No.141/May 2006

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IIIS Discussion Paper No. 141

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Abstract

We examine the issue of possible portfolio diversification benefits into seven Middle-Eastern and North African (MENA) stock markets. We construct international portfolios in dollars and local currencies. We compute the ex-ante weights by plugging five optimization models and two risk measures into a rolling block-bootstrap methodology. This allows us to derive 48 monthly rebalanced ex-post portfolio returns. We analyze the out-of-sample performance based on Sharpe and Sortino ratios and the Jobson-Korkie statistic. Our results highlight outstanding diversification benefits in the MENA region, both in dollar and local currencies. Overall, we show that these under-estimated, under-investigated markets could attract more portfolio flows in the future.

JEL classification: G11;G12;G15
Keywords: Portfolio Allocation, Emerging Markets, Middle East and North Africa.

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Both authors acknowledge the support of the Irish Government via the Programme for Research in Third Level Institutions. Lagoarde-Segot acknowledges the support of CEFI.

1. Introduction

International financial theory highlights the positive impact of market segmentation on international portfolio value. By spreading risks across countries, investors can minimize the negative effects of market volatility and ultimately yield increased long-term returns. However, the growing presence of co-movements across worldwide developed and emerging financial markets is now well documented (Kearney & Lucey, 2004). Considering the recent currency crises and macroeconomic imbalances experienced in many emerging markets of East Asia, Latin America and Eastern Europe, investors might have to consider other emerging markets, such as those of the Middle East and North Africa (MENA) region.

Having undergone macrostabilization during the 1990's, these countries are indeed in the process of developing their stock markets through waves of privatization and regulatory improvements. These financial development policies have started to yield significant results : taken as a percentage of GDP, market capitalization in the MENA (31%) is now higher than in Latin America (24%) and Eastern Europe (26%). This went along with policies aiming at attracting foreign investors. All countries have implemented ADR's during the 1990's (ERF, 2004). However, the region is still the world's smallest recipient of portfolio investment : according to the IMF (2004), foreign capital only represents 0.75% of the region's GDP – versus an average of 4.2% for emerging countries. Unsurprisingly, recent empirical studies have underlined the region's segmentation from world's financial markets (Lagoarde-Segot&Lucey, 2006a). This paradoxal situation, where successful financial reforms have not yet resulted in international financial integration, might well be at the origin of significant portfolio diversification opportunities in the MENA region.

The purpose of this paper is therefore to investigate the presence of portfolio diversification benefits into seven MENA markets : Morocco, Tunisia, Egypt, Jordan, Lebanon, Turkey and Israel. To our knowledge, this paper is the first attempt at formally capturing the performance of portfolio investment in the region. Controlling for currency risk, we construct portfolios both in local currencies and in dollars over the 1998-2006 period. We use a rolling block-bootstrap methodology based on five optimization models stemming from modern portfolio theory. Following Gilmore et.al (2005) and Stevenson (2000), we also compute optimal portfolios based on an assymetric risk measure, the lower partial moment, which controls for the bias implied by identifying risk with standard deviation when stock returns are characterized by non-normality. We then compare the ex-post performance of the constructed portfolios based on Sharpe ratios and Sortino ratios through the Jobson-Korkie pairwise tests for the equality of performance ratios.

Our results highlight the presence of outstanding potential diversification benefits in the MENA region, whether transaction are denominated in local currencies or in dollars. In most cases, the minimum variance portfolio appears as the most promising optimization technique. In addition, portfolios based on local currencies seem to exhibit a higher degree of diversification, while the measure of risk seems to affect profitability less than the optimization model employed. Overall, we show that these under-estimated, under-investigated markets should attract more portfolio flows in the future.

The remainder of the paper is structured as follows. Section 2 puts our contribution in perspective. Section 3 presents the data and the methodology we employed. Section 4 presents our results and section 5 draws together our conclusions.

2. Research background

Two main factors explain the attractiveness of international diversification for portfolio managers. First, the correlation between the returns of the securities that make up a portfolio are crucial in determining the associated level of risk. Low as opposed to high correlation between securities generally means lower portfolio risk, and risk-averse investors tend to select securities with low correlation (Markowitz, 1959). Second, the correlation between domestic and foreign returns is expected to be lower than between purely domestic securities. This is due to different monetary, fiscal, and industrial policies across countries which add up to different industrial composition of stock markets and result in significant differentials in country returns dynamics. By allowing the selection of foreign investment projects that exhibit very low correlation with the domestic portfolio, international diversification is therefore beneficial to both value stability and long run yields.

The power of diversification is in theory magnified in the case of emerging markets, where returns tend to be predominantly determined by the systematic risk of each security in the context of the national portfolio, as opposed to the world beta (Bartram&Dunfey, 2001). Besides, specific risks such as political instability and information costs are compensated by higher than average returns due to a faster rate of capital accumulation and faster economic growth than in developed countries. In a seminal study, Harvey (1995) showed that adding a portfolio of emerging markets to a diversified developed portfolio would result in a reduction of six percentage points in the total portfolio’s volatility while keeping the expected returns unchanged.

However, the performance characteristics of emerging markets may have changed as a consequence of recent financial crises and the increased economic and financial integration of emerging markets into the global markets. Recent studies measuring the degree of co-movement between stock markets have highlighted increasing integration to the world as the emerging markets of Eastern Europe, South East Asia and Latin America grow and become more transparent and efficient. These studies generally relied on cointegration analysis and time-varying analysis (Bracker and Koch (1999), Harvey (2000), Voronkova (2004)). Stronger financial integration can be interpreted as decreasing diversification benefits in markets whose properties are getting closer to developed standards. Besides, the series of financial turmoil that began with the Mexican ‘tequila’ crisis in Januray 1995, the Asian ‘flu’ crisis in August 1997 and the Russian default in 1998 have contributed both to an increase in return volatility and negative returns on the S&P/IFCI Composite Index, which led to negative returns for international investors over the 1994-2003 period (AIMR, 2005). However, the impact of such trends on individual emerging market returns was diverse and depended on various factors such as macroeconomic policy, transparency and market efficiency (Bekaert& Harvey, 1997).

