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Faith-Based Ethical Investing: The Case of Dow Jones Islamic Indexes

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Abstract: This paper examines the performance of seven indexes chosen from the Dow Jones Islamic Market Index (DJIM) vis-à-vis their non-Islamic counterparts using a variety of measures such as Sharpe, Treynor, Jensen and Fama's selectivity, net selectivity and diversification. Second, we examine the persistence of performance using Carhart's (1997) four factor pricing models. Third, we use cointegration to examine how the Islamic indexes compare to their non-Islamic counterparts. The sample period is from January 1996 to December 2005 (120 data points). It is further broken down into two sub-periods: January 1996 to December 2000 (60 data points) and January 2001 to December 2006 (60 data points). We find no difference between Islamic and non-Islamic indexes. The Dow Jones Islamic indexes outperform their conventional counterparts from 1996 to 2000 and underperform them from 2001 to 2005. Overall, similar reward to risk and diversification benefits exist for both the Islamic and conventional indexes.

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1. Introduction

Muslims represent approximately one fifth of the world's population and are estimated to have more than $800 billion to invest. This amount is growing by 15 percent annually. Only a small portion of the available funds are invested in Islamic products which is indicative that this market is, for the most part, unexploited (Hassan, 2002).[1]

According to a McKinsey Management Consulting Firm report , "Islamic finance is the new force in the financial market place." In fact, the recent surge of liquidity in the Middle Eastern capital markets is attracting both domestic and international money managers who are tapping this market by offering Shariah-compliant funds. For instance, many western financial institutions (such as Citibank, Barclays, Morgan Stanley, Merrill Lynch and HSBC) sell Islamic financial products. In addition, the New York and London Stock Exchanges launched Islamic indexes to track the performances of firms which conform to Islamic investing rules.[2] Such a trend is leading towards the integration of Islamic finance with conventional finance.

The Dow Jones Islamic Market Index (DJIM), a subset of the Dow Jones Global Indexes (DJGI), was launched in December, 1995. The DJIM excludes from the index universe any

[1] The Islamic mutual funds market is one of the fastest rising segments within the Islamic financial system. Yet, when compared to the mutual fund industry at large, Islamic mutual funds are still in their infancy stage of growth and development, most having been around for less than a decade.

[2] DJIM indices are not tradable per se but there are several no-load Islamic index funds, which have been substantially growing in size since the inception of the DJIM series in 1996. Large fund management companies are creating these Islamic funds with low costs to attract the Middle Eastern flush liquidity. Analysis of DJIM indices instead of investment funds has the distinct advantage of measuring the investment screening effect on their performance. Such approach avoids the difficult problem of correctly considering transaction costs of investment funds. Unlike investment funds, indices are not marred by the ability of the portfolio managers to produce outstanding performance by interfering with the screening criteria of ethical investing.

industry group that represents a line of business that is incompatible with Islamic principles. Such activities include tobacco, alcoholic beverages, pork, gambling, arms, pornography, the hotel and leisure industry, and conventional financial services (banking, insurance, etc.). Companies classified in other industry groups may also be excluded if they are deemed to have a material ownership in, or revenues derived from, prohibited business activities. Once companies with unacceptable primary business activities have been eliminated from the universe, the remaining stocks are tested according to three financial filters: (i) excluding companies if total debt divided by total assets is equal to or greater than 33 percent; (ii) excluding companies if accounts receivable divided by total assets is equal to or greater than 45 percent; and (iii) excluding companies if non-operating interest income is equal to or greater than 5 percent. Companies that pass these criteria are included in the DJIM investable universe. This allows the DJIM to invest in profitable companies that make positive contributions to society (Hassan, 2002; Hussein, 2005).

With the exception of a few studies (Hassan, 2001; Hassan, 2002; Hakim and Rashidian, 2002a; Hussein, 2005; Elfakhani, Hassan and Sidani, 2005; Hassan and Tag el-Din, 2005), research on Islamic investing is still in its infancy. Our paper adds knowledge to the area of faith-based Islamic investing since it is the first study to address the performance of the DJIM indexes. In particular, we conduct an in-depth examination of the performance and diversification benefits of Dow Jones Islamic indexes vis-à-vis their non-Islamic counterparts. Specifically, we examine the risk-return and performance matrix of DJIM vis-à-vis its conventional counterparts. Secondly, we employ a variety of capital asset pricing models (CAPM) such as two factor, three factor condition and unconditional CAPM to ascertain the best asset pricing methods for Islamic investment funds. Finally, we use a cointegration test to measure international diversification

benefits from including Islamic funds into the portfolio composition of investors. Our findings show that, from January 1996 to December 2005, there is no significant difference in performance between Islamic and non-Islamic indexes. Overall, similar reward to risk and diversification benefits exist for both set of indexes. There also exists scope for Islamic funds for international portfolio diversification.

This paper is organized as follows. We first describe the fundamentals of Islamic investing in Section 2. Then, we provide a comprehensive overview of empirical literature on faith-based Islamic investing in Section 3. Data and methodology are explained in Section 4. We analyze the empirical results in Section 5. Section 6 concludes the paper.

2. The fundamentals of Islamic investing

Islamic alternatives to traditional investment tools have been driven by the fact that such tools do not conform to Islamic standards (Usmani, 2002). There has been a growing desire to have funds in which profits are not based on *riba*, or interest, which is rejected in Islam. The Muslim faith deems that profit should come as a result of efforts; this is not the case in interest dominated investments. In addition, there is a desire for investment portfolios which are morally purified. Thus investments in companies that do not comply with Muslims' moral orientations are not permitted and are eliminated from the portfolio. To ensure compliance with the forgoing condition, Islamic mutual funds are governed by *shariah* advisory boards whose role is mainly to give assurance that money is managed within the framework of Islamic laws (Hassan, 2001; Hassan, 2002).

An Islamic mutual fund is similar to a conventional mutual fund in many ways. However, unlike its conventional counterpart, an Islamic mutual fund must conform to *shariah* investment

precepts. The *shariah* encourages the use of profit-sharing and partnership schemes, and forbids *riba* (interest), *maysir* (gambling and pure games of chance), and *gharar* (selling something that is not owned or that cannot be described in accurate detail in terms of type, size, and amount) (El-Gamal, 2000). The *shariah* guidelines and principles govern several aspects of an Islamic mutual fund, including its asset allocation (portfolio screening), investment and trading practices, and income distribution (purification).

When selecting investments for their portfolio (asset allocation), conventional mutual funds can freely choose between debt-bearing investments and profit-bearing investments and invest across the spectrum of all available industries. An Islamic mutual fund, however, must set up screens in order to select those companies that meet its qualitative and quantitative criteria set out by *shariah* guidelines. Qualitative screens are used to filter out companies or securities based on *riba, maysir* or *gharar* or other business practices considered unethical by *shariah* including, for example, selling alcohol, or engaging in biotechnology using aborted embryos and human cloning. Thus, excluded from Islamic-approved securities are fixed income instruments such as corporate bonds, Treasury bonds and bills, certificates of deposit (CDs), preferred stocks, warrants, and some derivatives (e.g., options), etc. Moreover, Islamic mutual funds cannot trade on margin; in other words, they cannot use interest-paying debt to finance their investments. They are also not permitted to engage in sale and repurchase agreements (i.e., repos or buy-backs). These transactions are considered akin to indirect interest charges. There are various financial filtering rules (quantitative) used for DJIM and the Financial Times and the London Stock Exchange (FTSE) respectively. Chart 1 gives these financial filtering ratios (Derigs and Marzban, 2008).

The basis upon which an Islamic mutual fund operates must also be *shariah* compliant - i.e., its invested funds must be liberated from interest-based debt or speculation. Traditional funds that rely heavily on interest-based debt to finance their activities are not compliant with Islamic law. In addition, Islamic fund managers are not allowed to speculate. An Islamic economic unit is expected to assume risk after making a proper assessment of such risk with the help of information. Only in the absence of information or under conditions of uncertainty is speculation akin to a game of chance and considered reprehensible.

On another front, most scholars allow partially "contaminated" earning income to be cleansed or purified. This means that investment can be made in stocks of companies with a tolerable (i.e., kept at a minimum proportion) amount of interest income or with tolerable revenues from unacceptable business activities if all "impure" earnings are "cleansed" by giving them away to designated charities. If, for example, the company has 8 percent interest-related income, then 8 percent of every dividend payment must be given away to purify the fund earnings. Cleansing capital gains, however, remains debatable. Some scholars argue that this is not necessary since the change in the stock price does not really reflect interest, while others suggest that it is safer and more equitable to purify earnings made from selling shares as well (Usmani, 2002). This purification process is done either by the fund manager before any distribution of income, or by reporting the necessary financial ratios for investors to purify their earnings on their own. Some researchers affirm that the fund ought to encompass a clear procedure and techniques of sorting out interest-based income and other sources of contaminated profits from the portfolio (Valpey, 2001).

