmented capital markets. Finally, we conclude that the cross-sections between returns and beta, standard deviation, skewness and kurtosis are theoretically incoherent or inconclusive for all the markets we examined in the study.

Figure 1
Cross-sections and trend regression[a] of average daily returns with standard deviation for all developed markets, the world index and T-Bill series



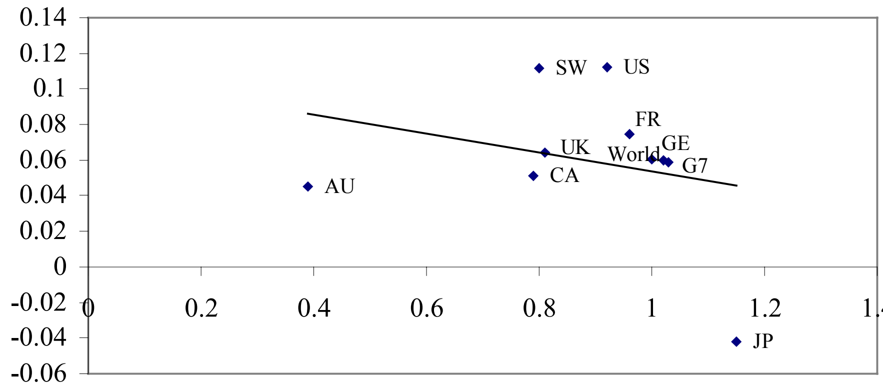
(a) Return = -0.1735 x Standard Deviation + 0.0858, F=0.66, R^2 = 0.0687 (N=11),
t-statistic (-0.82) (2.47*)
*, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 2
Cross-sections and trend regression[a] of average daily returns with standard deviation for all mena markets, the world index, the emerging market index and T-Bill series



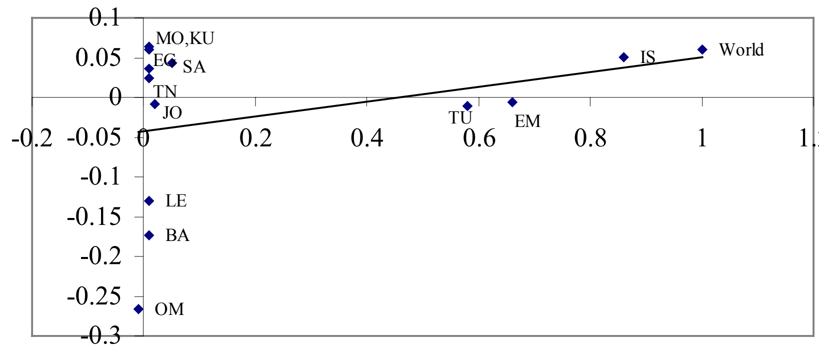
(a) Return = 0.0332 x Standard Deviation - 0.0201, F=0.02, R^2 = 0.0016 (N=14)\
t-statistic (0.14) (-0.42)
*, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 3
Cross-sections and trend regression[a] of average daily returns with beta for all developed markets and the world index Series



(a) Return = -0.0527 x Beta + 0.1064, F=0.58, R^2 = 0.0674 (N=10)
t-statistic (-0.76) (1.69)
*, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

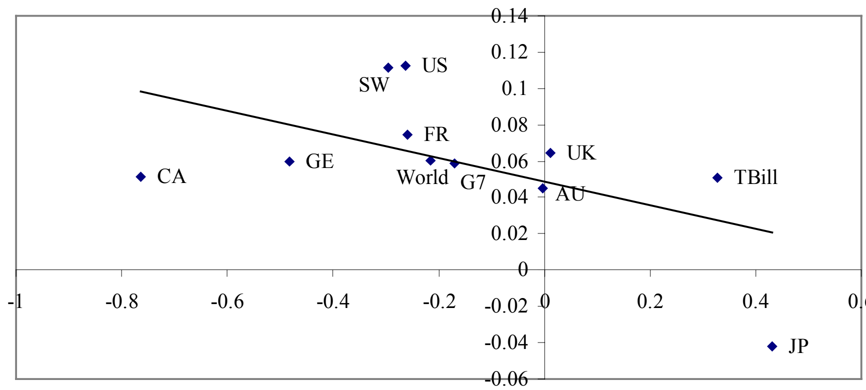
Figure 4
Cross-sections and trend regression[a] of average daily returns with beta for all mena markets, the world portfolio and the emerging market index series



(a) Return = 0.0933 x Beta - 0.0428, F=1.42, R^2 = 0.1143 (N=13)
t-statistic (1.19) (-1.24)
*, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 5

Cross-sections and trend regression[a] of average daily returns with skewness for all developed markets, the world portfolio and T-Bill series