Investing in an emerging market is thus ‘a bet on its emergence’, since high returns and diversification benefits can go along with either increased volatility through contagion or a smooth move towards development. This being said, very little is known about the recently emerging markets of the Middle East and North African (MENA) region. Two reasons justify our focus. First, these countries are now dotted with fast growing stock markets opened to international investors (see Lagoarde-Segot&Lucey, 2006b). Second, previous studies involving different methodologies (Neaime, 2004; Lagoarde-Segot & Lucey, 2006a) have established that the MENA markets are segmented from majour world markets. For illustration, we report the correlation coefficients of returns between these indices and their significance in table 2. Most of these coefficients are low, and some of them are not significant. In line with financial theory, fast growth and segmentation of the MENA capital markets might be a factor of attractivity as it suggests some diversification benefits for portfolio investors. It might therefore be time to investigate the position of these markets in the global allocation of capital.

INSERT TABLE 1 ABOUT HERE

3. Data and Methodology

3.1 Data

We examine the performance of diversification strategies in a total of seven MENA markets : Morocco, Tunisia, Egypt, Jordan, Lebanon, Israel and Turkey, plus a world benchmark. All eight indices are analyzed using weekly data as provided by the S&P/IFC database over the 1998-2006 period. The use of weekly data is generally recommended for portfolio simulations in thinly traded markets as it minimizes the impact of noise trading on the value of securities. Taking the standpoint of institutional investors, we also make the assumption that an investor cannot partake in short selling.

The financial and economic impact of the currency denomination of international portfolios is ambiguous. On the one hand, a portfolio of foreign securities can be exposed to unexpected exchange rate variations as foreign assets are denominated in foreign currency terms (Bartram & Gunfey, 2001). But on the other hand, investing in securities denominated in different currencies with offsetting correlations can also lower currency risk and ultimately contribute to the reduction of overall portfolio risk (Odier &Solnik, 1993). Economically, investment contracts in local currencies are also preferable for recipient countries as they transfer the currency risk to the investor and hence provide local businesses with a safer access to foreign capital (IFC, 2004). Allowing for comparison, all of the data is analyzed first on the basis of local returns. We then carry the same analysis after having converted these series in US dollars at the appropriate spot exchange rate as calculated by Datastream International.

Table 1 provides some descriptive statistics. As expected in emerging markets, both the standard deviation and the lower partial moment - an appropriate measure of risk accommodating with non-normality - seem overall higher in the MENA countries than in the S&P 500 benchmark, which suggests a higher level of risk. These risks are accompanied by higher mean returns, especially in local currency. The returns also display positive skewness and kurtosis, while the Jarque-Bera test rejects the null hypothesis of normality at the 5% level. This finding provide a justification for the use of the lower partial moment as a complementary measure of risk.

INSERT TABLE 2 ABOUT HERE

3.2 Methodology

The main advantage of boostrapping portfolio allocations lies in the analysis of estimation risk via the contruction of confidence intervals for the asset weights. The extreme sensitivity of portfolio weights to changes in the means is indeed a traditional hurdle to mean-variance analysis: the true parameters of return time-serie being unknowable, the estimation of parameters from historic data introduces severe estimation error in the optimization procedure (Best and Grauer, 1991). By contrasts, recent empirical studies have shown that the estimator of the optimal portfolio obtained through the bootstrap procedure tends to outperforms other traditional estimators (Khan and Zhou, 2004; Harvey et. al, 2006).

In this study, optimal portfolio weights are derived from a non-parametric moving block bootstrap as introduced by Carlstein (1986). The advantage of block-bootstrapping is that serial dependence, as well as cross-sectional correlation, is preserved within the blocks. Recent studies relying on this methodologies have underlined that the block length does not appear critical in designing the optimal portfolio weights (Persson and Riksbank, 2005). In our study, each block represents a quarterly period, which is enough to capture the stochastic interactions between markets while also generating a sufficient set of datapoints.

For a family of utility functions $(\mu_1,...,\mu_k)$, we therefore generate 1000 draws from a posterior density $\theta_{i,k} \approx p(\theta / x^o)$. For each $\vartheta_{i,k}$ we then find weight $\omega_{i,k}$ that maximizes $\mu_k(\omega, \theta_{i,k})$, and we finally use the empirical distribution to draw a 95% confidence interval corresponding to the selected optimal portfolio weights. The selected utility functions are directly stemming from the widely used Markowitz (1959) optimization models. The first model relies on the standard certainty equivalence tangency portfolio (CETP), which derives the optimal weights from the assumption that historical returns constitute an appropriate forecast of a portfolio's expected returns. In order to diminish the result's sensitivity to estimation error, we also compute the Bayes Stein (BS) estimator as a correction for the non normality in historical returns (Gilmore, 2005; Stevenson, 2000). The BS estimator takes into account the tendency of asset mean returns to revert towards a common value, proxied as the world mean. By shrinking historical asset means towards a global mean, this approach reduces the difference between extreme observations, and increases the out of sample performance of the tangency portfolio (Jorion, 1985,1986; and Chopra and Ziemba, 1993). The general form of the estimators in the BSP model can be defined as follows :