Zakat is a form of charity paid on personal wealth (exceeding a minimum amount called *nisab*) held idle for one lunar year. Whether *zakat* should be paid out of funds income at the fund

level or at individual level is still debatable. The rate of *zakat* differs with the type of the asset, 2.5 percent being the rate on most forms of monetary wealth and earned income. *Zakat* calculation on investment profits, however, is still controversial (DeLorenzo, 2000). In addition, such calculation is complicated, given the intricacies of the timing of the portfolio incomes and capital gains (Hassan, 2002). Recipients of *zakat* are clearly identified in Islamic jurisprudence and include charities and other bodies identified by the funds' supervisory boards.

In addition to the above principles, Valpey (2001) identifies other pillars that help in promoting socially responsible business practices. Shareholder advocacy refers to the mechanism of involving shareholders in positively influencing corporate behavior. Shareholders in the Islamic environment are not merely concerned with higher returns on their investment, but they also have a proactive role given their position as corporate owners. Constant monitoring and timely reporting are also needed to ensure that the companies included in the portfolio continuously meet the guidelines for Islamic investing. Often company shares are dropped from a certain fund after information about a violation is reported.

3. Empirical literature on faith-based Islamic investing

Several studies have assessed the performance of ethical funds and it is unclear whether investors have to bear a financial sacrifice in pursuing this strategy. For instance, Orlitzky, Schmidt and Rynes (2003) conduct a meta-analysis of 52 prior quantitative studies and conclude that there is a positive association between corporate social performance and financial performance across industries and across study contexts. On the other hand, Girard, Rahman and Stone (2005) refer to the results of several studies showing that socially responsible mutual funds tend to underperform broad benchmarks. In addition, the authors suggest that if some socially

responsible funds beat broad benchmarks, it is likely due to style investments rather than social responsible screening.

The literature on Islamic investing, a subset of ethical investing, is still at its infancy. The following articles best describe the stage of current of research on faith-based Islamic investing. Hassan (2002) empirically examines the issues of market efficiency and the time-varying risk return relationship for the DJIM over the 1996-2000 period. His paper employs serial correlation, variance ratio and Dickey Fuller tests to examine the market efficiency of the DJIM. The results show that DJIM returns are normally distributed and the returns show that DJIM returns are efficient. This paper also examines calendar anomalies of the DJIM. The results show that there is no turn-of-calendar-year, turn-of-financial-year, or month effect of DJIM returns. Utilizing a generalized autoregressive conditional heteroskedasticity (GARCH) framework, the paper examines volatility of the DJIM returns and finds a significant positive relationship between conditional volatility and DJIM equity index returns.

Hakim and Rashidian (2002a) employ a cointegration and causality analysis to examine the relationship between the DJIM, Wilshire 5000 Index, and the risk-free rate proxied by the three month Treasury bill over the time period 1999-2002. They find no correlation between the DJIM and the Wilshire 5000 Index, or the three month Treasury bill. The results also show that the changes in the DJIM are not caused by either the Wilshire 5000 Index or the three month Treasury bill. They conclude that the filtering criteria adopted to eliminate non-compliant firms leads to an Islamic index with unique risk-return characteristics unaffected by the broad equity market. Hakim and Rashidian (2002b) use a CAPM to examine to what extent a Shariah compliant index is correlated with the Dow Jones World Index (DJW) and the Dow Jones

Sustainability World Index (DJS), or green index. Their results show that the DJIM has done relatively well compared to the DJW, but has underperformed in relation to the DJS.

Hussein (2005) provides a comprehensive study of the accurate performance of each Islamic index by capturing the effects of industry, size, and economic conditions on DJIM returns. Covering the period 1996-2003, he examines the hypothesis that returns earned by investors who purchase each share in Islamic indexes for an equal amount of money are significantly different from their index counterparts, throughout the entire bull and bear periods. He finds that Islamic indexes provide investors with positive abnormal returns throughout the entire bull period, but they underperform their non-Islamic index counterparts during the bear market period. He argues that positive abnormal returns by Islamic indexes are not due to technology sector investing by these indexes. Rather, these abnormal returns are driven by investing in small size, basic material, consumer cyclical, industrial and telecommunication firms.

Hussein (2004) examines the performance of FTSE index funds vis-à-vis conventional funds (FTSE All World Index) over a period of January 1996-July 2003 by using a number of performance measures such as Sharpe, Treynor, Jensen measures and CAPM, but does not use more sophisticated methods such as Fama-French 3 factor and Carhart 4 factor models. He finds that FTSE indices perform as well as conventional indices during the overall period, but outperform during the bullish period and underperform during the bearish period.

Elfakhani, Hassan and Sidani (2005) examine Islamic mutual funds and the fundamentals of investing in such venues. They explore the dynamics of Islamic mutual funds, their governance and control, and marketing and distribution. They present the results of a study verifying whether the application of the Islamic investment guidelines in asset allocation and

portfolio selection has had a downside effect on investors' wealth in terms of risk-adjusted returns relative to the market benchmark. Considering the overall sample of 46 Islamic mutual funds, the total number of outperforming funds ranges between 29 funds (63 percent of the sample) and 11 funds (24 percent), depending on the performance measure used and market benchmark. In terms of fund category, four of the eight fund categories outperform their benchmarks regardless of what performance measure is used. Moreover, the analysis of Variance (ANOVA) statistical test shows that no statistically significant disparity exists for the performance of the funds compared to all used indexes. Therefore, a conclusion of their study is that the behavior of Islamic mutual funds does not differ from that of other conventional funds, with some *shariah* compliant mutual funds outperforming their benchmarks and others underperforming them.

Elfakhani, Hassan and Sidani (2005) use the Treynor-Mazuy (TM) model to measure the security selection ability and market timing ability of Islamic mutual fund managers. Their results show that the American Equity Fund, the European Equity Fund, the combined Emerging Fund, and the Technology Fund all have positive security selection, but only the Emerging Equity Fund has positive selectivity that is statistically significant. The remaining three funds (i.e., the Global, Asian and Malaysian funds) have negative selectivity performance during the same period. This is not so surprising, since the results may be dominated by the Asian crisis, while Western funds are less affected during the same sampling period. In particular, the Asian Equity Fund performs very badly as the intercept is statistically and significantly negative at the one percent level. However, other results show that the Asian Equity Fund has a significant positive market timing performance; all remaining funds have negative market timing performance, particularly the European and the combined Emerging Funds that are statistically

significant at the five percent level. This observation is confirmed by the negative correlations reported,, except for the Asian fund.

Hassan and Tag el-Din (2005) adapt duration dependence tests to analyze Islamic mutual funds of the DJIM. The fundamental idea of the tests comes from survival analysis frequently used by engineers and biostatisticians. According to the theoretical rational speculative bubbles model, if bubbles do not exist, runs of positive excess returns should not display duration dependence. To render this implication testable, returns are transformed into series on positive and negative observed excess returns. Then, the authors examine the probability that a run — a sequence of observations of the same sign — of positive excess return ends has positive dependence or negative hazard function with the length of the run. This approach is reliable and robust, since duration dependence is not affected by fundamental price movements and is more unique to bubbles, unlike the traditional measures of detecting bubbles such as autocorrelation, skewness, or kurtosis (for more details, see McQueen and Thorley (1994)). They use both weekly and monthly data of the DJIM and AMANX and AMAGX to test for the speculative bubbles in these markets. Their results show that none of the weekly and monthly returns of AMANX, AMAGX, and the DJIM show statistically significant evidence of speculative bubbles during our sample periods. Kia (2001) finds similar results for Canadian general stock markets.

Hassan, Antoniou and Paudyal (2005) examine the potential impact of Islamic Shariah screening on the Islamic investment portfolio performance vis-à-vis conventional portfolios. Since they examine index funds, their results are not confounded by transactions costs or management fees. They use a variety of similar methods as used in this present study and use DJIM databases for the 1996-2003 period. They find similar results as in this study: that Islamic funds do not necessarily perform worse than conventional index funds.