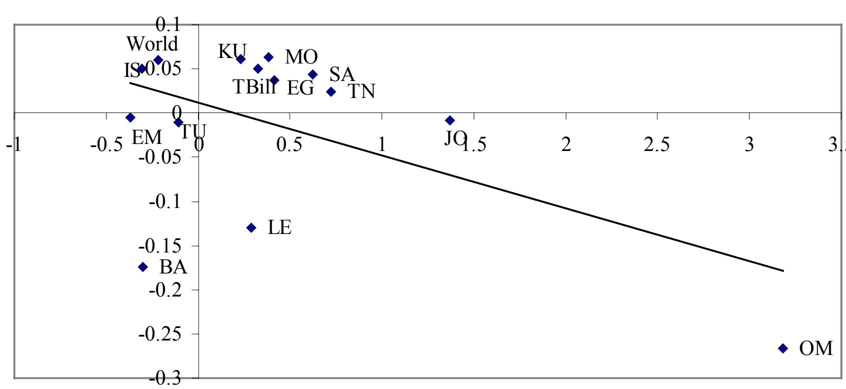


(a) Return = -0.065 x Skewness + 0.0489, F=3.79, R^2 = 0.2963 (N=11)
t-statistic (-1.95) (4.08**)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 6

Cross-sections and trend regression[a] of average daily returns with skewness for all MENA markets, the world index, the emerging market index and T-Bill series

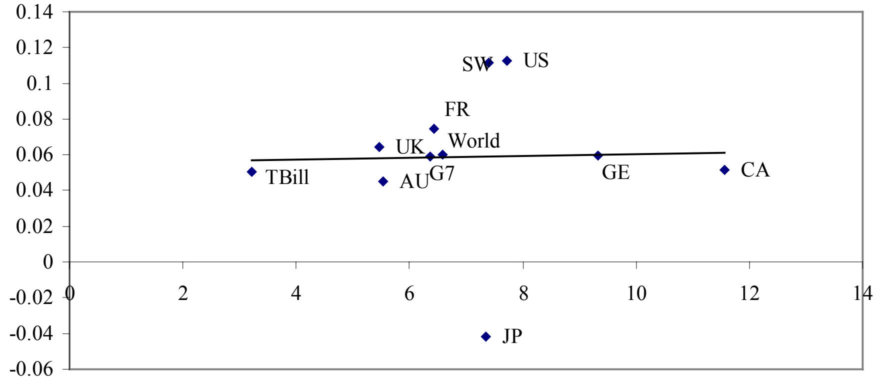


(a) Return = -0.0599 x Skewness + 0.0121, F=4.98*, R^2 = 0.2932 (N=14)
t-statistic (-2.23*) (0.45)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 7

Cross-sections and trend regression[a] of average daily returns with kurtosis for all developed markets, the world index and T-Bill series

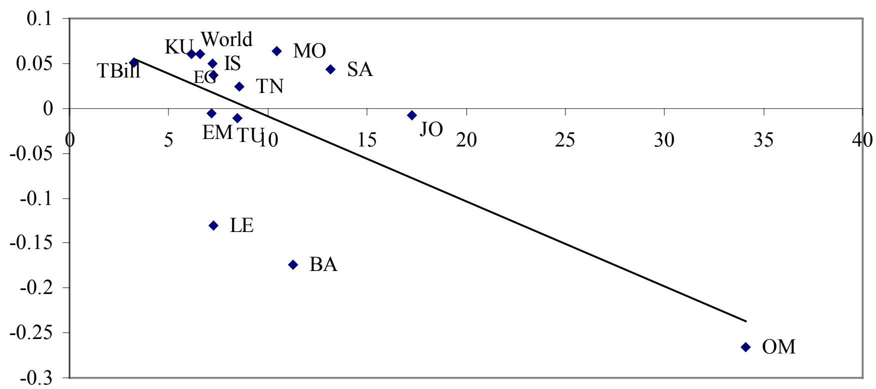


(a) Return = 0.0005 x Kurtosis + 0.055, F= 0.08, R^2 = 0.0008 (N=11)
t-statistic (0.09) (1.20)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 8

Cross-sections and trend regression[a] of average daily returns with kurtosis for all MENA markets, the world index, the emerging market index and T-Bill series



(a) Return = -0.0095 x Kurtosis + 0.0855, F=11.79**, R^2 = 0.4956 (N=14)
t-statistic (-3.43**) (2.41*)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

B. Analysis of an Intertemporal Relationship between Risk and Return

During periods of growth, risk does not keep investors away from the market because the stock index generally trends upwards. However, once growth falters, risk drives investors away from equity markets and brings about a direct relationship between risk and returns. Thus, the effect of risk on investor behavior and consequent risk-return relationship should be state-dependent. Based on our findings in section IV.1 and previous research from Harvey (1998), we argue that the relevant risk is the variance of returns in more segmented markets and the covariance of return with the world in more integrated capital markets. To examine whether such observations between risk and return exist serially (over time), we run regression models (1), (2), (3) and (4)[9]. Note that models (1) and (3) are simpler versions of models (2) and (4), respectively. They do not adjust for the two uncorrelated states of the world. Results inherent to models (1) and (2) are reported in Table 4; those pertaining to models (3) and (4) are outlined in Table 5.