$$E(r_i) = wr_g + (1-w)\bar{r}_i \tag{1}$$

where $E(r_i)$ is the adjusted asset mean, $\bar{r}_i$ is the original asset mean, r_g is the global mean, and w is the shrinkage factor. Jorion (1985, 1986) estimates the shrinkage factor from a suitable prior:

$$w = \frac{\lambda}{T+\lambda} \tag{2}$$

Where $\lambda = \dfrac{(N+2)(T-1}{(r_i - r_o 1)' S^{-1}(\bar{r} - r_g 1)(T-N-2}$ (3)

where T is the sample size, N is the number of markets, S is the sample covariance matrix, 1 is a vector of ones, and $\bar{r}$ is a vector of the means. In our calculations we use the MSCI global index as a proxy for the global mean. Finally, another way to diminish estimation risk is to implement the Minimum Variance Portfolio (MVP) approach which depends only on the variance-covariance matrix, and does not include returns. This approach is generally presented as more robust as it is not sensitive very to estimation error. Previous work has also underlined that such a portfolio is qualitatively more stable in its risk characteristics than other portfolios and is therefore more likely to perform better in the ex-post analysis (Pagliari et.al, 1995; Stevenson, 1999). We also consider the naïve portfolio strategy, in which allocations are equally weighted. This model assumes that past performance is irrelevant and does not contain any useful information about future performance. It is expected to perform well in an ex-ante framework as it constraints the impact instability on the input parameters (Frost & Savarino 1988) . For comparison purposes, we finally compute the home, undiversified portfolio.

Another issue to be considered in portfolio optimization is the definition of the adequate measure of risk. Skewness in returns series undermines the robustness of standard deviation as an appropriate measure of risk. Stevenson (2000) compared results of both variance and downside risk measures to construct optimal international portfolios involving developed countries and emerging markets in Latin America and Asia. In all cases the use of a downside risk measure produced superior out-of-sample results. Not surprisingly, in practice investors rather base their optimization decisions on downside risk measures, such as the Lower Partial Moment (hereafter LPM), developed by Bawa (1975) and Fishburn (1977), and the semivariance, which is a special case of the LPM. Both of these measures compute risk using only returns below the mean returns or, alternatively, below a target return. In the presence of negative skewness in a returns series the downside returns will occur in larger magnitudes than the upside returns; the opposite is true in the presence of positive skewness. The popularity of these risk measures is explained by Nawrocki (1999) who points out that investors are interested in minimizing downside risk, since that is what is relevant to them. Further justification is given in Harvey (2000) and Estrada (2000, 2002) who support the idea that downside risk measures matter for studying emerging market equity indices.

We calculate the LPM as:

$$LPM\left(a,t\right)=\frac{1}{K}\sum_{T-1}^{K}Max\left[0,t-R_t\right]^{a} \tag{4}$$

where a is the investor's risk tolerance value and degree of the lower partial moment, t is the target return, K is the number of observations, R_t is the stock return during period t. The LPM is a versatile risk measure in that it accommodates a range of investor behavior, from risk seeking to risk aversion. A value of a = 0 indicates that the investor is risk loving. At a value of a = 1 the investor is risk neutral. When the value of a is set at 2, which is appropriate for a risk-averse investor (see Hwang and Pederson, 2004), the LPM is equivalent to the special case of the semivariance. However, the objective of this paper is to show that the MENA emerging markets might be useful for diversification. Following Gilmore et. Al (2005), we therefore take the standpoint of the risk-averse investor by letting a = 2 and a target return equal to zero.

The period ranging from January 1st, 2002 to January 1st, 2006 is used as an out of sample window, where ex-post returns are calculated based on a rolling monthly rebalancing of portfolios using four years of weekly ex-ante data. For instance, weigths for the January 2002 portfolio are optimized using datas ranging from January 1st, 1998 to December 31st, 2001, and so on until the end of the sample is reached in January 1st, 2006. This allows us to yield a series of 48 ex-post portfolio returns. We then calculate Sharpe measures of portfolio performance as the ratio of mean excess return to standard deviation for each portfolio as (Rp −Rf)/Sp, where Rp is portfolio return,Rf is the risk-free rate (which is assumed to be zero), and Sp is the standard deviation. However the exclusive use of Sharpe ratios has been criticized on the premises that risk is adjusted using a non directionally-biased measure. We therefore also calculate Sortino ratios. This ratio is computationally very similar to the Sharpe Ratio, but uses downside standard deviation as the proxy for risk for investors, instead of using standard deviation of all the fund's returns. This in effect removes the negative penalty that the Sharpe Ratio imposes on positive returns. Finally, we compare the above different strategies using the Jobson-Korkie (1981) statistic defined as follows:

$$t = \frac{s_j r_i - s_i r_j}{\left[\frac{2}{T} \left(s_i^2 s_j^2 - s_i s_j s_{ij} \right)^{\frac{1}{2}} \right]} \qquad (5)$$

where s_j is the appropriate measure of risk of stock return *j*, r_j is the mean return of *j*, and s_{ij} is the covariance between *i* and *j*.

4. Results

Table 3 presents the average and standard deviation for our boostrapped portfolio weights. The average optimal amount of investment in the home market is only 11.10% (in dollars) or 9.11% (in local currencies). This suggests the presence of diversification opportunities in the MENA region. Besides, the smallest home portfolio weight is obtained using the MVP-LPM optimization in local currencie (1.64%). This constitutes preliminary intuition of the performance of the MVP portfolios.
Overall, the optimal MENA portfolio appear well-balanced among the sample countries. This suggests a good performance of the naïve diversification strategy. For instance, the ordered ranking of dollar portfolio weights is Morocco (16.08%), Jordan (15.70%), Tunisia (13.44%), Turkey (11.73%), Israel (11.51%), Egypt (10.46%), and Lebanon (9.97%). Turning to local currency, it is is Jordan (16.75%), Morocco (16.05%), Turkey (14.78%), Tunisia (14.51%), Egypt (10.69%), Lebanon (9.64%) and Israel (8.47%). The differences in country order following the currency denomination of portfolios also suggest that exchange rate factors may affect the optimal allocation of MENA portfolio investment.

