

## Volume 37, Issue 1

### The Performance Ranking of Emerging Markets Islamic Indices Using Risk Adjusted Performance Measures

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#### Abstract

This paper evaluates the performance of Emerging Market (EM) Morgan Stanley Capital International (MSCI) Islamic indices of 20 countries located in 3 different regions; using 16 different risk adjusted performance measures (RAPMs). The conducted tests show that only Sharpe and M2 Ratios give the identical rankings, Pearson Linear Correlation Coefficient analysis was also performed to measure the correlation between the rankings of 16 RAPMs. The final rankings of the indices are obtained using the Borda count method. Our results suggest that, on a regional basis, the performances of Asian countries are found to be better than both Latin American and EMEA (Europe, Middle East and Africa) region countries. When the countries are examined individually, EM Colombia Islamic index comes first in the assessment; EM United Arab Emirates Islamic index comes at the last position.

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**Citation:** Selim baha Yildiz and Abdelbari El khamlichi, (2017) "The Performance Ranking of Emerging Markets Islamic Indices Using Risk Adjusted Performance Measures", *Economics Bulletin*, Volume 37, Issue 1, pages 63-78

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**Submitted:** June 07, 2016. **Published:** January 13, 2017.

## 1. Introduction

Emerging markets (EM) have attained a critical mass in the global economy. Many emerging countries have attained a double-digit growth rate for years. But after the 2008 crisis, a new reality has come into play and a slowdown has taken hold in some countries (China for example). Since then, global trends have tended to affect them as a unit, but also individually. According to the Institute of International Finance (IIF 2016), EM equity markets are now trading at steep discounts to mature markets, which could be viewed as attractive to some investors. Furthermore, these markets became highly fragmented as some of them could be more attractive than others. Ethical investments could play a role by providing alternative products that enable investors to diversify their portfolios.

As a part of ethical investments, Islamic finance could be classified as faith-based or morally responsible (Ghoul and Karam 2007). Based on a set of principles, the rationale behind the establishment of Islamic financial institution is the prohibition of *riba*<sup>1</sup> in Islam. The latter prohibits also investments in some sectors qualified as non-ethical (alcohol, pork related products, etc.) and Gharar which means excessive uncertainty in a business transaction. These prohibitions do not mean that making profit is banned, but Shariah (Islamic law) promotes investments based on profit and loss sharing by the contracting parties. Furthermore, all transactions should be backed by real assets.

The historical activity of Islamic finance was banking according to Shariah principles. Hence in order to insure financial intermediation between borrowers and lenders, Islamic banks started their activities in the mid-seventies. Dubai Islamic Bank was the first Islamic commercial bank established in 1975, the same year saw the establishment of Islamic Development Bank at governmental level.

Since then, the Islamic financial industry has witnessed a significant progress which encourages the establishment of more Shariah compliant banks. This progress promotes Islamic financial institutions to create other segments, such as Takaful (Islamic insurance) Sukuk (Islamic asset based securities), Islamic mutual funds, and Islamic equity indices.

Islamic equity indices were launched in order to provide Muslim investors with investments without compromising their religious beliefs. They also provide diversification opportunities for non-Muslim investors. The subject of Islamic equity indices has gained interest among researchers in the past years. Hence, since the inception of these indices in the late nineties<sup>2</sup>, many papers have analysed these indices as compared to other conventional counterparts<sup>3</sup>.

The analysed aspects were numerous. On the one hand, a set of papers studied the efficiency; for example, Guyot (2011) highlighted that Islamic portfolios could be more sensitive to geopolitical events, but Shariah criteria don't compromise efficient investment allocation. El Khamlichi et al. (2014a) studied a sample of four Islamic indices families and showed that Islamic indices have

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<sup>1</sup>Literally, it means increase, or addition or growth. Technically it refers to the "premium" that must be paid by the borrower to the lender along with the principal amount as a condition for the loan or an extension of its maturity. *Riba* could be considered as equivalent to interest (Iqbal 2002).

<sup>2</sup> The first Islamic index was SAMI (Socially Aware Muslim Index), launched in 1998. Then, Dow Jones launched DJIMI (Dow Jones Islamic Market Index) in February 1999. In October of the same year, Financial Times Stock Exchange (FTSE) created FTSE Shariah to be the first Islamic index in UK.

<sup>3</sup>For a detailed literature review on Islamic indices, see : El Khamlichi et al. (2014b)

the same level of inefficiency as conventional ones, with the existence of long-run diversification opportunities.

On the other hand, some papers focused on the performance of Islamic indices. For example Zaminor et al. (2013) indicated that the performance of most Islamic indices is superior to the performance of the conventional indices. To analyse the effect of crisis, the performance was analysed in different market conditions. Ahmad and Ibrahim (2002) found no significant difference in terms of performance during expansion and economic meltdown. However, some researchers highlighted that Islamic indices provide positive abnormal returns over the entire period and the bull market period, and underperform their counterparts over the bear market period (Hussein 2004; Hussein and Omran 2005). In the same vein, some papers studied the effect of financial crisis on Shariah compliant portfolio performance. Indeed, Al-Khazali et al. (2014) and Arouri et al. (2013) concluded that Islamic equity indices outperform their conventional counterparts during and after the financial crisis. However, Ho et al. (2014) found that Islamic indices outperformed their conventional counterparts only during crisis periods; their results are inconclusive for the non-crisis periods.