Khathatay and Nisar (2007) review and compare the Shariah screening rules used by three organizations: the U.S. Dow Jones Islamic Indices, the Securities and Exchange Commission (SEC) of Malaysia, and Meezan Bank of Pakistan by employing March 2005 Bombay Stock Exchange 500 stocks. They conclude that DJIM is the most conservative and the Malaysian SEC is the most liberal. Based on the empirical results, they propose an independent set of norms that better reflect the objectives of formulating Shariah compliance. They propose a Shariah rating agency that will help promote this industry and argue that total assets is a better divisor than market capitalization in financial ratio filters.

Abdullah, Hassan, and Mohamad (2007) examine the relative performance of 14 Islamic funds and 51 conventional mutual funds in the Malaysian capital market over January 1992-December 2001 using a number of methods such as the Sharpe index, adjusted Sharpe index, Jensen Alpha, Modigliani measure, and timing and selectivity ability. In their study, Islamic funds performed better than the conventional funds during a bearish market, while conventional funds performed better than Islamic ones during a bullish market. Including Islamic mutual funds in a portfolio helps hedge the downside risk in adverse economic conditions. Islamic and conventional funds have a diversification level that is less than 50 percent the diversification level of the market index proxied by the Kuala Lumpur Composite Index (KLCI). They conclude that there is a poor selection and timing performance in both Islamic and conventional mutual funds.

Abderrezak (2008) employs 3 different benchmarks (conventional, Islamic and ethical benchmarks) and uses 46 Islamic equity mutual funds as used in the Elfakhani, Hassan and Sidani (2005) study, over January 1997-August 2002 to examine the relative performance of Islamic equity mutual funds. He uses similar methodology to Elfakhani, Hassan and Sidani

(2005) and finds Islamic funds performed poorly against their respective indices. The co-movement of Investor Education Fund (IEF) returns with the market, measured by the betas, is low. Further, he finds poor evidence for selectivity. IEFs are significantly affected by small cap firms and growth preference stocks. However, he does not find any significant performance differences between Islamic and ethical funds using Fama's performance measures. Finally, he found that IEFs do suffer from lower diversification.

Kräussl and Hayat (2008) find, on average, there is not any significant performance difference when IEFs are benchmarked against Islamic and conventional benchmarks during normal market condition. In a closer look at the bear market of 2002 using conditional CAPM, they document that IEFs do significantly outperform the Islamic and conventional market indices. They also find that IEFs possess superior systematic risk-to-return ratios, thus, they argue that these IEFs "seem most attractive as part of a larger fully diversified portfolio like a fund of funds." However, consistent with previous studies, they do not find any evidence for market timing ability. In their study, they use 59 Islamic equity funds over the 2001-2006 period and their sample is further divided into global, Malaysian, and other local regions. They use a variety of unconditional and conditional measures such as Jensen's measure, Sharpe ratio, Treynor ratio, Modigliani and Miller measure, TT measure, and the information ratio. Further, they use the Treynor and Mazuy (1966) measure for market timing and conditional CAPM for negative movements.

Mansor and Bhatti (2009) use yearly data of the Malaysian mutual funds industry from 1999 to March 2009, and daily return data of Malaysian mutual funds from July 1, 2008 to May 10, 2009 to analyze the performance and growth rates of Islamic mutual funds and conventional mutual funds in Malaysia. They use non-risk adjusted average returns, standard deviation, and

correlation analysis. They do not provide any statistical tests except for the Jarque-Bera test.

There is strong correlation between Islamic mutual funds and conventional mutual funds. They are moving together as proportions of the total industry. The ratio of Islamic to conventional funds is increasing indicating the importance of Islamic funds. The growth rates of Islamic mutual funds are higher than that of conventional funds in terms of net asset values (NAVs). They attribute factors such as expectations' stability, higher growth rates, and resilience during crisis, to the increasing global demand for Islamic mutual funds. They argue that Islamic funds are smaller than conventional funds in terms of size.

Hoepner, Rammal, and Rezec (2009) use a unique dataset of 262 Islamic equity funds from 20 countries and 4 regions from September1990 to April 2009 and uses a one factor model, Fama and French (1993) 3 factor model, Carhart (1997) model, 3 level Carhart model, and conditional 3 level Carhart model to examine Islamic mutual funds performance. Islamic funds from eight nations (mostly from the western regions) significantly underperform their international equity market benchmarks, and funds from only three nations outperform their respective market benchmarks. Second, only small stocks have an effect on Islamic funds. Third, Islamic funds from the Gulf Cooperation Council (GCC) or Malaysia do not significantly underperform their respective benchmarks or were affected by small stocks. Finally, they conclude that Islamic equity funds "exhibit a hedging function, as their investment universe is limited to low debt/equity ratio stocks." Hoepner, Rammal and Rezec (2009) cites the Girard and Hassan (2008) study that examines the FTSE as a pioneer in this stream of literature ("Their paper is recommended as gateway into this literature"; see footnote 4)

4. Data

The DJIM follows Islamic investment guidelines by tracking Shariah compliant stocks from around the world. Stocks incompatible with Shariah law are associated with alcohol, pork-related products, conventional financial services (banking, insurance, etc.), entertainment (hotels, casinos/gambling, cinema, pornography, music, etc.), tobacco manufacturers, or defense and weapons companies. The remaining stocks are tested according to three "filters" designed to remove those with unacceptable financial ratios — i.e., total debt divided by trailing 12-month average market capitalization must be less than 33 percent, the sum of company's cash and interest-bearing securities divided by the trailing 12-month average market capitalization must be less than 33%, and accounts receivable divided by the trailing 12-month average market capitalization must be less than 45%.

The index's weighting scheme follows a free-floating market capitalization and is reviewed quarterly. The Islamic market family comprises nearly 50 indexes on blocks, markets and sectors. Not all series have been introduced at the same time. While the oldest series date from January 1996 in Reuters, most series were introduced between 1998 and 2003. Our study focuses on the older set of broad indexes which are the Dow Jones Islamic Market World Developed Index, the Dow Jones Islamic Market World Emerging Markets Index, the Dow Jones Islamic Market U.S. Index, the Dow Jones Islamic Market Europe Index, the Dow Jones Islamic Market Asia/Pacific Index, the Dow Jones Islamic Market Canada Index, and the Dow Jones Islamic Market U.K. Index.[3]

[3] The Dow Jones Islamic Market Japan Index is not included as the series starts as of 1998 in Reuters.

Using Reuters, we select Dow Jones Islamic indexes and corresponding Morgan Stanley Capital International (MSCI) indexes that do not explicitly claim to use Islamic screening.[4] Our study uses closing prices and monthly returns on seven Islamic indexes (Dow Islamic Canada, Dow Islamic United Kingdom, Dow Islamic United States, Dow Islamic Asia Pacific Developed, Dow Islamic Europe Developed, Dow Islamic Emerging Markets and Dow Islamic World Developed Markets), seven corresponding non-Islamic indexes (MSCI Canada, MSCI United Kingdom, MSCI United States, MSCI Asia, MSCI Europe Developed, MSCI Emerging Markets and MSCI developed markets), and the MSCI All Country (MSCI AC) World Index. The sample period starts in January 1996 and ends in December 2005 (120 data points for the full period). It is further broken down into two sub-periods: January 1996 to December 2000 (60 data points; bull period) and January 2001 to December 2005 (60 data points; bear period). We have divided the sample period into two periods to examine the performance differences during bull and bear periods. Similar division has been done by Hussein (2004) and Hussein (2005).

The MSCI AC World Index is used as a buy-and-hold factor representing the broad stock market index. Since the small-versus-big (SMB), high book-to-price ratio (HML) and momentum (MOM) factors of Fama and French (1993) and Carhart (1997) are not directly available for the world market, we follow the methodology of Bauer, Koedijk, and Otten (2005) to construct a world version for each of the three factors—i.e., using all stocks of the Worldscope/Datastream[5] universe, the SMB factor is computed by taking each month the difference between the return of a lower quintile and higher quintile size-sorted value weighted

[4] Dow is not the only provider of "Islamic" indexes. FTSE also has several indexes that screen for the "Islamic constraint," however the series are not available in Reuters prior to 1999. As for the "non-Islamic" corresponding benchmarks, we also considered series other than MSCI which are more closely related to the Dow Islamic indexes — i.e., the Dow Global and Dow Stoxx series. Unfortunately, the emerging market series were only introduced in 2002. Furthermore the Stoxx series are only available in Reuters as of 2003 and do not specifically include emerging market series. Consequently, we chose the MSCI series which provide us with more history.

[5] We limit our sample to (1) firms with a market capitalization greater than $25 million, and (2) firms for which market capitalization and book value data are available.

portfolios, the HML factor is computed each month by taking the difference between the return of the top 30 percent and bottom 30 percent book-to-market-value-sorted value weighted portfolios, the MOM factor is computed by taking each month the difference of the return of the top 30 percent and bottom 30 percent 12-month-return value weighted portfolio.