INSERT TABLE 3 ABOUT HERE

Analyzing the patterns of portfolio weights across optimization methodologies permits to make some deduction on the country level risk-to-return tradeoff. For instance, market attractivity in Morocco and Tunisia seems to be primarily driven by low risks rather than high returns. Morocco obtains indeed the highest weights when returns are not taken into account, and risk assimilated to downside deviation: allocations in the MVP-LPM portfolio are 37.29% and 37.84% in dollars and local currencies, respectively. By comparison, the CETP portfolio weights are 8.79% and 5.40% using standard deviation as a measure of risk. Similarly, the Tunisian market also gets the highest weights through the MVP approach: 21.30% and 26.45% using SD, and 24.05% and 25.08% using LPM, in dollars and local currencies, respectively.

The opposite situation is found in Jordan and Israel. Portfolio allocations in these two countries are very small when the optimization technique relies on downside risk minimization: Jordan gets 3.95% and Israel 2.46% in the dollar MVP-LPM portfolio. By contrast, the inclusion of returns in the algorithm significantly increases portfolio weights: the dollar CETP-SD portfolio allocates 29.29% of resources to Jordan and 24.40% to Israel. Overall, these two markets seem to display both high returns and risks, in line with the standard view for emerging markets (Bekaert and Harvey, 2004).

Interestingly, portfolio allocations in Egypt seems to be very sensible to the selected measure of risk. Dollar CETP-SD, MVP-SD and BS-SD allocations are 3.20%, 4.34% and 8.82%, versus 7.68%, 21.64%, 13.01% for their LPM counterparts. This clearly suggests a predominance of upwards volatility in the Egyptian market, a not surprising feature considering last decade's massive capitalization increases in the Egyptian market (see Lagoarde-Segot and Lucey, 2006).

We observe the highest cross-methodology standard deviation for Turkey (0.11). More specifically, this country obtains the greatest share of allocations when time series are smoothed towards a common factor (32.82% in the dollar BS-SD portfolio), while weights collapse when the focus shifts towards the minimization of downside risk volatility (0.81% in the local MVP-LPM portfolio). This suggests that in spite of high average returns, the magnitude of downside volatility makes portfolio allocation converge towards to zero when risk minimization is the main optimization criterion. This dynamic might reflect the multiplier impact of the 2001 crisis on downside volatility in the Turkish market.

Finally, Lebanon seems to comparatively display the less attractive risk to return trade-off, being ranked last in dollars and second last in local currencies, with average portfolio weights of 9.97% and 9.64%, respectively. This is not surprising considering that the Lebanese market was almost inexistent at the beginning of the sample period and remains to this day by far the region's smallest.

INSERT FIGURE 1 ABOUT HERE

INSERT FIGURE 2 ABOUT HERE

The patterns of ex-post returns using the rolling ex ante bootstrapped weight are displayed in figure 1 and 2. Inspection of the figures reveals similarities in the dynamic of rolling returns across methodologies. Not surprisingly, the MVP returns appear to be the less volatile both in dollars and local currencies, which suggest a good performance. In dollars, the biggest gap between extreme values seems to be reached through the BS methodology when standard deviation as a measure of risk; and through the CETP methodology when using LPM as a measure of risk. In both cases, the home portfolio appears relatively volatile, which suggest that diversification in the MENA region may be an efficient strategy. Turning to local currencies, the figures are more ambiguous, however the home portfolio displays the most obvious volatility. Each figure display an upward trend, indicating increasing time-varying returns in the MENA region. This suggests that the undergoing reform program in the MENA markets exert a positive effect on their attractivity for international portfolio investment.

INSERT TABLE 4 ABOUT HERE

Table 4 presents the computed Sharpe and Sortino ratios for each methodology and currency denomination. In each case, the lowest ratios are obtained for the non-diversified portfolios, which ranges form 0.01 to 0.03. In line with previous observations, the highest Sharpe and Sortino ratios are obtained using the MVP methodology (0.56 and 1.52, respectively). By comparison, Gilmore et.al (2004) found the maximum ratios to be 0.37 and 0.61 in the emerging markets of Central Europe. Our study therefore clearly suggests a favourable risk-to-return tradeoff in the MENA markets.
Finally, our t-statistics allow to draw some comparisons among investment strategies. We observe that most investment strategies significantly outperform the home portfolio, which confirms previous observations on the presence of significant diversification opportunities in the MENA region. There also seems to be more difference in cross-methodology outcomes when the analysis is undertaken through a single currency. The MVP portfolio appears to be the most promising strategies, as it significantly outperforms the BSP, CETP and home portfolio. Our results therefore suggest that investors considering portfolio diversification in the MENA markets should primarily seek to minimize risk.

INSERT TABLE 5 ABOUT HERE
INSERT TABLE 6 ABOUT HERE

5. Conclusion

The objective of this paper was to investigate the issue of possible portfolio diversification benefits into seven Middle-East and North African (MENA) stock markets. Taking the standpoint of the world investor, our portfolios were constructed in dollars and local currencies to control for currency risk and were based on five optimization models and two risk measures. We then compared the portfolio out-of-sample performance based on Sharpe ratios and the Jobson-Korkie statistic. Overall, our results highlighted the presence of outstanding diversification benefits in the MENA region. In addition, the Minimum Variance Portfolio seemed to display the best performance. Future research could extend the battery of downside risk measures and performance indicators. It might also be necessary to investigate the importance of transaction costs in these markets.