The results of the relationship between realized return and conditional variance are summarized as follows: (1) the simple GARCH(1,1)-M (model 1) does a poor job modeling the relationship between risk premium and time-varying volatility; (2) all R-squared values are extremely low (around zero); (3) market price of variance risk (β) is never significant in MENA markets (note that a significant positive relationship is more likely with developed markets). These findings are similar to those of French, Schwert and Stambaugh (1987) and Baillie and DeGennaro (1990).

In its ex-ante form, the CAPM suggests that market price of risk should be positive[10]. Yet, only a post hoc formulation of Sharpe-Lintner's CAPM can be tested. Since the realized risk premium can be positive or negative, it points to a positive or negative market price of risk. Model (2) adjusts for this reality. We find significant positive (negative) market price of risk in expected upstate (downstate) conditions, which indicates that an increase in market conditional variance leads to an increase (further decrease) in market risk premium in up-state (down-state) periods.

In summary, our two-state conditional relationship expressed in model (2) provides a better fit than model (1): coefficients of determination are much greater (R-squared values range from 0.4 to 0.6 for the industrialized group and 0.3 to 0.5 in the MENA group). These findings restore local variance as an explanatory variable of the return generating process for all markets.

Table 4
Comparison of univariate GARCH-M and univariate state-dependent GARCH-M

Country	Obs.	GARCH-M (a)			State-dependent GARCH_M (b)							
		α_I	β_I	R^2	α_I	β_I	ϕ_I	ω_I	ψ_I	R^2	Wald (c) ($\beta+\phi=0$)	Wald (d) ($\omega+\psi=1$)
Australia	2974	NS	8.74	0.00	NS	73.24**	-68.17**	0.05**	0.93**	0.57	1.29	10.15**
Canada	2974	NS	2.46	-0.00	NS	44.97**	-42.97**	0.06**	0.94**	0.46	0.48	0.32
France	2974	NS	7.71*	0.00	NS	61.44**	-62.72**	0.08**	0.89**	0.55	1.20	9.43**
Germany	2974	NS	2.38	0.00	NS	42.07**	-48.05**	0.07**	0.92**	0.50	1.11	1.54
Japan	2974	(-)**	6.14**	0.01	(-)**	41.43**	-29.58**	0.10**	0.89**	0.48	9.72**	4.24*
Switzerland	2974	NS	8.84	0.00	NS	56.45**	-66.00**	0.13**	0.79**	0.54	1.66	6.69**
United Kingdom	2974	NS	4.16	0.00	NS	74.32**	-65.02**	0.05**	0.94**	0.56	1.15	6.48*
United States	2974	NS	4.69	0.00	NS	58.88**	-55.27**	0.05**	0.95**	0.49	0.35	0.42
G7	2974	NS	10.60**	0.00	NS	76.40**	-72.68**	0.11**	0.88**	0.52	0.30	3.45
Bahrain	289	(-)**	20.56	-0.00	(-)**	97.62**	-31.61**	0.21*	0.68**	0.28	5.48*	0.89
Egypt	1670	NS	1.27	-0.00	(-)*	39.20**	-27.25**	0.07**	0.93**	0.44	11.77**	0.32
Israel	2191	NS	0.80	-0.00	NS	32.24**	-32.49**	0.10**	0.86**	0.47	0.01	7.10**
Jordan	2974	(-)*	4.32	-0.00	(-)*	88.77**	-41.86**	0.05**	0.92**	0.31	17.63**	5.42*
Kuwait	1672	NS	0.95	-0.00	NS	66.56**	-73.19**	0.23**	0.66**	0.47	0.34	14.34**
Lebanon	1393	(-)**	3.81	0.00	(-)**	58.20**	-33.10**	0.21**	0.73**	0.42	8.34**	7.39**
Morocco	1670	NS	10.06	-0.00	NS	87.31**	-50.61**	0.19**	0.65**	0.44	2.79	8.06**
Oman	289	NS	127.05	0.14	(-)**	98.12**	-15.76*	0.04**	0.67**	0.37	47.62**	4.22*
Saudi Arabia	890	NS	4.93	-0.00	(-)*	79.37**	-38.68**	0.03**	0.96**	0.36	10.54**	0.63
Turkey	2974	NS	0.73	-0.00	NS	12.37**	-14.81**	0.12**	0.84**	0.44	0.68	7.17**
Tunisia	891	NS	12.22	0.00	NS	94.98**	-94.75**	0.10**	0.73**	0.50	0.01	3.98*
EM	2974	(+)*	-1.10	-0.00	NS	44.02**	-50.15**	0.12**	0.88**	0.49	1.62	0.54
World	2974	NS	9.89**	0.00	NS	76.66**	-72.25**	0.11**	0.87**	0.52	0.88	2.86

(a) Model 1; (b) Model 2; (c) Wald test F-statistic; Ho: $\beta+\phi=0$; (d) Wald test F-statistic; Ho: $\omega+\psi=1$; *, ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively; NS means "not significant;" (+) and (-) refer to the sign of the intercept (values have been omitted for sake of brevity); all series are in U.S. Dollars.