Other data are retrieved from the International Country Risk Guide (ICRG) and Datastream. We use local and global variables similar to those used in Sanders and Walter (2002). For instance, local risk factors (lagged 1 month) are the gross domestic product (GDP) growth, short term interest rates, the inflation rate, the change in industrial production and the change in political, economic and financial risk ratings.[6] Global factors (lagged 1 month) are the world GDP growth, world inflation, change in world industrial production, the U.S. maturity spread, the change in the price of oil, and the U.S. default spread.[7]

5. Methodology

5.1 Performance measures

In addition to the Sharpe and Treynor ratio, we assess the alpha of an index as compared to the world benchmark from the following equation (Jensen, 1968):

$$R_{it}\text{-}Rf_t = \alpha_i + \beta_{i,1,0}(R_{mt}\text{-}Rf_t) + \varepsilon_{it} \quad (1)$$

where $R_{i,t}$ is the return of index i over period t; $R_{f,t}$ is the risk-free security for period t proxied by the 1-month U.S. Treasury rate; $R_{m,t}$ is the return on the MSCI AC World Index for period t;

[6] For Canada, the United Kingdom, and the United States, we use series of GDP growth, short term interest rates, local inflation factors, local industrial production and the change in political, economic and financial risk ratings available in the ICRG database and the international financial statistics database of the International Monetary Fund (IMF). For Asia Pacific, Emerging and Europe, we use the change in political, economic and financial risk ratings, inflation factors, and short term interest rates (for Europe only). For the World Developed series, obviously no local factors are used.

[7] WDCONPRCF, WDGDP…D, USGBOND, USINTER3, FRCBAAA, and FRCBBAA are Datastream's mnemonics for the world consumer price index, world GDP, long term U.S. interest rates, short term U.S. interest rates, Moody's AAA, and Moody's BBA series, respectively. The price of oil series and the world industrial production series are obtained from the international financial statistics database of the IMF.

β_i is the beta of index i; α_i is the alpha of the index; and $\varepsilon_{i,t}$ is the random error for index i over period t with an expected value of zero.

If "alpha" is positive (negative), then the index is comprised of outperforming (underperforming) stocks. Fama (1972) shows that the selectivity component of a portfolio's performance usually comes at the expense of some diversification. He provides a methodology to measure diversification (the added return necessary to justify any loss of diversification in a portfolio) and net selectivity (the additional return from outperforming stocks net of the additional cost for incomplete diversification). Fama relates selectivity, net selectivity and diversification as follows:

$$\alpha = (R_{i,t} - R_{f,t}) - \beta_i (R_{m,t} - R_{f,t}) = (\frac{\sigma_{i,t}}{\sigma_{m,t}} - \beta_i) \times (R_{m,t} - R_{f,t}) + (R_{i,t} - R_{f,t}) - \frac{\sigma_{i,t}}{\sigma_{m,t}} (R_{m,t} - R_{f,t}) \quad (2)$$

$$= \text{Selectivity} = \text{Diversification} + \text{Net Selectivity}$$

where $\sigma_{i,t}$ is the standard deviation of index i over period t. Other notations are the same as for equation 1.

5.2 Controlling performance for style and time variability

Carhart (1997) proposes an attribution model that extends CAPM by including Fama and French (1993 and 1996) size and value factors, and a momentum factor that captures the Jegadeesh and Titman (1993) momentum anomaly. The resulting model is a 4-factor market equilibrium model, where the coefficient associated with each factor provides an indication of the style focus of a portfolio. This model is believed to improve average CAPM pricing errors and is formally described as follows:

$$R_{it}\text{-}Rf_t = \alpha_i + \beta_{i,1,0}(R_{mt}\text{-}Rf_t) + \beta_{i,2,0}HML_t + \beta_{i,3,0}SMB_t + \beta_{i,4,0}MOM_t + \varepsilon_{it} \quad (3)$$

where SMB_t is the difference in return between a small cap portfolio and a large cap portfolio at time t, HML_t is the difference in return between a portfolio of high book-to-market stocks and one of low book-to-market stocks at time t, and MOM_t is the difference in return between a portfolio of past 1 month winners and a portfolio of past 12 month losers at time t.

Since risks vary over time (Chen and Knez, 1996; and Ferson and Schadt, 1996), the estimation of alphas in equations 1 and 3 are likely unreliable. Thus, we consider a conditional performance measurement by including a vector of lagged global and local instruments (Z_{t-1}) to allow for Carhart Model's betas to vary over time in a linear fashion, i.e.,

$$\beta_{i,k\,t} = \sum_{k=1}^{n} \beta_{i,k0} + \sum_{k=1}^{n} B_{i,k}^{'} Z_{t-1} \tag{4}$$

where B'_i is a vector of response coefficients of the conditional betas with respect to the instruments in Z_{t-1}. Then, the conditional Carhart equation to be estimated then becomes

$$R_{it}-Rf_t=\alpha_i+\beta_{i,1,0}(R_{mt}-Rf_t)+\beta_{i,2,0}HML_t+\beta_{i,3,0}SMB_t+\beta_{i,4,0}MOM_t$$
$$+Z_{t-1}[B'_{i,1}(R_{mt}-Rf_t)+B'_{i,2}HML_t+B'_{i,3}SMB_t+B'_{i,4}MOM_t]+\varepsilon_{it} \tag{5}$$

As for the instruments in Z_{t-1}, we use local and global variables similar to those used by Sanders and Walter (2002). Local risk factors (lagged 1 month) are the GDP growth, short term interest rates, and the change in political, economic and financial risk ratings. Global factors (lagged 1 month) are MSCI AC World Index dividend yield, world GDP growth, world inflation, U.S. maturity spread, change in the price of oil, and the U.S. default spread.

5.3 Measuring the benefit of a portfolio constructed with Islamic indexes

We investigate cointegration using stock index price levels for all of the indexes during each period. We conduct Johansen cointegration tests to determine long term relationships between the markets.[8] Considering a VAR of order p:

$$y_t = A_1 y_{t-1} + \ldots + A_p y_{t-p} + \theta + \varepsilon_t \quad (6)$$

where y_t is a k vector of non-stationary, I(1) variables; θ is a deterministic term; and A_i are (n x n) matrices. Equation (1) can be rewritten as:

$$\Delta y_t = \Pi_p y_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \quad (7)$$

where Π_p is the impact matrix and associated changes in price, Δy_t, to prices, y_{t-p}, p periods earlier. Johansen's method is used to estimate the matrix Π_p with a reduced rank r and then it tests if the restriction implied by the reduced rank of Π_p can be rejected. Lags, trend specifications and cases are established using the Akaike Info Criterion (AIC).[9] Likelihood ratio[10] is used as a trace statistic to determine whether cointegration (reduction to r of Π_p) between the two non-stationary variables is significant and how many cointegration equations are significant. Significance is set by the critical values reported in Osterwald-Lenum (1992).

6. Results

[8] In cointegration theory (Engle and Granger, 1987), if non-stationary variables do not drift apart from each other, there is a long-term linkage between those variables; it is often seen as a test of cross-border equity market efficiency.

[9] We evaluate model selection criteria in terms of consistency. As we cannot know the true data generating process, the most asymptotically efficient model selection criterion is the Akaike Info Criterion.

[10] The determination of the rank of Π_p is solved by determining the number of eigenvalues ($\hat{\lambda}_i$) of Π_p that are statistically different from zero. The trace test statistic is calculated as follows: $-T\sum_{r+1}^{n} \ln(1-\hat{\lambda}_i)$ where T is the number of observations, and r is the number of cointegrating vectors.

6.1 Descriptive statistics, Sharpe, Treynor, selectivity and net selectivity

Table 1 shows each index's descriptive statistics and performance measures for the overall period in Panel A (1996-2005), the first sub-period in Panel B (1996-2000), and the second sub-period in Panel C (2001-2005).

During the overall period, Islamic indexes return on average 7.04 percent per annum as compared to 5.34 percent for MSCI indexes. Also, Islamic series are less risky than MSCI indexes with 17.52 percent standard deviation per annum as compared to 18 percent per annum. Furthermore, Islamic indexes are somewhat correlated with their peers (0.78), but less correlated with the MSCI AC World Index (average correlation of 0.69 with MSCI AC World) than with the MSCI indexes (average correlation of 0.87 with MSCI AC World). This translates into a lower beta with the world (0.79) as compared to MSCI indexes (1.03).