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Table 1Correlation coefficients of the weekly stock market returns over the sample period, 1998-2005

Panel A: in dollars	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Tunisia**	**Lebanon**	**Turkey**	**USA**
Egypt	1.0000							
Israel	0.1115*	1.0000						
	(0.0250)							
Jordan	0.1331*	0.0840	1.0000					
	(0.0074)	(0.0917)						
Morocco	0.0534	0.0368	0.0110	1.0000				
	(0.2841)	(0.4602)	(0.8248)					
Tunisia	0.0115	-0.0282	0.0472	0.1876*	1.0000			
	(0.8180)	(0.5723)	(0.3445)	(0.0002)				
Lebanon	0.1007*	0.0682	0.1418*	0.0426	0.0619	1.0000		
	(0.0431)	(0.1713)	(0.0043)	(0.3934)	(0.2150)			
Turkey	0.1201*	0.2268*	0.0350	-0.0254	0.0243	0.0921	1.0000	
	(0.0157)	(0.0000)	(0.4825)	(0.6100)	(0.6262)	(0.0643)		
S&P 500	0.0764	0.5083*	0.0485	-0.0275	-0.0121	0.1070	0.3030*	1.0000
	(0.1255)	(0.0000)	(0.3306)	(0.5817)	(0.8081)	(0.0316)*	(0.0000)	
Panel B: in local currencies	**Egypt**	**Jordan**	**Israel**	**Morocco**	**Tunisia**	**Lebanon**	**Turkey**	**USA**
Egypt	1.0000							
Israel	0.1436*	1.0000						
	(0.0038)							
Jordan	0.0629	0.1074*	1.0000					
	(0.2070)	(0.0309)						
Morocco	0.1283	0.0127	-0.0079	1.0000				
	(0.0098)*	(0.7991)	0.8746					
Tunisia	0.0509	0.1026*	0.0710	0.1084*	1.0000			
	(0.3070)*	(0.0393)	(0.1545)	(0.0293)				
Lebanon	0.0332	-0.0072	0.0929	0.0784	0.0704	1.0000		
	(0.5055)	(0.8855)	(0.0620)	(0.1154)	(0.1579)			
Turkey	-0.1303*	0.0654	-0.0616	-0.0999*	-0.0324	-0.0038	1.0000	
	(0.0087)	(0.1895)	(0.2169)	(0.0447)	(0.5166)	(0.9401)		
S&P 500	0.1483*	0.0715	0.1044*	0.0642	0.0759	0.0906	-0.0108	1.0000
	(0.0028)	(0.1515)	(0.0360)	(0.1976)	(0.1278)	(0.0689)	(0.8294)	

Note: Numbers in ( ) are the correlation coefficient p-values. (*) indicates significance at the 5% level.

Table 2 Summary statistics of the weekly stock market returns over the sample period, 1998-2005

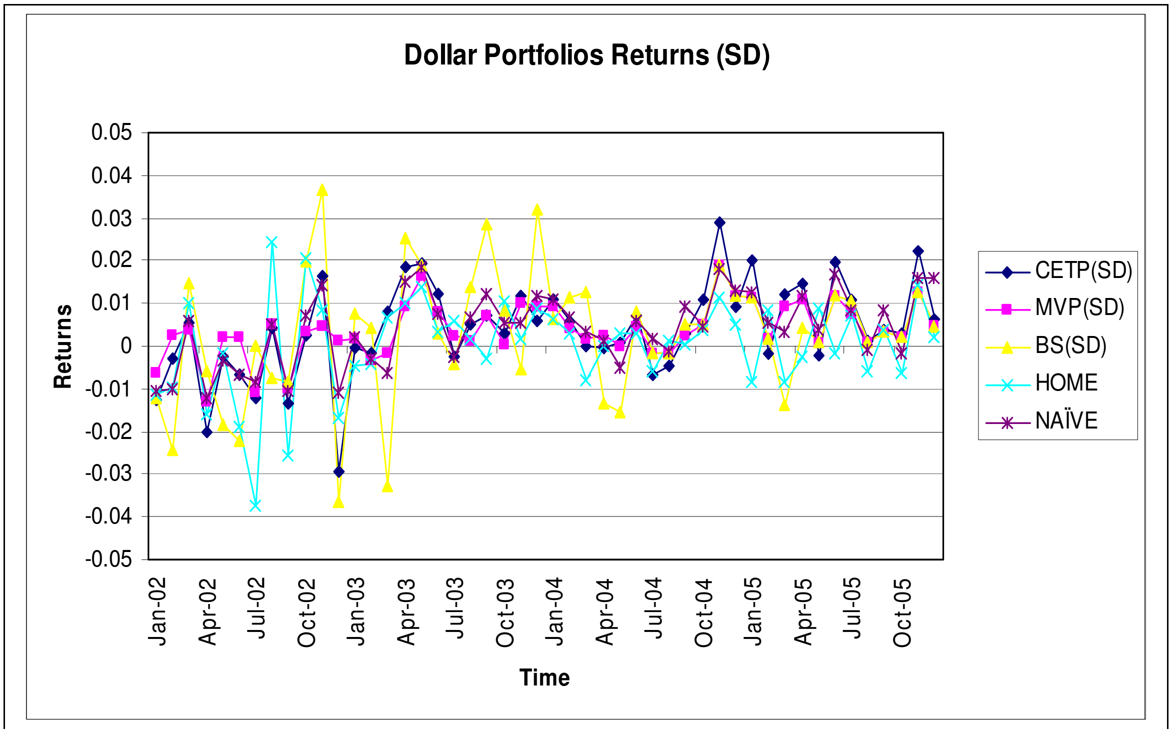
Panel A: in dollars	Egypt	Jordan	Israel	Morocco	Tunisia	Lebanon	Turkey	S&P 500
Mean	0,001	0,001	0,004	0,000	0,001	0,002	0,001	0,001
Std. Dev.	0,038	0,033	0,025	0,032	0,022	0,027	0,084	0,024
Lower Partial Moment	0,015	0,011	0,007	0,011	0,005	0,007	0,073	0,006
Skewness	0,258	-0,603	0,692	0,081	0,455	-0,758	-0,158	-0,431
Kurtosis	4,007	4,143	6,614	7,249	5,363	12,107	4,999	3,742
Jarque-Bera	21,487	46,339	251,494	303,647	107,674	1431,063	68,774	21,733
Panel B: in local currency	Egypt	Jordan	Israel	Morocco	Tunisia	Lebanon	Turkey	S&P 500
Mean	0,003	0,003	0,002	0,002	0,004	-0,001	-0,014	0,001
Std. Dev.	0,037	0,020	0,029	0,024	0,029	0,029	0,231	0,024
Lower Partial Moment	0,014	0,004	0,009	0,006	0,009	0,009	0,552	0,006
Skewness	0,532	0,406	-0,248	0,451	-0,364	0,510	2,617	-0,435
Kurtosis	5,165	3,994	2,682	5,403	11,709	6,190	70,956	3,747
Jarque-Bera	97,960	27,758	5,842	110,895	1285,754	188,780	78198,320	22,139