Table 5
Comparison of bivariate GARCH-M and bivariate state-dependent GARCH-M

Country	Obs.	Bivariate GARCH-M (a) $\alpha_{i,m}$	$\beta_{i,m}$	R^2	State-dependent Bivariate GARCH_M (b) $\alpha_{i,m}$	$\beta_{i,m}$	$\phi_{i,m}$	R^2	Wald ($\beta+\phi=0$) (c)
Australia	2974	NS	10.50	0.00	NS	230.78**	-220.32**	0.40	0.31
Canada	2974	NS	3.18	0.00	NS	96.84**	-106.14**	0.44	0.74
France	2974	NS	12.97	0.00	NS	125.87**	-133.28**	0.47	2.10
Germany	2974	NS	5.31	0.00	NS	104.99**	-118.81**	0.45	1.11
Japan	2974	(-)**	11.84	0.00	(-)**	118.72**	-90.74**	0.44	6.97**
Switzerland	2974	NS	11.54	0.00	NS	114.26**	-133.40**	0.45	1.73
United Kingdom	2974	NS	8.39	0.00	NS	137.38**	-128.21**	0.51	0.81
United States	2974	NS	5.72	0.00	NS	91.62**	-92.22**	0.47	0.11
G7	2974	NS	8.22	0.00	NS	78.72**	-75.76**	0.52	0.19
Bahrain (d)	289	(-)*	46.93	0.02	(-)**	118.11*	16.32	0.04	4.24*
Egypt (d)	1670	NS	-4.15	0.00	NS	34.52	30.96	0.00	0.00
Israel	2191	NS	3.48	0.00	NS	151.19**	-149.94**	0.35	0.01
Jordan (d)	2974	NS	-2.96	0.00	NS	76.36	-30.77	0.00	0.92
Kuwait (d)	1672	NS	-14.81	0.00	NS	-14.35	-15.17	0.00	0.30
Lebanon (d)	1393	(-)**	47.62	0.01	(-)**	119.23*	6.93	0.01	3.67
Morocco (d)	1670	NS	-27.81	0.00	NS	-12.63	-43.41	0.00	1.39
Oman (d)	289	(-)**	96.35	0.04	(-)**	234.98*	-14.44	0.10	4.55*
Saudi Arabia(d)	890	NS	-85.63**	0.01	NS	256.05**	-272.30**	0.09	0.06
Turkey (d)	2974	NS	-8.25	0.00	NS	143.07**	-147.71**	0.11	0.04
Tunisia (d)	891	NS	-94.78**	0.02	NS	-127.56**	-62.63	0.01	11.34**
EM	2974	NS	-0.74	0.00	NS	98.07**	-117.10**	0.40	3.49

(a) Model 3; (b) Model 4; (c) Wald test F-statistic; Ho: $\beta + \phi = 0$; (d) The QML failed to converge to an optimal solution after 5000 iterations and, thus GARCH covariance series could not be generated efficiently for Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Oman, Saudi Arabia, Turkey and Tunisia.
* and ** denote rejection of the null hypothesis at the 5% and 1% levels, respectively; NS means "not significant;" (+) and (-) refer to the sign of the intercept (values have been omitted for sake of brevity); all series are in U.S. Dollars.

We report the findings of the GARCH equation from model 2[11] in Table 4. ω_i is the ARCH parameter and ψ_i is the GARCH parameter. For each market, ω_i and ψ_i are significant. The ARCH parameter is usually greater in MENA countries; it shows that Middle Eastern and North African markets are more likely to evidence volatility clustering. Volatility clustering in stock returns implies that large (small) price changes follow large (small) price changes in either signs. The sum of ω_i and ψ_i is less or close to the unity in all indices. It signifies that shocks are not explosive and persist; it also indicates that volatility is predictable using lagged information. In addition the Wald test statistics results indicate that the sum of ARCH and GARCH parameters ($\omega_i + \psi_i$) is significantly less than one in MENA markets, suggesting that variance does not persist as much as in developed markets.

The results of the relationship between realized return and conditional covariance from models (3) and (4) are reported in table V. The bivariate GARCH(1,1)-M (model 3) does not provide a relationship between risk premium and time-varying covariance. Furthermore, all R-squared values are extremely low (around zero), and the market price of covariance risk (β) is not significant for all series (with the exception of Saudi Arabia and Tunisia).

We use model (4) to adjust for positive or negative realized risk premiums, and find only significant positive (negative) market price of covariance risk in expected upstate (downstate) conditions in the more integrated markets (all developed markets, both global indices and Israel). The results pertaining to MENA capital markets indicate that future covariance is not an important factor in explaining contemporaneous returns. However, Saudi Arabia and Turkey respond significantly to covariance changes. But, the R-squared values are very low (0.06 and 0.11, respectively) and suggest that the model is inadequate in explaining changes in returns in these two markets.