To assess whether the size does matter in the performance of Islamic equity indices, this effect was also studied. Miglietta and Forte (2007) documented that Islamic stock selection does not neglect the small caps. Hussein and Omran (2005) highlighted that small size firms are the drivers of the positive performance. In a recent paper, Charles and Darné (2015) found that the Shariah compliant screens modify the proportion of firm sizes. The sector level was also studied by Miglietta and Forte (2007) who found that Islamic indices are highly exposed to Oil&Gas sector. In terms of risk-adjusted performance, Charles and Darné (2015) documented that the Islamic sector indices outperform their conventional counterpart for Basic Materials, Consumer Goods and Services, Health Care, Industrials, Technologies and Telecommunications.

Even if the literature focused on Islamic equity indices starts to become well documented, the current researches suffer from some weaknesses. Firstly, the most existing papers used classical performance measures. But, according to the financial literature, the performance measures could lead to different rankings. To overcome this shortcoming, Walkshausl and Lobe (2012) proposed to use alternative measures and style analysis. We extend this study by using more recent measures and covering a wide range of countries. Secondly, vast majority of the previous studies on Islamic indices compare Islamic indices to conventional indices; and due to the lack of data on Islamic indices, short histories of Islamic and conventional indices are analysed. Our paper bridges the gap by making a comprehensive performance evaluation on the Emerging Markets Islamic indices in itself by applying 16 risk adjusted performance measures (RAPMs), in a long run analysis, since we use data from May 2002 to April 2015. Thirdly, even recent papers (Dewandaru et al. 2015) fail to highlight a significant difference of performance between Islamic and conventional indices. Using a wide range of indices (20 emerging markets located in 3 different regions), we assess whether the performance is country dependent.

Furthermore, according to our analysis, the 16 RAPMs could lead to different rankings, only Sharpe and  $M^2$  Ratios give the identical rankings. The use of Borda count method (Emerson 2013) enables to have a final ranking, taking into account the order given by each RAPM. Our results suggest that performances of the Islamic indices in Asia are generally superior to the Islamic indices of EMEA (Europe, the Middle East and Africa) and Latin America regions.

The remainder of the article is structured as follows: Section 2 is devoted to data and applied methodology, results will be discussed in Section 3, and Section 4 wraps the paper.

## 2. Data and Methodology

The purpose of this paper is to rank the performance of 20 Morgan Stanley Capital International (MSCI) Emerging Markets (EM) Islamic Indices using 16 risk adjusted performance measures. This section defines the data and empirical measures applied to compare the performance measurements of the indices. Indices price series are monthly and acquired from MSCI web site<sup>4</sup>. All index data are in U.S. dollars, based on closing prices and in the form of total returns (gross returns with reinvested dividends). The Islamic indices of 20 countries in accordance with the market classification made by the MSCI are divided into 3 sub-categories<sup>5</sup>. These categories are Asia, Latin America, and EMEA that are represented by 8, 4, and 8 countries respectively. Note that although 23 countries are listed in the MSCI dataset, we have excluded three of these countries (Peru, Greece, and Hungary) since related data is not completely available. The sample period is from May 2002 to April 2015 for 17 indices – providing 155 monthly returns, from June 2004 to April 2015 for one index – providing 131 monthly returns and from June 2005 to April 2015 for 2 indices – providing 119 monthly returns. Table 1 shows MSCI Islamic Indices of the countries, sample periods, and regions of each index within the study. The MSCI Emerging Market Islamic Index is selected as a market benchmark for all indices and one month British Bankers Association (BBA) LIBOR is acquired from the Global Financial Database which is used as proxy for risk free rate return.

The methodology in this study consists of three steps. Firstly, the arithmetic returns are estimated by subtracting the previous month's index value from the current month index value and dividing it by the previous month's index value as shown in the below equation, where  $R_t$  denotes the return of the index during month  $t$ ,  $P_t$  denotes the index at time  $t$  (this month's index) and  $P_{t-1}$  denotes the index at time  $t - 1$  (last month's index).

$$R_t = (P_t - P_{t-1})/P_{t-1}$$

In the second step of the study, 16 RAPMs in five different categories (absolute, relative, drawdown, partial moments and extreme RAPMs) are used, in order to rank the performance of the Islamic indices. Table 2 gives brief information about these measures.

In the last step, we aim to unite the results of 16 RAPMs into a single ranking by employing the Borda count method (Emerson, 2013). According to it, since there are 20 indices in our study, 20 points are assigned to the 1<sup>st</sup> index, 19 (20-1) points are assigned to the 2<sup>nd</sup> index and so on, for each RAPM. Then the indices are ranked based on the total points they receive.

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<sup>4</sup> <https://www.msci.com/end-of-day-data-search> [accessed May 2016]

<sup>5</sup> <https://www.msci.com/market-cap-weighted-indexes> [accessed May 2016]

### 3. Results and discussion

Table 3 includes the summary statistics for the 20 Emerging Market Islamic Indices and the benchmark Islamic Index for the overall period of the study. Colombia and Philippines Islamic Indices have achieved the highest annualized mean return over the sample period. The annualized monthly returns for these two markets are 21.21% and 19.68% respectively. Furthermore, Colombia and Philippines have achieved the best performance of their regions too. In addition, Czech Republic has provided the maximum mean return among EMEA Region countries. On the other side, United Arab Emirates (UAE) Islamic Index is the worst performer and the only negative return providing index among all of the Islamic Indices during the study period. For Asia and Latin America Regions, the lowest returns are generated by Taiwan and Brazil Islamic Indices. Finally, the benchmark index yields 10.24% in a year. Eight countries' Islamic Indices' mean returns are below the benchmark index.