Note: A target rate of zero is used for the lower partial moment (LPM) measure.

Table 3 Average Rolling Bootstrapped Portfolio Weights, 1997-2006

Panel A: in dollars	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Turkey**	**Lebanon**	**Tunisia**	**S&P 500**
CETP-SD	3.20%	24.40%	29.29%	8.79%	4.52%	7.60%	8.61%	13.59%
MVP-SD	4.34%	5.30%	21.92%	21.78%	1.91%	11.53%	21.30%	11.92%
BSP-SD	8.82%	3.32%	13.37%	9.22%	32.82%	16.03%	9.51%	6.91%
NAÏVE-SD	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
HOME-SD	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
CETP-LPM	7.68%	18.70%	24.21%	14.74%	7.98%	4.17%	9.38%	13.15%
MVP-LPM	21.64%	2.46%	3.95%	37.29%	0.84%	4.41%	26.45%	2.97%
BSP-LPM	13.01%	12.93%	7.87%	11.81%	20.77%	11.03%	7.28%	15.29%
NAÏVE-LPM	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
HOME-LPM	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Average	*10.46%*	*11.51%*	*15.70%*	*16.08%*	*11.73%*	*9.97%*	*13.44%*	*11.10%*
St.dev	*0.06*	*0.08*	*0.09*	*0.09*	*0.11*	*0.04*	*0.07*	*0.04*
Panel B: in local currencies	**Egypt**	**Israel**	**Jordan**	**Morocco**	**Turkey**	**Lebanon**	**Tunisia**	**S&P 500**
CETP-SD	8.32%	17.55%	27.02%	5.40%	20.95%	7.23%	6.36%	7.16%
MVP-SD	4.28%	5.68%	20.83%	19.37%	2.55%	12.00%	24.05%	11.25%
BSP-SD	8.11%	3.00%	16.94%	13.37%	22.04%	15.11%	14.53%	6.91%
NAÏVE-SD	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
HOME-SD	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
CETP-LPM	5.94%	3.95%	27.14%	20.01%	16.98%	3.67%	16.11%	6.21%
MVP-LPM	22.47%	2.53%	4.05%	37.84%	0.81%	4.07%	26.58%	1.64%
BSP-LPM	11.37%	10.06%	13.01%	7.41%	29.91%	10.03%	3.47%	14.74%
NAÏVE-LPM	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%	12.50%
HOME-LPM	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%
Average	10.69%	8.47%	16.75%	16.05%	14.78%	9.64%	14.51%	9.11%
St.dev	0.06	0.05	0.08	0.10	0.10	0.04	0.08	0.04