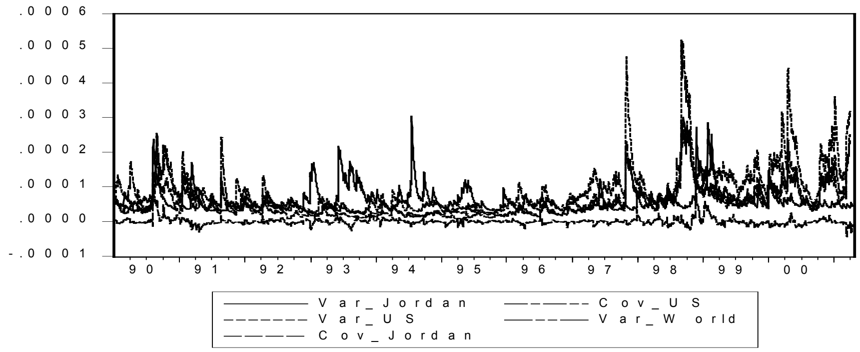
Our two-state-of-the-world conditional relationship expressed in model (4) provides a better fit than model (3) for more integrated markets. The coefficients of determination are much greater than for MENA capital markets (R-squared values range from 0.35 to 0.52 for the industrialized group and Israel, and 0.00 to 0.11 in the MENA group). Figure 9 further supports the above conclusion. Daily, weekly and monthly variance and covariance with the MSCI AC WORLD are generated (with GARCH and bivariate GARCH models) and graphed for the U.S. and Jordan[12]. It is obvious that, in all frequencies, the covariance between Jordan and the world market is flat and around zero. Also daily, weekly and monthly U.S. variance, world variance and the covariance between U.S. and the world are moving in tandem. In conclusion, the state-dependent models are efficient in explaining contemporaneous returns. Note that in MENA countries, local variance is an important variable in explaining returns, while the local variance and covariance with the world are both instrumental in developed markets.

C. A Tenet for the Overreaction Hypothesis in MENA Markets

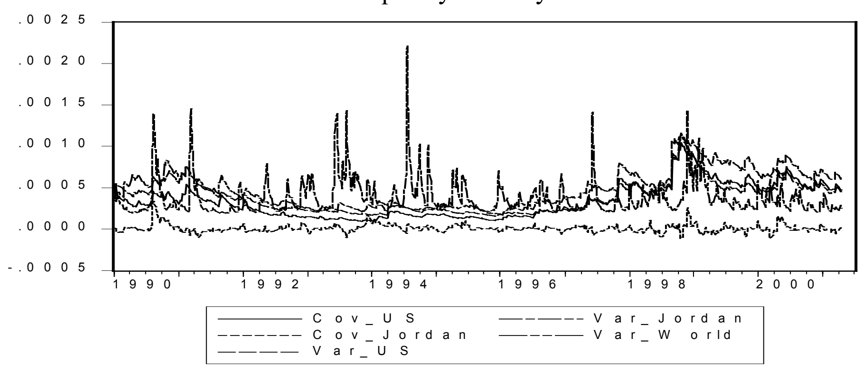
In the previous section, we find evidence indicating that the risk-return generating process is intertemporally state-dependent. We also show that variance of market returns is always important in determining the returns in all markets and that covariance of returns is an important explanatory variable only for more integrated markets.

Figure 9
Daily, weekly and monthly variance and covariance for US and Jordan return series

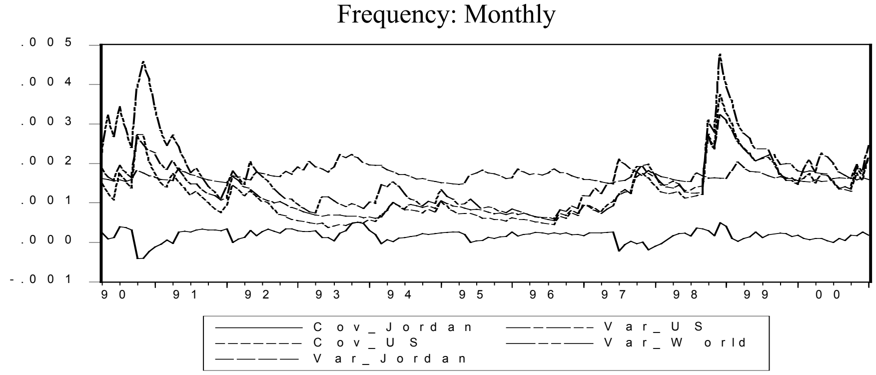
Frequency: Daily



Frequency: Weekly



Frequency: Monthly



If investors tend to overreact to dramatic news and events regardless whether these events are good or bad, there is a tenet for a contrarian portfolio strategy. This strategy is based on the premise that if a market consistently underperforms (outperforms) other markets, it will outperform (underperform) current outperforming (underperforming) markets over subsequent periods (Mun, Vasconcellos and Kish, 2000). A rational for that strategy is that investors become excessively pessimistic (optimistic) to bad (good) news, infrequent trading, or other local inefficiencies. As a result, prices should overshoot their intrinsic value systematically and their reversals should be predictable from past returns data alone[14].