Regarding the total risk level; UAE, Turkey, and Brazil have the highest standard deviation which means it was the riskiest among all other indices while Malaysia, Chile, and Taiwan exhibit lower annualized standard deviations of monthly returns than their counterparts. Generally, the risk level of the countries in EMEA Region is higher than the other two regions. For instance; South Africa, which has the minimum risk level (26.25%) in the EMEA Region, ranks fifth in general and the Czech Republic, which has the second lowest risk level (29.49%) in the same region, is more risky than eight of the twelve countries in the other regions. Benchmark index with 23.26% has the next lowest risk level than Malaysia.

In harmony with the standard deviation data, the most extreme minimum and maximum monthly returns among Islamic Indices are from EMEA Region countries. The largest monthly decrease in value belongs to UAE (-44.45%) while the largest monthly increase in value has been detected in Turkey (63.16%).

Examining to the third and fourth moments of the distribution, with the exceptions of Korea, Philippines, Turkey, Egypt, Qatar and UAE, all return distribution of indices are negatively skewed. This indicates that, for most indices, most values are concentrated on the right of the mean with extreme values to the left. The excess kurtosis values are greater than 0 for all indices, this means the distribution is leptokurtic and fatter tails and/or a more peaked form than a normal distribution. According to the Jarque-Bera (JB) normality test, with the exceptions of Taiwan, Colombia, Czech Republic and Poland, null hypothesis of the normality of the returns should be rejected, and implying that series are not normally distributed.

Table 4 reports RAPM results of each country's Islamic Indices and their rank orders in parentheses. Evaluating the results, Malaysia and Philippines Islamic Indices exhibit the best performance in the six of the RAPMs. Colombia and Thailand follow these countries, by taking the first place three times and once, respectively. For the second order, Colombia has 10 places, Philippines has 4 places, Malaysia and Thailand have 1 place for each. Third order is shared among 6 different countries. These are Philippines with 5 times, Malaysia with 4 times, Czech Republic with 3 times, Colombia with 2 times, Indonesia and Turkey once. In total; Colombia, as a representative of Latin America, appears in top three 15 times by ranking first three times, ranking second ten times, and ranking third two times. Philippines, the representative of Asia, also has 15 top three rankings while six of them are first place. Malaysia, as another representative of Asia, emerges in top three 11 times.

It is obvious that UAE exhibits the worst performance by taking the last place in 15 out of the 16 RAPMs. Only in the Information Ratio, South Africa exhibits the worst performance. In the second worst performance order, we see Russia 8 times, Qatar 6 times, and Brazil and Taiwan once for each. In the 18<sup>th</sup> rank order, which indicates the third worst performance, Russia appears 8 times, Qatar 7 times, and Brazil once. In general, UAE which is a country in the EMEA Region shows the worst performance by ranking last in almost all of the RAPMs. Russia Islamic Index can also be qualified as unsuccessful since it appears in the last three places in all of the RAPMs. Another representative of the EMEA Region, Qatar, takes place in the last three orders 15 times.

Table 5 includes the points of each country's MSCI Islamic Indices for each RAPM according to the Borda Count method. In the last column of the table, final rankings of the countries are listed. If we consider our case as a league with 20 teams, Colombia as a representative of Latin America takes the top place with a score of 303 points. As a representative of Asia, Philippines follows Colombia with 1 less point. Another Asia representative Malaysia is the third in this league, with 286 Borda points. Thailand and Indonesia from Asia take the fourth and fifth places respectively. The best Islamic Index in the EMEA Region is of the Czech Republic with 245 Borda points and it takes the sixth place in the overall ranking. Turkey, which ranks the ninth in overall, is the second best Islamic Index in the EMEA region.

The last three rankings are from the EMEA Region countries: Qatar is the 18<sup>th</sup> with 52 points, Russia is the 19<sup>th</sup> with 40 points, and UAE is the 20<sup>th</sup> with 19 points. Brazil Islamic Index ranks 17<sup>th</sup> with 65 points in general and it exhibits the worst performance in Latin America; while the worst performance of Asia is from Taiwan with 114 points and rank of 14<sup>th</sup>.

When we compare the three regions in this study, Asia Islamic Indices seem the most prominent. Eight countries from Asia are included in this study and the average score of these countries is 213. Top five of the overall ranking, other than the first order, are from Asia countries. Asia countries take 20 full points (Philippines 6 times, Malaysia 6 times, Thailand once) in the 13 of the 16 measures. Even Taiwan, which exhibits the worst performance in this region, takes more than 10 points in two of the RAPMs.

The runner up region is Latin America which takes place in the ranking with four countries and the average score of these countries is about 187. Colombia from this region ranks first in the overall, while Chile is the seventh and Mexico is the twelfth. From this region, only Brazil, which brings up the rear in this region, takes less than 100 points.

Among these regions, EMEA region with eight countries has the worst performance with average score about 114. Czech Republic, which is the top of this region, could become 6<sup>th</sup> in the overall ranking. Only Czech Republic, Turkey, and Egypt could achieve more than 100 points in total in this region. The last places of the overall ranking are also from this region (Qatar, Russia, and UAE).