Overall Sharpe and Treynor ratios indicate that Islamic indexes outperform their non-Islamic peers. More specifically, the Islamic indexes offer an average of 205 basis points of excess performance as compared to MSCI indexes. Interestingly, Islamic indexes are less diversified than their peers — i.e., the cost of diversification is 31 basis points above the average MSCI index. On a diversification-adjusted basis, all Islamic indexes outperform MSCI indexes by 174 basis points over the last 118 months.

During the first period, Islamic indexes return on average 13.51 percent per annum as compared to 8.27 percent per annum for MSCI indexes. Equivalently, the average cumulated return for the Islamic indexes is 25.32 percent above the MSCI indexes average. Furthermore, the Islamic indexes are not as risky as corresponding MSCI indexes (average standard deviation of 17.51 percent per annum versus 18.6 percent per annum). Islamic indexes are strongly correlated with their peers (average of 0.71) but less correlated with the MSCI AC World Index

than other indexes (average of 0.61 versus 0.86). Hence, they have lower betas (average of 0.71) than MSCI indexes (average of 1.06).

Sharpe and Treynor ratios indicate that Islamic indexes outperform their non-Islamic peers. More specifically, the Islamic indexes offer an average of 728 basis points of excess performance compared with MSCI indexes. Islamic indexes are less diversified than their peers — i.e., the cost of diversification is 162 basis points above the average MSCI index. On a diversification-adjusted basis, all Islamic indexes outperform MSCI indexes by 566 basis points over the first 59 months of our sample.

During the second period**,** Islamic indexes return on average 0.58 percent per annum as compared to 2.42 percent per annum for MSCI indexes. The average cumulated return for the MSCI indexes is 9.61 percent above the average of the Islamic indexes over the most recent 59 months and the Islamic indexes are as risky as corresponding MSCI indexes (MSCI and Dow Islamic series average 17.2 percent standard deviation per annum). Islamic indexes are more correlated with their peers (average of 0.83) and somewhat correlated with the MSCI AC World (average of 0.76 versus 0.90). This translates into lower beta (average of 0.85) as compared to MSCI indexes (average of 1.01).

Sharpe and Treynor ratios indicate that Islamic indexes underperform their non-Islamic peers for this period. More specifically, the MSCI indexes offer an average of 231 basis points of excess performance as compared to the Dow Islamic indexes. Islamic indexes are still less diversified than their peers — i.e., the cost of diversification is 48 basis points above the average MSCI index. On a diversification-adjusted basis, Islamic indexes underperform MSCI indexes by an average 185 basis points over the last 59 months of the sample.

Such results from Sharpe and Treynor measures are expected as both qualitative and quantitative screening of DJIM indices formation shrinks the investment universe for deriving the full benefits of portfolio diversification. These results are consistent with other studies of Islamic investment performance behavior. However, results based on such measures only will be misleading as these measure do not fully capture the restrictions imposed on portfolio formation by Islamic law. So, we turn to more sophisticated performance and asset pricing methods to study their performance and asset pricing behavior.

b. Results from multifactor tests

Results from multifactor tests are shown in Table 2. Results are broken down into three panels: Panel A (1996-2005) is the overall period, Panel B (1996-2000) is the first sub-period, and Panel C (2001-2005) is the second sub-period. While column 2 repeats the unconditional alphas from Table 1, the style-adjusted unconditional alphas are in column 4 and the style-adjusted conditional alphas are in column 10.

Table 2, Panel A (overall period) shows an increase in average adjusted R-squared for the modeling of Islamic indexes risk premiums using a conditional multi-factor model (0.66), as compared to the 1-factor CAPM model (0.48) and the 4-factor model (0.55). The same observation can be made for the MSCI series (adjusted R-squared are 0.83, 0.78, and 0.77 for the conditional 4 factor model, the unconditional 4 factor model and the CAPM, respectively). Thus, the conditional Carhart model is better at explaining index returns, and reveals the series' exposures to global and local factors, indicating strong time variation in betas. More specifically, the hypothesis of constant betas can be rejected at the 1 percent level in all series – i.e., at least one of the four conditional betas has significant Wald test statistics. Looking at the difference in

unconditional and conditional alphas, Islamic indices have weakly outperformed MSCI indices during the period of study. Indeed, after controlling for market risk, size, book-to-market, momentum, local and global factors, the difference in return between Islamic and conventional indices is positive but rarely significant (MSCI US, MSCI Asia Pacific, and Dow Islamic Asia Pacific are the only series with alphas statistically different from zero).

Interestingly, the negative correlation with the HML factor reveals that Islamic indices contain more growth stocks, while non-Islamic indices have a positive correlation with the HML factor and are therefore more invested in value stocks.[11] The exclusion of value sectors like chemical, energy and basic industries could be the reason for this higher proportion of growth stocks exposure in Islamic indices—i.e., ethical portfolios are often underweighted in companies with higher environmental risk.

Both types of indices have, on average, a positive correlation with the returns of a portfolio of small caps. In addition, Islamic series show a greater sensitivity to the SMB factor than MSCI series, indicating that the Dow Islamic indices are comprised of smaller firms than the MSCI series.

Table 2, Panel B also shows an increase in average adjusted R-squared for the modeling of Islamic and conventional indices risk premiums using a conditional multifactor model, as compared to the unconditional models. Thus, the conditional model is better at explaining index returns with global and local factor exposure (again, the null hypothesis of constant betas can be rejected at least at the 1 percent level for all series), indicating strong time variation in betas. As in table 2A, Islamic indices have a growth stock and momentum focus, while conventional indices are positively correlated with a value portfolio. Finally, the difference in return between Islamic and conventional funds increases with the inclusiveness of the model, and 6 out of the 14

[11] Bauer, Koedijk, and Otten (2005) reported similar results for international socially responsible mutual funds.

alphas are statistically significant—i.e., this is the case for the Dow U.K. Islamic, MSCI U.S., Dow U.S. Islamic, MSCI Asia Pacific, and Dow World Developed Islamic series. The overall convincing superior performance of the Islamic series as compared to the conventional series is likely period-specific since growth stocks outperformed value stocks from 1996 to 2000.[12]

As shown in Table 2, Panel C, the conditional multifactor model has a higher average R-squared, as compared to the unconditional models. As in Table 2A and 2B, the conditional Carhart model is better at explaining Islamic and conventional index returns (again, the hypothesis of constant betas can always be rejected). Additionally, the difference in conditional alphas between MSCI and Islamic indexes increases from those observed with the unconditional CAPM. Indeed, after controlling for market risk, size, book-to-market, momentum and local and global factors, Islamic series underperform conventional indices; although, since only one alpha (Dow Islamic Asia Pacific) is significantly different from zero, it is difficult to conclude on the definite superiority in performance of one set of indices as compared to the other.

One reason behind the observed underperformance of the Islamic series is likely period specific and can be attributed to their growth focus relative to conventional indices. That is, if growth stocks fared well as compared to value stocks during the 1996-2000 period, portfolios with a growth focus considerably suffered during the 2001-2005 period.[13]

Our results are generally consistent with previous studies. Like Hassan, Antoniou and Paudyal (2005), an Islamic investor does not necessarily suffer from low return by following his or her religious restrictions in stock investing. However, we divide the sample into bull and bear

[12] For instance, the MSCI AC World Growth index outperformed the MSCI AC World Value by an average of 290 basis points per annum from January 1996 to December 2000.
[13] For instance, the MSCI AC World Growth index underperformed the MSCI AC World Value by an average of 440 basis points per annum from January 2001 to December 2005.

periods to see if the performance matrices of Islamic and conventional indices differ from each other. We also use a longer data period to capture such differences.

c. Diversification analysis

The multivariate cointegration analysis suggests that both the Islamic and conventional groups are poorly integrated for the overall period. However, there seems to be some strong common stochastic trends in both groups during the first period (at most two significant cointegrating equations). For the second period, the Islamic group remains somewhat cointegrated while the non-Islamic group shows little evidence of common stochastic trends. These findings are illustrated in Figure 1 where an efficient set is created for each group for the overall period (Panel A), the first sub-period (Panel B) and the second sub-period (Panel C). Panels A and C clearly show a net advantage of allocating among Islamic indexes as compared to conventional indexes. However, the situation is reversed in the later period; the Islamic indexes provide a less efficient mix than the MSCI indexes. Again, as for the analysis of the performance of each index, we cannot see much difference between Islamic and non-Islamic series either as standalone assets or as an asset class. Our results seem to point to a recent underperformance of the Islamic group as compared to the more conventional MSCI indexes.[14]

6. Summary and conclusions

Our paper focuses on a special kind of ethical investing based on Islamic principles. Investors want to know whether Islamic ethical investing screening criteria provide for a different performance than conventional ethical index funds. Focusing on DJIM indices, this study has the advantage of examining effects of the screening process on the risk-return

[14] We conducted unit root tests to examine the stationarity properties of these series and find that they are integrated at the same level. We find that most of these series have unit roots after first differencing.

performance directly without the need for extracting funds transaction costs, management skills or market timing of funds management. Because DJIM employs a similar screening mechanism comparable to those based on Islamic mutual funds, this study is also relevant for the assessment of performance measures of ethical Islamic mutual funds or similar faith-based investment funds.