Figure 1: Holding period returns, in dollars



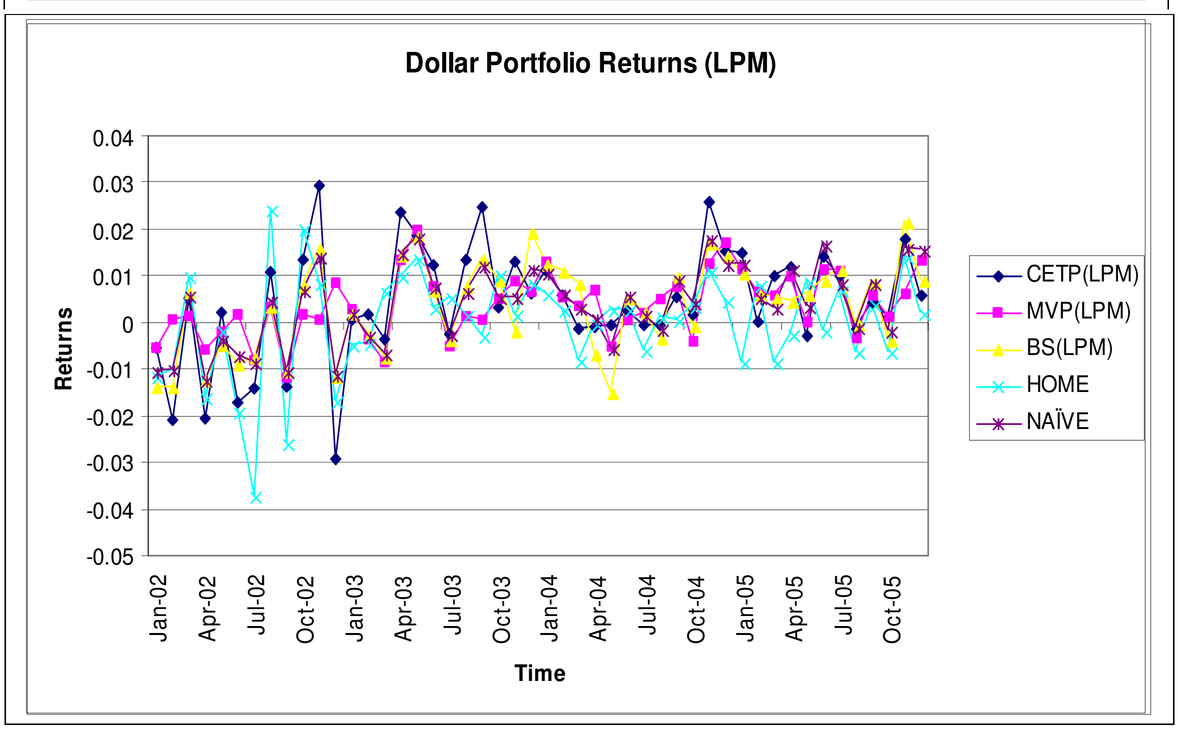
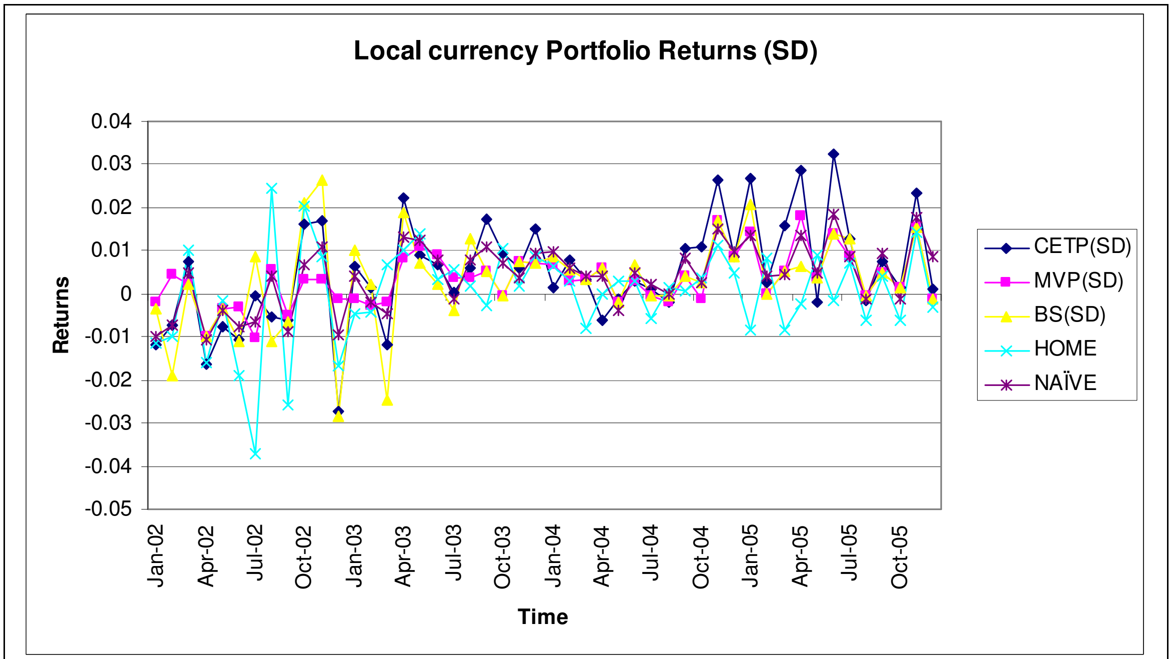