Table 6 shows the Spearman's rank correlation coefficients between 16 RAPMs. With reference to Table 6 all performance measures present very high correlation between each other. The highest possible rank correlation of 1.00 is found when comparing the Sharpe and  $M^2$  ratios, while the lowest value of 0.72 is found with the Upside Potential and the Pain ratios. While these correlation results are in agreement with Eling and Schuhmacher (2006, 2007) and Auer and Schuhmacher (2013) found in a hedge fund context and Auer (2015) obtained in a

commodity investment context; disaccording Caporin and Lisi (2009) analysed in a S&P Index and Zakamouline (2010) obtained in a hedge fund context.

Table 7 includes the total scores and ranks (in parenthesis) of 16 RAMPs according to 5 categories (absolute, relative, drawdown, partial moment, and extreme risk). In the ranking with respect to the methods based on absolute risk, Malaysia, Philippines, and Colombia share the first rank with 38 points and Indonesia follows these countries. According to the ranking with the relative risk measurement methods, the uppermost country is Colombia, Philippines comes the second, and Thailand is in the third order. In the rankings of the partial moment and drawdown categories, Philippines takes the first order; while the first order belongs to Malaysia in the extreme risk category. In all the five categories examined in this study, UAE is the worst performing country. Russia is the penultimate country in absolute, relative, and drawdown categories; whereas it is the third last country in the other categories.

#### **4. Conclusion**

Despite the huge number of studies focused on the comparison between Islamic and conventional indices, most of them failed to document overall statistically performance difference. For this reason, many researchers tried to add explicative variables such as studying the differences during crisis and non-crisis periods. Also some of them assessed whether big, medium or small size firms are the drivers of the performance. Others attributed the performance either to the index family or the performance measures.

The contribution of our article is threefold. The first one is the use of a wide range of Islamic indices (20 emerging markets located in 3 different regions), and we assess whether the performance is country dependant in a long run analysis, covering the period of data from May 2002 to April 2015. The second contribution is the use of comprehensive performance evaluation on the Emerging Markets Islamic indices by applying 16 risk adjusted performance measures (RAPMs), divided into three regions (Asia, Latin America and EMEA). The third contribution is that we have examined whether there are some differences between the ranking results of the RAPMs that are used in this study.

Our results exhibit that performance could differ from a measure to another and therefore lead to different investment decisions. Only Sharpe and  $M^2$  Ratios give the identical rankings. The use of Borda count method enables to have a final ranking, taking into account the order given by each RAPM. When we evaluate on a regional basis, Emerging Market Islamic Indices of Asia Region generally outperform the remaining regions. According to the country based assessment, Colombia as a representative of Latin America takes the top place; Philippines and Malaysia from Asia take the second and third places respectively. The last three rankings are from the EMEA Region countries: Qatar, Russia, and UAE.

The managerial implications of our results are related to portfolio diversification by the managers and investors. Indeed, the study of risk-adjusted performance of Islamic indices and their rankings shows that some emerging markets are more attractive than others, and therefore could lead to different investment decisions and portfolio allocation. Future works should go for in depth analysis to look into the behaviour of risk-averse and risk-seeking investors towards these Islamic indices.

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**Table 1: Summary of the MSCI Emerging Market Islamic Indices**

<b>MSCI Index</b>	<b>Sample Period</b>	<b>Region</b>	<b>MSCI Index</b>	<b>Sample Period</b>	<b>Region</b>
China Islamic	May 2002-April 2015	Asia	India Islamic	May 2002-April 2015	Asia
Indonesia Islamic	May 2002-April 2015	Asia	Korea Islamic	May 2002-April 2015	Asia
Malaysia Islamic	May 2002-April 2015	Asia	Philippines Islamic	May 2002-April 2015	Asia
Taiwan Islamic	May 2002-April 2015	Asia	Thailand Islamic	May 2002-April 2015	Asia
Brazil Islamic	May 2002-April 2015	Latin America	Chile Islamic	May 2002-April 2015	Latin America
Colombia Islamic	May 2002-April 2015	Latin America	Mexico Islamic	May 2002-April 2015	Latin America
Czech Rep. Islamic	May 2002-April 2015	EMEA	Poland Islamic	May 2002-April 2015	EMEA
Russia Islamic	May 2002-April 2015	EMEA	Turkey Islamic	May 2002-April 2015	EMEA
S. Africa Islamic	May 2002-April 2015	EMEA	Egypt Islamic	June 2004-April 2015	EMEA
Qatar Islamic	June 2005-April 2015	EMEA	U.A.E. Islamic	June 2005-April 2015	EMEA
EM Islamic	May 2002-April 2015	Benchmark Index			