We find no convincing performance differences between Islamic and non-Islamic indexes from January 1996 to December 2005. Indeed, the Dow Islamic indexes outperform their conventional counterparts from 1996 to 2000 and underperform them from 2001 to 2005. Overall, similar reward to risk and diversification benefits exist for both indexes.

Controlling performance for style and time variability, we find that Islamic indices are growth focused and MSCI indices are value focused. In addition, Islamic indices comprise smaller firms that MSCI indices. In sum, Islamic indexes are growth and small-cap oriented and conventional indices are relatively more value and mid-cap focused. We suggest that one reason behind the high proportion of growth stocks may come from the exclusion of value sectors with higher environmental risk like chemical, energy and basic industries.

After controlling for market risk, size, book-to-market, momentum, local and global factors, we conclude that the difference in return between Islamic and conventional indices is rarely significant — i.e., only a few of the alphas are significantly different from zero. Although, Islamic indices convincingly outperform conventional indices during the first period (1996-2000), they underperform the same conventional indices during the last period (2001-2005). Our findings suggest that the period-specific performance of Islamic indices is likely attributed to style differences between the two types of series.

The multivariate cointegration analysis suggests that both the Islamic and conventional groups are poorly integrated for the overall period. However, there seems to be some strong

common stochastic trends in both groups during the first period (at most two significant cointegrating equations). For the second period, the Islamic group remains somewhat cointegrated while the non-Islamic group shows little evidence of common stochastic trends.

Our findings suggest that the behavior of the DJIM indexes does not differ from that of their conventional counterparts, with some indexes outperforming their conventional counterparts and others underperforming them. Overall, similar reward to risk and diversification benefits exist for both types of indexes.

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Chart 1: Quantitative Shariah Filtering Rules

Asset-based Filtering Rule	Market Capital-based Filtering Rule
Non-permissible income / total income < 5%	Non-permissible income / total income < 5%
Interest-bearing cash and investments / assets < 33%	Interest-bearing cash and investments / 12 month average market capitalization < 33%
Receivables / assets < 33%	Receivables / 12 month average market capitalization < 33%
Interest-bearing debt / sssets < 33%	Interest-bearing debt / 12 month average market capitalization < 33%

Note: Total assets are used as divisors for filtering screens of MSCI and FTSE. Different varieties of average market capitalization are used as divisors for Russell Indexes, Dow Jones Indexes, Standard and Poor's (S&P) Indexes, as well as the Accounting and Auditing Organization for Islamic Financial Institutions Index (AAOIFI).

Source: Adapted from Derigs and Marzban, 2008.

Table 1: Descriptive statistics and performance of indexes

Results from Table 1 are based on monthly return series for MSCI Canada (CAN), Dow Islamic Canada (CANI), MSCI U.K. (UK), Dow Islamic U.K. (UKI), MSCI U.S. (US), Dow Islamic U.S (USI), MSCI Asia Pacific Developed (AP), Dow Islamic Asia Pacific Developed (API), MSCI Europe Developed (EU), Dow Islamic Europe Developed (EUI), MSCI Emerging (EM), Dow Islamic Emerging (EMI), MSCI World Developed (WDD), Dow Islamic World Developed (WDDI), and MSCI AC World (World). Mean and standard deviations are annualized. "Cum. Return" is the cumulative monthly return over the period. "corr (peer)"is the correlation between an Islamic index and its corresponding MSCI index. "Corr (World)" is the correlation between an index and the MSCI AC World index. Beta is computed relative to the MSCI AC World. "Sharpe" is the Sharpe ratio ($[Ri-Rf]/\sigma_i$). "Treynor" is the Treynor ratio ($[Ri-Rf]/\beta_i$). "Alpha" is the measure of selectivity ($[Ri-Rf]-\beta_i[Rm-Rf]$). "Diver." is cost of diversification ($\sigma_i/\sigma_m[Rm-Rf]-\beta_i[Rm-Rf]$). Net Sel." is Fama's measure of net selectivity ($[Ri-Rf]-\sigma_i/\sigma_m[Rm-Rf]$).

Panel A: January 1996 to December 2005

	Descriptive Statistics						Performance				
N=120	Mean	Std. dev.	Cum. return	Corr (peer)	Corr (world)	Beta (world)	Sharpe Ratio	Treynor (world)	Alpha (world)	Diver. (world)	Net sel. (world)
CAN	11.31%	20.39%	105.89%		0.83	1.13	0.38	0.07	6.09%	0.32%	5.77%
CANI	13.57%	21.48%	129.11%	0.75	0.59	0.85	0.47	0.12	8.76%	0.83%	7.93%
UK	5.52%	14.21%	49.54%		0.86	0.81	0.14	0.02	0.77%	0.19%	0.58%
UKI	7.63%	14.17%	71.49%	0.72	0.69	0.65	0.29	0.06	3.11%	0.42%	2.69%
US	7.19%	15.65%	68.08%		0.94	0.97	0.23	0.04	2.20%	0.09%	2.11%
USI	8.16%	16.71%	76.39%	0.77	0.75	0.83	0.27	0.06	3.38%	0.40%	2.98%
AP	-1.40%	19.31%	-9.33%		0.77	0.99	-0.26	-0.05	-6.42%	0.42%	-6.83%
API	0.93%	16.43%	8.25%	0.78	0.62	0.69	-0.16	-0.04	-3.65%	0.58%	-4.23%
EU	7.04%	17.08%	65.30%		0.91	1.02	0.20	0.03	1.98%	0.16%	1.82%
EUI	8.38%	14.05%	79.19%	0.79	0.80	0.75	0.34	0.06	3.72%	0.26%	3.45%
EM	2.55%	24.45%	26.24%		0.80	1.31	-0.04	-0.01	-2.93%	0.45%	-3.38%
EMI	3.16%	24.35%	30.41%	0.83	0.57	0.93	-0.02	0.00	-1.77%	0.99%	-2.76%
WDD	5.20%	14.92%	49.33%		0.99	0.98	0.11	0.02	0.20%	0.01%	0.19%
WDDI	7.47%	15.43%	70.16%	0.79	0.79	0.81	0.25	0.05	2.72%	0.31%	2.41%
WORLD	5.03%	15.12%	47.86%		1	1	0.10	0.01	0.00%	0.00%	0.00%
RF	3.57%	0.52%	34.50%								
Averages											
Dow Islamic	7.04%	17.52%	66.43%	0.78	0.69	0.79	0.21	0.04	2.32%	0.54%	1.78%
MSCI	5.34%	18.00%	50.72%		0.87	1.03	0.11	0.02	0.27%	0.23%	0.04%

Panel B: January 1996 to December 2000

	Descriptive Statistics						Performance				
N=60	Mean	Std. Dev.	Cum. Return	Corr (peer)	Corr (World)	Beta (world)	Sharpe ratio	Treynor (world)	Alpha (world)	Diver. (world)	Net Sel. (world)
CAN	16.00%	21.72%	77.32%		0.80	1.17	0.50	0.09	4.16%	1.68%	2.48%
CANI	17.40%	23.41%	84.09%	0.75	0.50	0.79	0.53	0.16	7.77%	4.54%	3.23%
UK	9.75%	13.53%	47.11%		0.83	0.76	0.35	0.06	0.29%	0.86%	-0.57%
UKI	12.70%	13.56%	61.38%	0.58	0.53	0.48	0.56	0.16	4.87%	2.50%	2.37%
US	17.78%	15.36%	85.92%		0.92	0.95	0.83	0.13	7.22%	0.47%	6.75%
USI	22.22%	14.78%	107.41%	0.64	0.63	0.63	1.16	0.27	13.52%	2.11%	11.41%
AP	-4.20%	22.26%	-20.32%		0.80	1.20	-0.42	-0.08	-16.21%	1.71%	-17.93%
API	4.39%	17.00%	21.20%	0.80	0.65	0.75	-0.04	-0.01	-5.01%	2.28%	-7.28%
EU	12.65%	15.79%	61.13%		0.87	0.94	0.48	0.08	2.15%	0.70%	1.45%
EUI	15.59%	12.07%	75.36%	0.70	0.73	0.60	0.87	0.18	7.06%	1.22%	5.84%
EMER	-5.85%	26.95%	-28.28%		0.79	1.42	-0.40	-0.08	-19.14%	2.27%	-21.41%
EMERI	3.05%	27.93%	14.73%	0.85	0.57	1.07	-0.07	-0.02	-8.21%	4.68%	-12.89%
WDD	11.76%	14.61%	56.86%		0.99	0.98	0.46	0.07	1.03%	0.01%	1.02%
WDDI	19.20%	13.83%	92.80%	0.67	0.68	0.64	1.02	0.22	10.44%	1.68%	8.76%
WORLD	10.85%	14.89%	52.43%		1	1	0.39	0.06	0.00%	0.00%	0.00%
Rf	5.04%	0.17%	24.35%								
Averages											
Dow Islamic	13.51%	17.51%	65.28%	0.71	0.61	0.71	0.58	0.14	4.35%	2.72%	1.63%
MSCI	8.27%	18.60%	39.96%		0.86	1.06	0.26	0.04	-2.93%	1.10%	-4.03%