For developed markets, models (2) and (4) tell us the same story: a rational hypothesis stands, to the sole exception of Japan. The period covered includes the Asian crises shocks that might have triggered panic, herding, and thus overly pessimistic reactions on the Japanese markets. For MENA markets, we only look at model (2) because model (4) is inappropriate for more segmented markets. Wald tests reveal that in six of the eleven markets (Bahrain, Egypt, Jordan, Lebanon, Oman and Saudi Arabia), there is evidence of overly pessimistic reaction unwarranted by local variance alone[15]. It is difficult to speculate for that observation, except that infrequent trading is a strong feature of Middle Eastern and North African markets; also, the period of study is very short (especially for Oman and Bahrain) and anything can happen during such a short period. However, it is important to mention that the same markets show asymmetry when weekly and monthly data is used (except for Oman and Bahrain, for which we have too few observations).

D. Market-based CAPM or the International CAPM?

The results from Tables 4 and 5 might help answer the inevitable question: Does the CAPM hold? Prior to addressing this issue, we need to differentiate between market-based CAPM (models 1 and 2) and International CAPM (models 3 and 4). Both tell the same story: there is a direct relationship between required compensation for risk and risk. The market-based CAPM establishes a relationship between the expected risk premium and the volatility of that market's expected returns; it holds in purely segmented capital markets. The International CAPM establishes a relationship between the expected market risk premium and the covariance between that market and the world's expected returns[16]; theoretically, it should hold for integrated capital markets. Then, market price of variance (or covariance risk) is idiosyncratic to that market and depends on the state of the economy.

These relationships theoretically hold ex-ante and can only be empirically tested ex-post. The idea of the state-dependent approach is to overcome that obstacle by allowing for the negative portion of the market risk premium distribution—i.e., the CAPM is set as a piecewise function of risk. Ex ante, investors have perfect market timing ability in their rational expectations and will always choose between the market return and the risk-free rate, whichever is greater. Ex-post, investors do not have perfect market ability and may allocate funds in a market, which realized return is smaller than the risk-free rate.

After simply adjusting for the two states of the world[17] in the market-based CAPM and the international CAPM, we find an average positive (negative) market price of risk associated with positive (negative) risk premiums. Therefore, we conclude that the market based CAPM holds for all markets and the International CAPM holds only for more integrated markets. To verify these findings, we look at the following cross-sectional relationships. Average positive and negative risk premium are computed in each market and plotted against the inherent "average" positive (β) and negative (ϕ) price of risk obtained from models (2) and (4), respectively. Results are graphed in figures 10 and 11.

Cross-sectional results from the market-based CAPM (state-dependent GARCH-M) show that each country has its own average reward to variance risk. Additionally, the relationship between average positive (negative) returns and positive (negative) market price of variance risk is significant, inverse and linear (significant F statistics in Figure 10). The slopes in the two states are also significant and similar. This relationship indicates that, across countries, the greater the reward to variance risk, the smaller the required rate of return.

Cross-sectional results from the International CAPM[18] (bivariate state-dependent GARCH-M) show that each country has its own average reward to covariance risk. Additionally, the relationship between average positive (negative) returns and positive (negative) market price of covariance risk is significant, direct and linear (significant F statistics in Figure 11); again, slopes in the two states are significant and similar. This relationship indicates that the greater the reward to global risk factors, the smaller the reward to local risk factors. In that case, global investors tend to require higher rate of return to invest in a local market. One can further notice that, in the global investor's mind, markets with low correlation with the world portfolio should return higher rates. Thus, the relative importance of the sensitivity to local risk factors versus global risk factors is inherent to the level of integration of a market with the world portfolio. This conclusion is consistent with the CAPM.