**Table 2: Risk Adjusted Performance Measures**

Measure	Formula	Explanation
<b>Absolute Risk-Adjusted Performance Measures</b>		
Sharpe Ratio (SR) (Sharpe, 1966)	$SR = (\bar{r}_i - \bar{r}_f) / \bar{\sigma}$	$\bar{r}_i$ : annualised index return $\bar{r}_f$ : annualised risk free return $\bar{\sigma}$ : annualised index risk
Treynor Ratio (TR) (Treynor, 1965)	$TR = (\bar{r}_i - \bar{r}_f) / \beta_i$	$\beta_i$ : index beta
<b>Relative Risk-Adjusted Performance Measures</b>		
Information Ratio (IR) (Kidd, 2011)	$IR = (\bar{r}_i - \bar{r}_b) / \bar{\sigma}_{i-b}$ $\bar{\sigma}_{i-b} = \sqrt{\frac{\sum_{i=1}^n (r_i - \bar{r})^2}{n}}$	$\bar{r}_b$ : annualised benchmark index return $\bar{\sigma}_{i-b}$ : annualised tracking error $\bar{r}$ : mean of excess return $n$ : number of observation
Jensen's Alpha (JA) (Jensen, 1968)	$\bar{\alpha} = \bar{r}_i - \bar{r}_f - \beta_i (\bar{r}_b - \bar{r}_f)$	$\alpha$ : annualised Jensen's alpha
Modigliani–Modigliani measure ( $M^2$ ) (Modigliani and Modigliani, 1997)	$M^2 = (\bar{r}_i - \bar{r}_f) \times \left( \frac{\bar{\sigma}_b}{\bar{\sigma}} \right) + \bar{r}_f$	$\bar{\sigma}_b$ : annualised benchmark index risk
<b>Drawdown Risk Adjusted Performance Measures</b>		
Calmar Ratio (CR) (Young, 1991)	$CR = (\bar{r}_i - \bar{r}_f) / D_{Max}$	$D_{Max}$ : measures the largest single drop from peak to bottom in the value of an index (before a new peak is achieved)
Sterling Ratio* (StR <sub>d</sub> ) (Kestner, 1996)	$StR_d = (\bar{r}_i - \bar{r}_f) / \bar{D}_{Lar}$ $\bar{D}_{Lar} = \left  \sum_{j=1}^d \frac{D_j}{d} \right $	$\bar{D}_{Lar}$ : average largest drawdown $D_j$ : j <sup>th</sup> drawdown over entire period $d$ : total number of drawdowns in entire period
Modified Burke Ratio (MBR <sub>d</sub> ) (Burke, 1994; Bacon, 2012)	$MBR_d = (\bar{r}_i - \bar{r}_f) / DD$ $DD = \sqrt{\sum_{j=1}^d \frac{D_j^2}{n}}$	DD: drawdown deviation
Pain Ratio (PR) (Zephyr Associates, 2006)	$PR = (\bar{r}_i - \bar{r}_f) / PI$ $PI = \sum_{i=1}^n \frac{ D_i }{n}$	PI (pain index): mean value of the drawdowns over the entire analysis period
Martin Ratio (MR) (Martin and McCann, 1998)	$MR = (\bar{r}_i - \bar{r}_f) / UI$ $UI = \sqrt{\sum_{i=1}^n \frac{D_i^2}{n}}$	UI (ulcer index): volatility measure that only captures continuous downside movements in index, and ignores upside volatility
<b>Partial Moments Risk Adjusted Performance Measures</b>		
Omega Ratio (OR) (Keating and Shadwick, 2002)	$OR (\Omega) = \mu_u / \mu_d$ $\mu_u = \frac{1}{n} \times \sum_{i=1}^n \max (r_i - r_t, 0)$ $\mu_d = \frac{1}{n} \times \sum_{i=1}^n \max (r_t - r_i, 0)$	$\mu_u$ (upside potential): upside potential is the average sum of returns above target $\mu_d$ (downside potential): downside potential is the average sum of returns below target
Sortino Ratio (SoR) (Sortino and Van Der Meer, 1991)	$SoR = (\bar{r}_i - \bar{r}_t) / \bar{\sigma}_d$ $\sigma_d = \sqrt{\sum_{i=1}^n \frac{\min [(r_i - r_t), 0]^2}{n}}$	$\bar{\sigma}_d$ : annualized downside risk $r_t$ : annualized minimum target return

Kappa 3 ( $K_3$ ) (Kaplan and Knowles, 2004)	$K_3 = \frac{(\tilde{r}_i - \tilde{r}_f)}{\sqrt{\frac{1}{n} \times \sum_{i=1}^n \max(r_t - r_f, 0)^2}}$	
Upside Potential Ratio (UPR) (Sortino et al, 1999)	$UPR = \frac{\frac{1}{n} \times \sum_{i=1}^n \max(r_i - r_f, 0)}{\tilde{\sigma}_d}$	
<b>Extreme Risk Adjusted Performance Measures</b>		
Reward to VaR <sup>**</sup> (R to VaR) (Alexander and Baptista, 2003)	$Reward\ to\ VaR = (\tilde{r}_i - \tilde{r}_f) / VaR_{1-\alpha}$	$VaR_{1-\alpha}$ the absolute of the worst ranked return with (1- $\alpha$ ) confidence
Conditional Sharpe Ratio (CSR) (Agarwal, Naik, 2004)	$CSR = (\tilde{r}_i - \tilde{r}_f) / CVaR$ $CVaR_{1-\alpha} = \frac{ \sum_{i=1}^n \langle r_i   r_i < VaR_{1-\alpha} \rangle }{n_{VaR}}$	$n_{VaR}$ : number of returns that more negative than the value at risk

\* Average largest drawdown d=5 takes for Sterling Ratio and Modified Burke Ratio

\*\* The probability of  $\alpha$  takes a value of 5% equating to confidence levels of 95%