Panel C: January 2001 to December 2005

N=60	Descriptive Statistics						Performance				
	Mean	Std. Dev.	Cum. return	Corr (peer)	Corr (world)	Beta (world)	Sharpe Ratio	Treynor (world)	Alpha (world)	Diver. (world)	Net sel. (world)
CAN	6.62%	19.06%	28.57%		0.87	1.10	0.24	0.04	7.69%	-0.42%	8.11%
CANI	9.74%	19.50%	45.02%	0.76	0.70	0.92	0.39	0.08	10.29%	-1.02%	11.31%
UK	1.29%	14.87%	2.43%		0.89	0.87	-0.05	-0.01	1.70%	-0.29%	1.99%
UKI	2.56%	14.74%	10.11%	0.84	0.83	0.81	0.03	0.01	2.79%	-0.44%	3.23%
US	-3.39%	15.46%	-17.84%		0.96	0.97	-0.36	-0.06	-2.70%	-0.12%	-2.58%
USI	-5.91%	17.64%	-31.01%	0.87	0.86	0.99	-0.45	-0.08	-5.16%	-0.47%	-4.69%
AP	1.41%	15.99%	10.99%		0.78	0.83	-0.04	-0.01	1.70%	-0.62%	2.32%
API	-2.54%	15.92%	-12.95%	0.78	0.59	0.63	-0.29	-0.07	-2.83%	-1.18%	-1.64%
EU	1.44%	18.28%	4.17%		0.93	1.11	-0.04	-0.01	2.54%	-0.24%	2.78%
EUI	1.17%	15.61%	3.82%	0.85	0.86	0.88	-0.06	-0.01	1.60%	-0.40%	2.01%
EMER	10.95%	21.63%	54.52%		0.88	1.25	0.41	0.07	12.45%	-0.47%	12.92%
EMERI	3.27%	20.42%	15.68%	0.81	0.60	0.81	0.06	0.01	3.50%	-1.51%	5.01%
WDD	-1.36%	15.12%	-7.53%		0.99	0.99	-0.23	-0.03	-0.61%	0.01%	-0.61%
WDDI	-4.26%	16.31%	-22.64%	0.88	0.88	0.94	-0.39	-0.07	-3.65%	-0.36%	-3.29%
WORLD	-0.78%	15.30%	-4.57%		1	1	-0.19	-0.03	0.00%	0.00%	0.00%
Rf	2.10%	0.39%	10.15%								
Averages											
Dow Islamic	0.58%	17.16%	1.15%	0.83	0.76	0.85	-0.10	-0.02	0.94%	-0.77%	1.71%
MSCI	2.42%	17.20%	10.76%		0.90	1.02	-0.01	-0.00	3.25%	-0.31%	3.56%

Table 2: Performance of Islamic indexes after controlling for style effects (Carhart factors)

Unconditional CAPM: $R_{it}-Rf_t = \alpha_i+\beta_{i,1,0}(R_{mt}-Rf_t) +\varepsilon_{it}$

Unconditional Carhart model: $R_{it}-Rf_t = \alpha_i+\beta_{i,1,0}(R_{mt}-Rf_t)+\beta_{i,2,0}HML_t+\beta_{i,3,0}SMB_t+\beta_{i,4,0}MOM_t+\varepsilon_{it}$

Conditional Carhart model: $R_{it}-Rf_t = \alpha_i+\beta_{i,1,0}(R_{mt}-Rf_t)+\beta_{i,2,0}HML_t+\beta_{i,3,0}SMB_t+\beta_{i,4,0}MOM_t+Z_{t-1}[B'_{i,1}(R_{mt}-Rf_t)+B'_{i,2}HML_t+B'_{i,3}SMB_t+B'_{i,4}MOM_t]+\varepsilon_{it}$

To correct for the presence of autocorrelation and heteroskedasticity, standard errors and t-statistics are calculated using the Newey-West heteroskedasticity and autocorrelation consistent (HAC) covariance matrix. In the case of the conditional Carhart model, we save space by reporting the significance of (i) a Wald test (WT_1) for the null hypothesis of $\Sigma Z_{t-1}B'_{i,1}=0$, (ii) a Wald test (WT_2) for the null hypothesis of $\Sigma Z_{t-1}B'_{i,2}=0$, (iii) a Wald test (WT_3) for the null hypothesis of $\Sigma Z_{t-1}B'_{i,3}=0$, and (iv) a Wald test (WT_4) for the null hypothesis of $\Sigma Z_{t-1}B'_{i,4}=0$. WT_1 ,WT_2, WT_3, and WT_4 follow a χ^2 distribution with 12 degrees of freedom (CAN, CANI, UK, UKI, US, USI), 10 degrees of freedom (AP, API, EU, EUI, EMER, EMERI), and 6 degrees of freedom (WDD, WDDI). "Adj. R^2" is the adjusted R-squared. Variance inflation factors are less than 1.2, suggesting the absence of multicolinearity. a, b, and c indicate statistical significance at the 1, 5 and 10 percent levels.

Panel A: January 1996 to December 2005

	Unconditional CAPM				Unconditional Carhart								Conditional Carhart								
	α	β		Adj. R^2	α	β		HML		SMB		MOM		Adj. R^2	α	WT_1		WT_2		WT_3		WT_4		Adj. R^2
CAN	0.48	1.13	**a**	0.69	0.34	1.11	**a**	0.06		0.23	**a**	0.04		0.72	0.49	123.22	**a**	2.31		24.44	**b**	5.87		0.76
CANI	0.71	0.85	**a**	0.34	0.13	0.84	**a**	-0.39	**b**	0.51	**a**	0.16	**c**	0.47	0.59	166.06	**a**	21.12	**b**	34.99	**a**	23.66	**b**	0.59
UK	0.03	0.81	**a**	0.75	-0.09	0.83	**a**	0.13	**c**	-0.02		0.05		0.75	-0.08	175.99	**a**	5.54		4.99		21.90	**b**	0.82
UKI	0.24	0.65	**a**	0.48	0.09	0.66	**a**	-0.29	**a**	-0.15	**b**	-0.03		0.57	0.34	203.45	**a**	27.32	**a**	19.03	**c**	18.92	**c**	0.72
US	0.18	0.97	**a**	0.88	0.36	0.96	**a**	-0.11	**b**	-0.14	**a**	-0.07	**b**	0.90	0.37	506.67	**a**	24.40	**b**	28.42	**a**	36.66	**a**	0.93
USI	0.26	0.83	**a**	0.56	0.28	0.79	**a**	0.02		0.17	**b**	-0.05		0.58	0.37	128.12	**a**	2.22		23.87	**b**	32.01	**a**	0.70
AP	-0.48	0.99	**a**	0.59	-0.83	1.02	**a**	0.28	**b**	0.13		0.13	**c**	0.61	-0.92	148.7	**a**	23.98	**a**	7.66		29.22	**a**	0.71
API	-0.30	0.69	**a**	0.39	-0.72	0.67	**a**	-0.45	**a**	0.18	**b**	0.05		0.45	-0.96	54.73	**a**	2.89		9.09		1.99		0.55
EU	0.15	1.02	**a**	0.82	0.07	1.02	**a**	0.03		0.09	**b**	0.04		0.82	-0.04	571.65	**a**	16.00	**c**	2,67		2.88		0.87
EUI	0.29	0.75	**a**	0.65	0.12	0.73	**a**	-0.22	**b**	0.09	**c**	-0.02		0.67	0.25	236.21	**a**	30.93	**a**	2.02		2.95		0.76
EMER	-0.21	1.31	**a**	0.64	-0.53	1.24	**a**	0.31	**b**	0.42	**a**	-0.02		0.70	-0.50	138.19	**a**	21.55	**b**	39.88	**a**	9.36		0.74
EMERI	-0.14	0.93	**a**	0.33	-0.66	0.84	**a**	-0.50	**b**	0.57	**a**	0.00		0.44	-0.73	30.01	**a**	30.00	**a**	38.32	**a**	4.45		0.54
WDD	0.01	0.98	**a**	0.99	0.03	0.99	**a**	-0.01		-0.02	**a**	0.00		0.99	0.01	823.24	**a**	13.77	**b**	13.70	**b**	3.22		0.99
WDDI	0.21	0.81	**a**	0.62	0.17	0.77	**a**	-0.00		0.19	**a**	-0.01		0.65	0.24	177.02	**a**	8.81		13.65	**b**	26.76	**a**	0.74
Averages																								
Islamic	0.18	0.79		0.48	-0.08	0.76		-0.26		0.22		0.01		0.55	0.01									0.66
MSCI	0.02	1.03		0.77	-0.09	1.02		0.10		0.10		0.02		0.78	-0.10									0.83