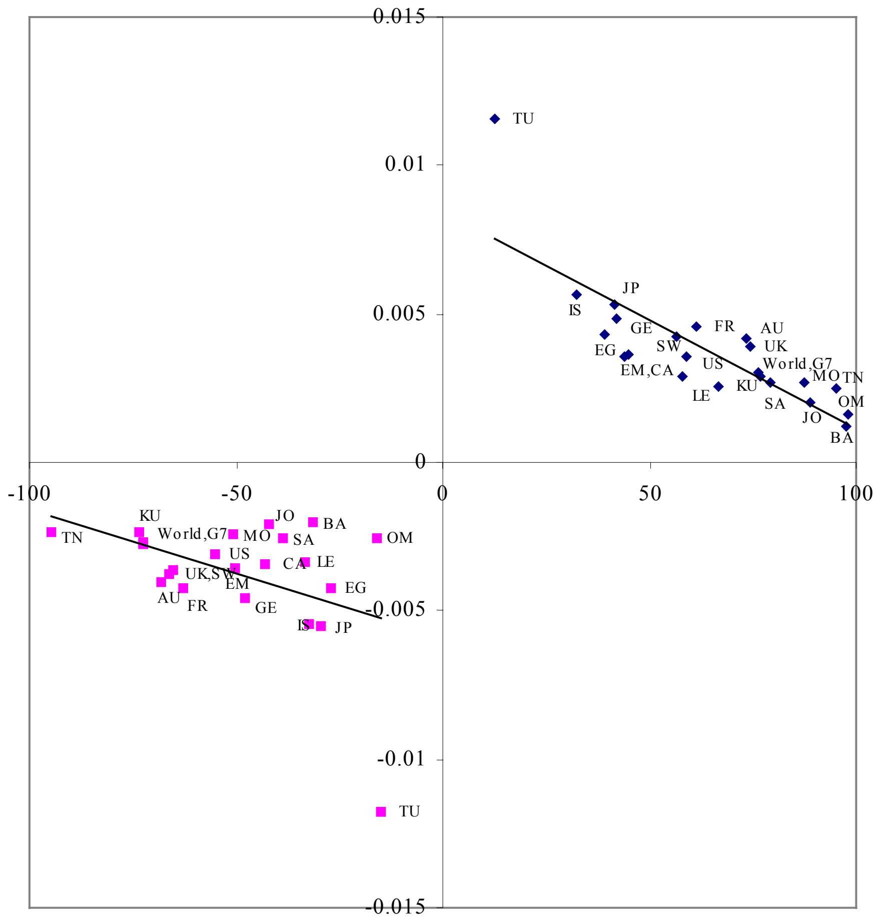
Several additional remarks must be made. First, the low number of cross sectional observations might have altered our statistical findings. Second, there is the traditional criticism on how to proxy the world or the risk-free rate in the CAPM, for instance, the MSCI AC World index is probably not mean-variance efficient (Roll and Ross, 1994). Third, many researchers have suggested that reward to risk is time-varying, which challenges the validity or the meaning of an "average reward to local or world variance."

V. CONCLUSION

Our study indicates that MENA markets, like other emerging markets, have low correlation with the world markets and show signs of predictability. While less volatile than other emerging markets or even developed markets (except for Turkey), MENA markets seem to be highly segmented and provide great diversification potentials to global investors.

Figure 10

Cross-sections and trend regression of average positive[a] and negative[b] daily risk premiums (RP(+) and RP(-), respectively) with upstate (β_i) and downstate (ϕ_i) market price of variance risk for all series

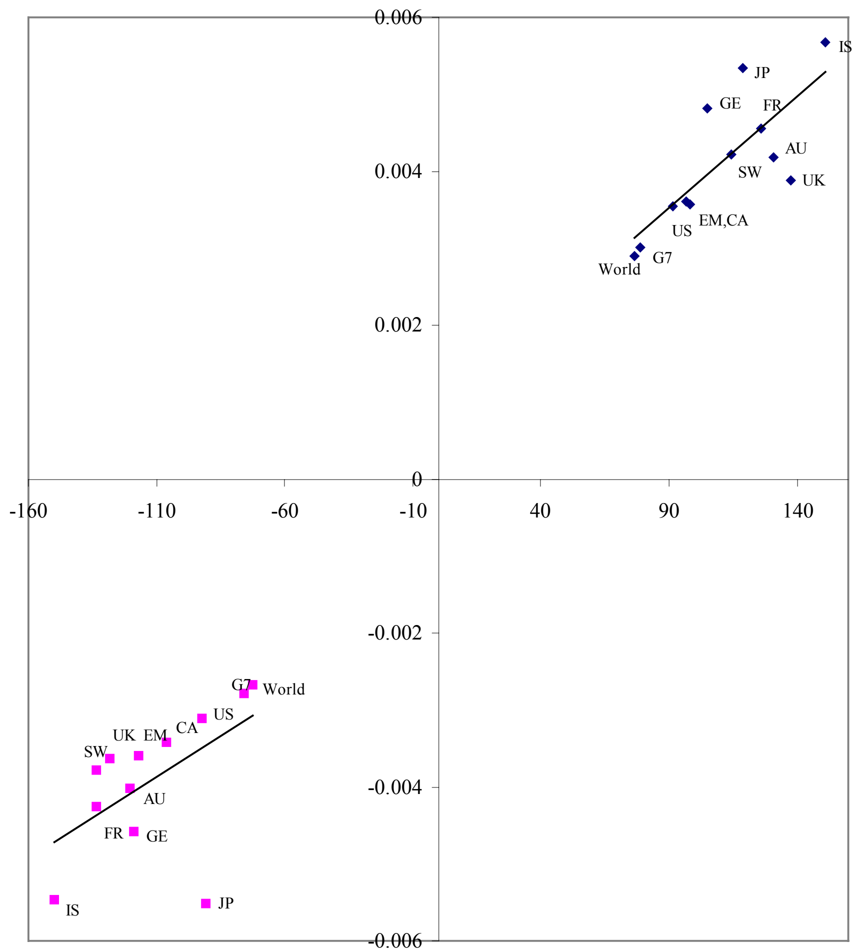


(a) RP(+) = -7E-05 β + 0.0085, F=40.09**, R^2 = 0.6672 (N=22)
t-statistic (-6.33**) (10.81**)