**Table 3: Descriptive Statistics**

<b>Country</b>	<b>Mean</b>	<b>StdDev</b>	<b>Min</b>	<b>Max</b>	<b>Skew</b>	<b>Excess Kurt</b>	<b>JB Test</b>
<b>CHINA</b>	13,97%	26,37%	-22,35%	21,31%	-0,25	0,71	4,86 <sup>c</sup>
<b>INDIA</b>	13,06%	29,19%	-30,27%	33,70%	-0,11	1,61	16,99 <sup>a</sup>
<b>INDONESIA</b>	17,98%	32,83%	-39,76%	31,48%	-0,40	2,70	51,29 <sup>a</sup>
<b>KOREA</b>	9,76%	26,84%	-21,61%	28,48%	0,07	0,83	4,62 <sup>c</sup>
<b>MALAYSIA</b>	13,84%	18,06%	-21,13%	17,35%	-0,28	2,33	37,11 <sup>a</sup>
<b>PHILIPPINES</b>	19,68%	30,97%	-22,59%	27,64%	0,16	0,80	4,79 <sup>c</sup>
<b>TAIWAN</b>	8,94%	23,37%	-16,85%	16,83%	-0,23	0,15	1,54
<b>THAILAND</b>	16,36%	29,03%	-35,60%	27,12%	-0,35	2,60	46,92 <sup>a</sup>
<b>BRAZIL</b>	9,07%	39,26%	-34,99%	30,13%	-0,23	1,03	8,22 <sup>b</sup>
<b>CHILE</b>	12,85%	23,26%	-29,31%	20,89%	-0,54	2,93	62,85 <sup>a</sup>
<b>COLOMBIA</b>	21,21%	30,14%	-27,02%	24,82%	-0,21	0,32	1,81
<b>MEXICO</b>	12,04%	26,17%	-30,14%	19,69%	-0,50	1,77	26,71 <sup>a</sup>
<b>CZECH REP.</b>	16,35%	29,49%	-29,79%	21,88%	-0,18	0,49	2,36
<b>POLAND</b>	10,09%	32,36%	-32,02%	27,61%	-0,06	0,60	2,43
<b>RUSSIA</b>	7,36%	34,43%	-35,26%	30,08%	-0,21	0,91	6,40 <sup>b</sup>
<b>TURKEY</b>	15,36%	42,87%	-37,07%	63,16%	0,50	4,05	112,44 <sup>a</sup>
<b>S. AFRICA</b>	9,25%	26,25%	-30,08%	20,57%	-0,40	1,28	14,74 <sup>a</sup>
<b>EGYPT</b>	13,94%	36,35%	-34,37%	54,31%	0,76	5,08	153,30 <sup>a</sup>
<b>QATAR</b>	6,96%	32,92%	-27,13%	31,03%	0,18	2,50	31,58 <sup>a</sup>
<b>UAE</b>	-7,34%	45,33%	-44,45%	60,35%	0,54	3,80	77,63 <sup>a</sup>
<b>EM ISLAMIC</b>	10,24%	23,18%	-27,25%	17,72%	-0,61	1,68	27,72 <sup>a</sup>

a, b and c imply significance at 1%, 5% and 10%, respectively.