Figure 2: Holding period returns, in local currencies



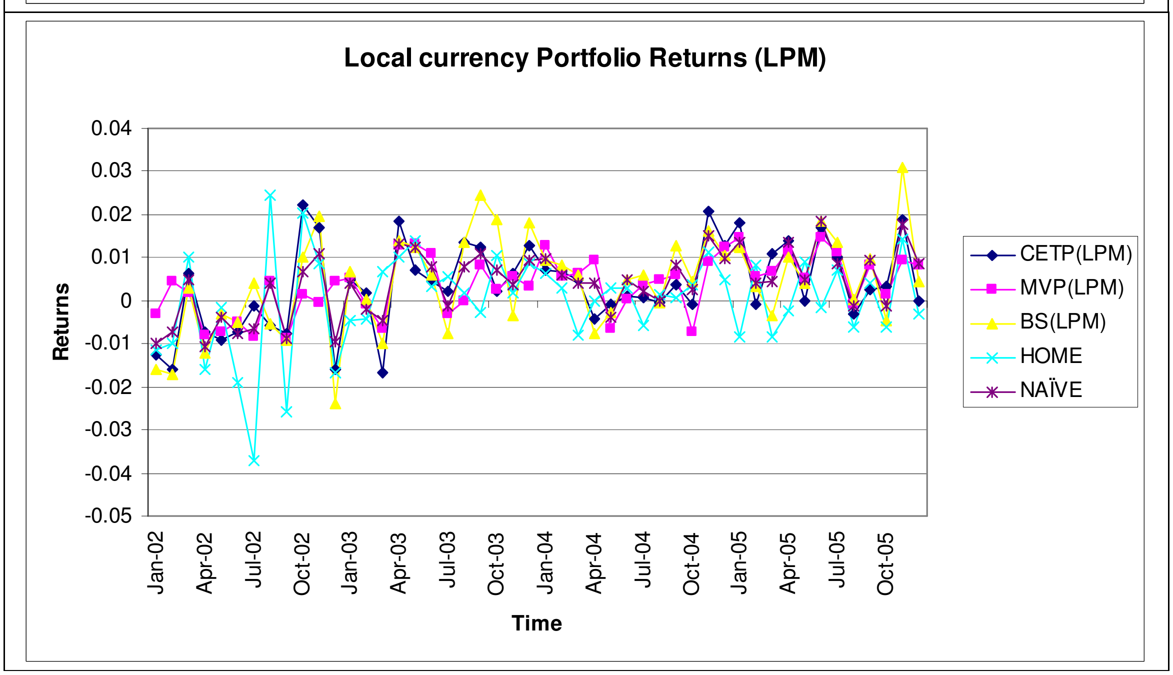


Table 4 Performance ratios

Methodology	*Sharpe ($)*	*Sortino ($)*	*Sharpe*	*Sortino*
CETP-SD	0.36	0.68	0.42	0.97
MVP-SD	0.58	1.29	0.54	1.52
BSP-SD	0.18	0.31	0.29	0.50
NAÏVE-SD	0.49	1.16	0.54	1.28
HOME-SD	0.02	0.03	0.01	0.02
Average	*0.33*	*0.69*	*0.36*	*0.86*
CETP-LPM	0.35	0.64	0.37	0.78
MVP-LPM	0.55	1.41	0.56	1.37
BSP-LPM	0.39	0.85	0.38	0.81
NAÏVE-LPM	0.49	1.16	0.54	1.28
HOME-LPM	0.02	0.03	0.01	0.02
Average	*0.36*	*0.82*	*0.37*	*0.85*

Table 5 Statistical comparisons of the out of sample performance : in dollars

Panel A: Sharpe Ratios								
	S&P (SD)	EQWP (SD)	MVP (SD)	BSP (SD)	S&P (LPM)	EQWP (LPM)	MVP (LPM)	BSP (LPM)
EQWP (SD)	-3.78**							
MVP (SD)	-4.76**	-1.05						
BSP (SD)	-1.01	3.21**	2.66**					
CETP (SD)	-2.55**	1.70**	2.81**	-1.35				
EQWP (LPM)	-3.78**	0.00	1.05	-3.21**	-3.78**			
MVP (LPM)	-3.35**	-0.50	0.38	-2.29**	-3.55**	-0.50		
BSP (LPM)	-2.85**	1.73**	1.80**	-2.47**	-2.85**	1.73**	1.31	
CETP (LPM)	-2.66**	2.04**	2.26**	-1.65	-2.66**	2.04**	1.44	0.48
Panel B: Sortino Ratios								
	S&P (SD)	EQWP (SD)	MVP (SD)	BSP (SD)	S&P (LPM)	EQWP (LPM)	MVP (LPM)	BSP (LPM)
EQWP (SD)	-5.11**							
MVP (SD)	-5.72**	-0.35						
BSP (SD)	-5.02**	2.89**	5.94**					
CETP (SD)	-3.94**	1.43	1.89**	-1.92**				
EQWP (LPM)	-5.11**	0.00	0.35	-2.89**	-5.11**			
MVP (LPM)	-9.21**	-0.69	-0.33	-6.85**	-7.65**	-0.69		
BSP (LPM)	-4.17**	0.80	1.38	-1.84**	-4.17**	0.80	1.72	
CETP (LPM)	-3.44**	1.51	2.24**	-1.41	-3.44**	1.51	3.07**	0.67

Note:This table presents the Jobson and Korkie (1981) test for the equality of the Sharpe ratios . For 48 degrees of freedom, the one-tail test at a 5% level is 1.686.

Table 6 Statistical comparisons of the out of sample performance : in local currencies

	S&P (SD)	EQWP (SD)	MVP (SD)	BSP (SD)	S&P (LPM)	EQWP (LPM)	MVP (LPM)	BSP (LPM)
Panel A: Sharpe Ratios								
EQWP (SD)	-4.12**							
MVP (SD)	-4.60**	0.05						
BSP (SD)	-1.67	2.45**	1.76**					
CETP (SD)	-2.58**	1.65	1.17	-1.45				
EQWP (LPM)	-4.12**	0.00	0.05	-2.45**	-4.12**			
MVP (LPM)	-3.43**	-0.20	-0.18	-1.76**	-3.44**	-0.20		
BSP (LPM)	-2.44**	2.15**	1.20	-0.93	-2.44**	2.15**	1.23	
CETP (LPM)	-2.31**	2.22**	1.52	-1.13	-2.31**	2.22**	1.43	0.16
Panel B: Sortino Ratios								
	S&P (SD)	EQWP (SD)	MVP (SD)	BSP (SD)	S&P (LPM)	EQWP (LPM)	MVP (LPM)	BSP (LPM)
EQWP (SD)	-5.86**							
MVP (SD)	-5.49**	0.55						
BSP (SD)	-5.40**	2.69**	4.23**					
CETP (SD)	-8.27**	0.80	-1.40	-1.57				
EQWP (LPM)	-5.86**	0.00	0.55	-2.69**	-5.86**			
MVP (LPM)	-10.52**	-0.22	0.35	-4.64**	-10.37**	-0.22		
BSP (LPM)	-6.12**	1.28	2.32**	-1.12	-6.12**	1.28	2.22**	
CETP (LPM)	-6.38**	1.35	2.08**	-0.93	-6.38**	1.35	2.05**	-0.07

Note:This table presents the Jobson and Korkie (1981) test for the equality of the Sharpe ratios . For 48 degrees of freedom, the one-tail test at a 5% level is 1.686.

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