(b) RP(-) = -4E-05 ϕ - 0.0058, F=4.52*, R^2 = 0.1843 (N=22)
t-statistic (-2.12*) (-5.48**)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

Figure 11
Cross-sections and trend regression of average positive[a] and negative[b] daily risk premiums (RP(+) and RP(-), respectively) with upstate ($\beta_{i,m}$) and downstate ($\phi_{i,m}$) market price of covariance risk for all developed markets, the world index, the G7 index, the emerging market index and Israel



(a) RP (+) = 3E-05 β + 0.0009, F= 15.16**, R^2 = 0.6025 (N=12)
t-statistic (3.89**) (1.11)

(b) RP (-) = 2E-05 ϕ - 0.0016, F= 4.62*, R^2 = 0.3068 (N=12)
t-statistic (2.31*) (-1.36)

*,** denote rejection of the null hypothesis at the 5% and 1% levels, respectively. All returns are in U.S. Dollars.

We fail to find cross-sectional relationships between returns and beta, standard deviation, skewness and kurtosis. However, we find evidence of a significant state-dependent relationship between risk premium and conditional variance in all markets. On the other hand, a state-dependent relationship between risk premiums and conditional covariance only holds in more integrated markets. The cross-sectional analysis of reward to variance and covariance risk indicates that the relative importance of the sensitivity to local risk factors versus global risk factors is inherent to the level of integration of a market with the world portfolio. As a result, we restore variance and correlation as important instrumental variables in the return generating process in all markets and thus fail to invalidate the CAPM.

In the light of Wald tests for asymmetry, we observe that the relationship between variance and risk premium follows the rational expectation hypothesis in more integrated markets. However, the same tests unveil that investors overreact in six of the eleven MENA markets. This findings demonstrates that the successive privatizations, liberalization of foreign ownership, and "anti red tape laws" initiated during the nineties have not yet started crystallizing. This finding also indicates that contrarian portfolio strategies are more likely to hold in highly segmented markets. In practice, the efficiency of these strategies can be adversely affected by the high cost of trading idiosyncratic to emerging capital markets (Bekaert, Erb, Harvey and Viskanta, 1997).

In the quest of finding the "optimal" allocation proportion between capital markets, most global portfolio managers make predictions of returns by using fundamentals in a market model. We suggest that a multifactor state-dependent approach to the CAPM that includes local and global risk factors can provide further understanding of the return generating process in less integrated markets.

NOTES

1. Based on GNP/Capita as compared to the US.
2. Also, Harvey and Siddique (2000) suggest that coskewness (to some extent) explains the return generating process in the more integrated developed markets.
3. We assume that up state and downstate are the two uncorrelated states of the world.
4. It is particularly true with daily data time series in emerging markets, which are often characterized by infrequent trading and subjected to asynchrony in data recording.
5. An expected decrease in growth in equity markets drives investors away from those markets, while an expected increase in growth will do the opposite. In a perfect market with no barriers to entry, these forces have equal intensity.
6. Note that Oman MUSCAT (local index) is available since the mid-90s. However, when plotting the return series from 1995 to 2001, we observed inconsistency in the series in 1998 and 1999. Subsequently, we use the price series from the IFC database.
7. Note that IFC has started to cover Tunisia as a "frontier market" in a monthly frequency since the end of 1995. We found that the local series "TUNINDEX" (available in a daily frequency) has a correlation of 0.91 with IFCM-Tunisia from 1998:01 to 2001:06.

8. When using monthly return data, distributions are normal in most developed markets and remain non-normal for the MENA markets.
9. ARCH-LM tests have been conducted but not reported for sake of brevity. For each series, we find the absence of serial correlation in the squared residuals, which suggests that the GARCH parameterization got rid of the problem of heteroskedasticity in the mean equation. Also, we do not report the one-lag autoregressive regressor. However, it is significant for all series and add stability to both models (Durbin-Watson statistics range from 1.58 to 1.87 without RP_{t-1} and from 1.90 to 2.06 with it).
10. With perfect market timing ability, an investor will always shift funds into either the risk-free asset or the market, whichever is expected to do better.
11. Note that we reach the same conclusions if we use the variance equation in model 1.
12. For sake of brevity, we only report Jordan and US, which are representative of the MENA and Industrialized group, respectively.
13. An expected decrease in growth drives investors away from equity markets, while an expected increase in growth will do the opposite. In a perfect market with no barriers to entry, these forces have equal intensity.
14. See DeBondt and Thaler (1985) for a detail description of "systematic reversal of fortune" and consequent justification of the use of contrarian portfolio strategies.
15. These observations are consistent with that abnormal returns (α) are significantly negative for Bahrain, Egypt, Jordan, Lebanon, Oman and Saudi Arabia.
16. There is traditionally a currency risk factor in the ICAPM; by using the same currency across markets, we set it equal to zero.
17. That is, the market return is greater than the T-Bill rate (upstate) or the T-Bill rate is greater than the market return (downstate).
18. We are only referring to markets for which Model (4) converges—i.e., eight industrialized markets, two regional indices and Israel.

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