**Table 4: RAPM Results of Each Country's Islamic Indices and Their Rank Orders**

<b>RATIOS</b>	<b>CHINA</b>	<b>INDIA</b>	<b>INDONESIA</b>	<b>KOREA</b>	<b>MALAYSIA</b>	<b>PHILIPPINES</b>	<b>TAIWAN</b>	<b>THAILAND</b>	<b>BRAZIL</b>	<b>CHILE</b>
<b>SR</b>	0.4661 (8)	0.3899 (10)	0.4967 (6)	0.3011 (14)	0.6740 (1)	0.5815 (3)	0.3108 (13)	0.5059 (4)	0.1883 (17)	0.4806 (7)
<b>TR</b>	0.1270 (9)	0.1178 (12)	0.1833 (4)	0.0832 (15)	0.2253 (3)	0.3511 (1)	0.0908 (13)	0.1553 (8)	0.0524 (18)	0.1642 (7)
<b>IR</b>	1.3154 (9)	0.5202 (12)	1.6854 (6)	-0.1933 (14)	1.5917 (7)	1.9498 (5)	-0.9867 (19)	12,1040 (1)	-0.3023 (15)	1.4799 (8)
<b>JA</b>	0.0401 (10)	0.0311 (11)	0.0869 (3)	-0.0024 (15)	0.0754 (4)	0.1361 (1)	0.0041 (13)	0.0659 (6)	-0.0469 (19)	0.0535 (8)
<b>M<sup>2</sup></b>	0.1248 (8)	0.1071 (10)	0.1319 (6)	0.0865 (14)	0.1730 (1)	0.1515 (3)	0.0888 (13)	0.1340 (4)	0.0604 (17)	0.1282 (7)
<b>OR</b>	1.5388 (8)	1.4614 (12)	1.6353 (4)	1.3700 (13)	1.7480 (1)	1.6920 (3)	1.3573 (14)	1.6134 (5)	1.3371 (17)	1.5609 (7)
<b>SoR</b>	0.7192 (7)	0.6092 (10)	0.7677 (6)	0.4715 (13)	0.7120 (8)	0.9638 (1)	0.3419 (17)	0.8566 (4)	0.4326 (16)	0.5983 (12)
<b>K<sub>3</sub></b>	0.5095 (6)	0.4265 (11)	0.5028 (8)	0.3437 (13)	0.5044 (7)	0.6747 (1)	0.2240 (17)	0.6245 (2)	0.3065 (16)	0.4188 (12)
<b>UPR</b>	0.2082 (8)	0.2108 (7)	0.2070 (9)	0.2022 (12)	0.2240 (4)	0.2367 (2)	0.1967 (15)	0.2119 (5)	0.1893 (17)	0.1994 (13)
<b>CR</b>	0.1887 (10)	0.1701 (11)	0.2221 (6)	0.1221 (15)	0.2513 (3)	0.3201 (1)	0.1273 (14)	0.2473 (4)	0.0963 (17)	0.2417 (5)
<b>StR<sub>5</sub></b>	0.4368 (7)	0.4168 (9)	0.5624 (4)	0.2823 (13)	0.6762 (1)	0.6704 (2)	0.2495 (15)	0.5304 (5)	0.1676 (17)	0.4180 (8)
<b>MBR<sub>5</sub></b>	2.3194 (7)	2.1495 (9)	2.5386 (5)	1.3877 (13)	2.9562 (3)	3.5178 (1)	1.2686 (15)	2.8127 (4)	0.8979 (17)	2.1632 (8)
<b>PR</b>	0.4939 (13)	0.5249 (10)	1.1186 (5)	0.4969 (12)	1.8681 (1)	1.5560 (3)	0.6739 (9)	1.2994 (4)	0.2632 (17)	0.9595 (6)
<b>MR</b>	0.3919 (11)	0.4076 (10)	0.7519 (5)	0.3696 (15)	0.9821 (3)	0.9881 (2)	0.4213 (9)	0.8532 (4)	0.2029 (17)	0.6313 (6)
<b>R to VaR</b>	0.2994 (9)	0.2999 (8)	0.3598 (7)	0.1941 (15)	0.4753 (1)	0.4574 (2)	0.2022 (13)	0.4103 (5)	0.1316 (17)	0.3783 (6)
<b>CSR</b>	0.2208 (7)	0.1901 (9)	0.2327 (6)	0.1466 (14)	0.3226 (2)	0.2994 (3)	0.1469 (13)	0.2477 (5)	0.0870 (17)	0.2150 (8)
<b>RATIOS</b>	<b>COLOMBIA</b>	<b>MEXICO</b>	<b>CZECH REP.</b>	<b>POLAND</b>	<b>RUSSIA</b>	<b>TURKEY</b>	<b>S. AFRICA</b>	<b>EGYPT</b>	<b>QATAR</b>	<b>UAE</b>
<b>SR</b>	0.6482 (2)	0.3959 (9)	0.4978 (5)	0.2600 (16)	0.1652 (18)	0.3192 (12)	0.2886 (15)	0.3374 (11)	0.1604 (19)	-0.1989 (20)
<b>TR</b>	0.2499 (2)	0.1189 (11)	0.1679 (6)	0.0752 (17)	0.0470 (19)	0.1264 (10)	0.0796 (16)	0.1731 (5)	0.0850 (14)	-0.1130 (20)
<b>IR</b>	3.3911 (2)	0.7159 (10)	3.0147 (4)	-0.1106 (13)	-0.9742 (18)	3.2933 (3)	-1.003 (20)	0.6228 (11)	-0.5280 (16)	-0.9513 (17)
<b>JA</b>	0.1284 (2)	0.0290 (12)	0.0719 (5)	-0.0117 (17)	-0.0468 (18)	0.0441 (9)	-0.0057 (16)	0.0619 (7)	-0.0004 (14)	-0.1585 (20)
<b>M<sup>2</sup></b>	0.1670 (2)	0.1085 (9)	0.1321 (5)	0.0770 (16)	0.0550 (18)	0.0907 (12)	0.0837 (15)	0.0950 (11)	0.0539 (19)	-0.0293 (20)
<b>OR</b>	1.7193 (2)	1.4673 (11)	1.5694 (6)	1.3526 (15)	1.2813 (19)	1.4847 (10)	1.3513 (16)	1.4891 (9)	1.3140 (18)	1.0147 (20)
<b>SoR</b>	0.9198 (2)	0.6043 (11)	0.8588 (3)	0.4504 (14)	0.2678 (18)	0.7983 (5)	0.4433 (15)	0.6564 (9)	0.2487 (19)	-0.5260 (20)
<b>K<sub>3</sub></b>	0.6024 (4)	0.4406 (10)	0.6083 (3)	0.3153 (14)	0.1754 (18)	0.5820 (5)	0.3140 (15)	0.4595 (9)	0.1629 (19)	-0.3834 (20)
<b>UPR</b>	0.2386 (1)	0.1993 (14)	0.2279 (3)	0.2038 (11)	0.1892 (18)	0.2063 (10)	0.1948 (16)	0.2110 (6)	0.1706 (19)	0.1572 (20)
<b>CR</b>	0.3165 (2)	0.1666 (12)	0.2190 (7)	0.1138 (16)	0.0734 (19)	0.1954 (8)	0.1378 (13)	0.1916 (9)	0.0869 (18)	-0.1003 (20)
<b>StR<sub>5</sub></b>	0.5834 (3)	0.3762 (11)	0.4707 (6)	0.2458 (16)	0.1392 (19)	0.3782 (10)	0.2702 (14)	0.3672 (12)	0.1530 (18)	-0.1969 (20)
<b>MBR<sub>5</sub></b>	3.1658 (2)	1.9019 (11)	2.4233 (6)	1.2134 (16)	0.7010 (19)	1.9383 (10)	1.3667 (14)	1.7704 (12)	0.7366 (18)	-0.8681 (20)
<b>PR</b>	1.6414 (2)	0.7699 (7)	0.5237 (11)	0.2981 (16)	0.1780 (19)	0.7077 (8)	0.4936 (14)	0.4844 (15)	0.2138 (18)	-0.1328 (20)
<b>MR</b>	1.0642 (1)	0.5218 (7)	0.3829 (13)	0.2337 (16)	0.1399 (19)	0.5168 (8)	0.3778 (14)	0.3912 (12)	0.1769 (18)	-0.1254 (20)
<b>R to VaR</b>	0.4433 (3)	0.2825 (10)	0.4180 (4)	0.1768 (16)	0.0983 (19)	0.2045 (12)	0.2002 (14)	0.2416 (11)	0.1212 (18)	-0.1498 (20)
<b>CSR</b>	0.3393 (1)	0.1878 (10)	0.2604 (4)	0.1312 (16)	0.0767 (18)	0.1656 (12)	0.1357 (15)	0.1835 (11)	0.0691 (19)	-0.0984 (20)



**Table 6: Rank Correlations Between Different Performance Measures**

<i>RATIOS</i>	SR	TR	IR	JA	M <sup>2</sup>	OR	SoR	K <sub>3</sub>	UPR	CR	StR <sub>5</sub>	MBR <sub>5</sub>	PR	MR	R to VaR	CSR
<b>SR</b>	1,00															
<b>TR</b>	0,92	1,00														
<b>IR</b>	0,83	0,80	1,00													
<b>JA</b>	0,93	0,99	0,84	1,00												
<b>M<sup>2</sup></b>	1,00	0,92	0,83	0,93	1,00											
<b>OR</b>	0,98	0,96	0,86	0,96	0,98	1,00										
<b>SoR</b>	0,88	0,86	0,92	0,89	0,88	0,90	1,00									
<b>K<sub>3</sub></b>	0,88	0,84	0,92	0,87	0,88	0,89	0,99	1,00								
<b>UPR</b>	0,88	0,85	0,81	0,87	0,88	0,89	0,93	0,91	1,00							
<b>CR</b>	0,96	0,94	0,85	0,95	0,96	0,97	0,90	0,89	0,87	1,00						
<b>StR<sub>5</sub></b>	0,98	0,92	0,84	0,93	0,98	0,98	0,90	0,90	0,88	0,96	1,00					
<b>MBR<sub>5</sub></b>	0,98	0,92	0,86	0,94	0,98	0,97	0,93	0,92	0,90	0,97	0,99	1,00				
<b>PR</b>	0,91	0,82	0,74	0,84	0,91	0,89	0,76	0,75	0,72	0,90	0,90	0,90	1,00			
<b>MR</b>	0,91	0,86	0,75	0,87	0,91	0,90	0,78	0,77	0,74	0,92	0,90	0,90	0,98	1,00		
<b>R to VaR</b>	0,99	0,92	0,80	0,93	0,99	0,96	0,87	0,86	0,88	0,96	0,97	0,97	0,89	0,89	1,00	
<b>CSR</b>	0,99	0,92	0,83	0,93	0,99	0,97	0,90	0,89	0,91	0,95	0,98	0,98	0,88	0,89	0,99	1,00

**Note: All of the correlation coefficients are significant at the 1% level**



**Table 7: The Total Scores and Ranking According to the Risk Categories**

	<b>ABSOLUTE</b>	<b>RELATIVE</b>	<b>PARTIAL M</b>	<b>DRAWDOWN</b>	<b>EXTREME</b>	<b>TOTAL</b>
<b>CHINA</b>	25 (9)	36 (9)	55 (7)	57 (9)	26 (8)	199 (8)
<b>INDIA</b>	20 (11)	30 (12)	44 (10)	56 (11)	25 (9)	175 (11)
<b>INDONESIA</b>	32 (4)	48 (6)	57 (6)	80 (5)	29 (6)	246 (5)
<b>KOREA</b>	13 (14)	20 (13)	33 (13)	37 (14)	13 (14)	116(13)
<b>MALAYSIA</b>	38 (1)	51 (4)	64 (5)	94 (3)	39 (1)	286 (3)
<b>PHILIPPINES</b>	38 (1)	54 (2)	77 (1)	96 (1)	37 (3)	302 (2)
<b>TAIWAN</b>	16 (13)	18 (14)	21 (16)	43 (13)	16 (13)	114 (14)
<b>THAILAND</b>	30 (6)	52 (3)	68 (4)	84 (4)	32 (5)	266 (4)
<b>BRAZIL</b>	7 (18)	12 (17)	18 (17)	20 (17)	8 (17)	65 (17)
<b>CHILE</b>	28 (7)	40 (7)	40 (11)	72 (6)	28 (7)	208 (7)
<b>COLOMBIA</b>	38 (1)	57 (1)	75 (2)	95 (2)	38 (2)	303 (1)
<b>MEXICO</b>	22 (10)	32 (11)	38 (12)	57 (9)	22 (10)	171 (12)
<b>CZECH REP.</b>	31 (5)	49 (5)	69 (3)	62 (7)	34 (4)	245 (6)
<b>POLAND</b>	9 (16)	17 (15)	30 (14)	25 (16)	10 (16)	91 (16)
<b>RUSSIA</b>	5 (19)	9 (19)	11 (18)	10 (19)	5 (18)	40 (19)
<b>TURKEY</b>	20 (11)	39 (8)	54 (8)	61 (8)	18 (12)	192 (9)
<b>S. AFRICA</b>	11 (15)	12 (17)	22 (15)	36 (15)	13 (14)	94 (15)
<b>EGYPT</b>	26 (8)	34 (10)	51 (9)	45 (12)	20 (11)	176 (10)
<b>QATAR</b>	9 (16)	14 (16)	9 (19)	15 (18)	5 (18)	52 (18)
<b>UAE</b>	2 (20)	6 (20)	4 (20)	5 (20)	2 (20)	19 (20)