Panel B: January 1996 to December 2000

	Unconditional CAPM				Unconditional Carhart								Conditional Carhart									
	α		β		Adj. R^2	α		β		HML		SMB		MOM		Adj. R^2	α		WT_1		WT_2		WT_3		WT_4		Adj. R^2
CAN	0.35		1.17	**a**	0.64	0.37		1.16	**a**	0.13		0.31	**a**	-0.01		0.70	0.41		162.60	**a**	3.34		4.05		27.78	**a**	0.79
CANI	0.64		0.79	**a**	0.24	0.56		0.79	**a**	-0.38		0.63	**a**	0.06		0.48	1.00		92.40	**a**	7.00		29.80	**a**	7.04		0.63
UK	0.03		0.76	**a**	0.69	-0.01		0.76	**a**	0.07		-0.02		-0.00		0.69	0.08		271.78	**a**	4.85		3.71		5.99		0.80
UKI	0.41		0.48	**a**	0.28	0.28		0.51	**a**	-0.27		-0.18	**c**	-0.02		0.47	0.88	**b**	59.57	**a**	2.12		5.33		5.41		0.76
US	0.60	**b**	0.95	**a**	0.84	0.58	**a**	0.96	**a**	-0.01		-0.16	**a**	-0.01		0.88	0.59	**b**	254.70	**a**	8.79		3.90		10.02		0.91
USI	1.13	**b**	0.63	**a**	0.40	0.97	**c**	0.60	**a**	-0.14		0.19	**c**	0.11		0.48	1.06	**b**	40.42	**a**	6.66		6.64		2.39		0.62
AP	-1.35	**b**	1.20	**a**	0.65	-1.38	**b**	1.20	**a**	0.17		0.17	**c**	-0.00		0.66	-1.70	**b**	69.80	**a**	2.43		2.09		2.08		0.72
API	-0.42		0.75	**a**	0.43	-0.40		0.76	**a**	-0.31	**c**	0.20	**c**	-0.08		0.50	-0.52		36.00	**a**	6.00		5.07		8.97		0.62
EU	0.19		0.94	**a**	0.76	0.22		0.91	**a**	-0.08		0.09		0.01		0.78	0.17		189.89	**a**	7.99		9.82		2.07		0.85
EUI	0.59	**c**	0.60	**a**	0.54	0.53		0.60	**a**	-0.23	**c**	0.14	**b**	-0.01		0.60	1.14	**a**	70.50	**a**	25.78	**a**	5.55		5.01		0.75
EMER	-1.60	**b**	1.42	**a**	0.62	-1.33	**b**	1.43	**a**	0.17		0.45	**a**	-0.18		0.69	-1.16		59.93	**a**	4.99		10.82		6.68		0.75
EMERI	-0.68		1.07	**a**	0.33	-0.61		1.06	**a**	-0.39		0.59	**a**	-0.08		0.45	0.24		37.69	**a**	3.33		17.95	**c**	11.44		0.63
WDD	0.08	**b**	0.98	**a**	0.99	0.07	**b**	0.98	**a**	-0.00		-0.02	**a**	0.01		0.99	0.03		197.39	**a**	13.59	**b**	7.04		15.69	**b**	0.99
WDDI	0.87	**b**	0.64	**a**	0.47	0.74	**c**	0.61	**a**	-0.09		0.22	**b**	0.11		0.59	0.96	**b**	47.87	**a**	2.76		2.08		4.59		0.70
Averages																											
Islamic	0.36		0.71		0.38	0.30		0.70		-0.26		0.26		0.01		0.51											0.67
																	0.68										
MSCI	-0.24		1.06		0.74	-0.21		1.06		0.06		0.12		-0.03		0.77	-0.23										0.83

Panel C: January 2001 to December 2005

	Unconditional CAPM				Unconditional Carhart								Conditional Carhart									
	α		β		Adj. R^2	α		β		HML		SMB		MOM		Adj. R^2	α		WT_1		WT_2		WT_3		WT_4		Adj. R^2
CAN	0.58		1.10	**a**	0.74	0.56		1.09	**a**	-0.10		0.14		0.02		0.75	0.64		87.10	**a**	7.77		8.09		24.48	**b**	0.86

CANI	0.80		0.92	**a**	0.48	0.09		1.03	**a**	-0.46	**b**	0.23		0.24	**a**	0.55	0.34		67.03	**a**	19.90	**c**	20.88	**c**	26.09	**b**	0.68
UK	0.08		0.87	**a**	0.79	-0.12		0.97	**a**	0.18	**c**	-0.01		0.13	**a**	0.82	-0.24		210.77	**a**	2.97		20.56	**c**	20.02	**c**	0.88
UKI	0.20		0.81	**a**	0.69	-0.10		0.87	**a**	-0.37	**b**	-0.13		0.07		0.73	-0.07		130.91	**a**	4.88		4.91		9.90		0.79
US	-0.23		0.97	**a**	0.93	0.09		0.91	**a**	-0.25	**a**	-0.03		-0.11	**a**	0.95	0.08		330.94	**a**	39.02	**a**	20.99	**c**	27.45	**a**	0.97
USI	-0.44		0.99	**a**	0.74	-0.47		0.90	**a**	-0.00		0.05		-0.09		0.75	-0.13		90.97	**a**	4.98		33.97	**a**	29.00	**a**	0.86
AP	0.22		0.83	**a**	0.62	-0.20		0.88	**a**	0.33	**c**	0.07		0.11		0.64	-0.22		57.08	**a**	16.66	**c**	8.12		3.69		0.75
API	-0.23		0.63	**a**	0.36	-1.10	**b**	0.59	**a**	-0.63	**a**	0.23		0.07		0.47	-1.26	**b**	54.78	**a**	25.05	**a**	16.07	**c**	2.94		0.65
EU	0.17		1.11	**a**	0.87	-0.15		1.19	**a**	0.27	**b**	0.01		0.12	**b**	0.89	-0.17		330.30	**a**	31.11	**a**	20.09	**b**	7.07		0.94
EUI	0.11		0.88	**a**	0.74	-0.20		0.90	**a**	-0.37	**a**	-0.10		0.02		0.77	-0.11		183.42	**a**	6.67		5.49		3.34		0.83
EMER	1.05	**a**	1.25	**a**	0.77	0.43		1.14	**a**	0.28		0.40	**a**	-0.00		0.82	0.43		147.94	**a**	3.09		2.04		4.90		0.88
EMERI	0.29		0.81	**a**	0.37	-0.88		0.53	**a**	-0.65	**a**	0.62	**a**	-0.10		0.55	-0.90		40.66	**a**	2.88		27.77	**a**	8.08	**a**	0.69
WDD	-0.05	**b**	0.99	**a**	0.99	-0.02		0.99	**a**	-0.01		-0.02	**a**	-0.00		0.99	-0.03		282.71	**a**	5.58		5.91		5.04		0.99
WDDI	-0.32		0.94	**a**	0.78	-0.46		0.90	**a**	-0.13		0.02		-0.04		0.78	-0.23		110.24	**a**	9.03		17.08	**a**	18.88	**a**	0.87
Averages																															
Islamic	0.06		0.85		0.59	-0.45		0.82		-0.37		0.13		0.02		0.66	-0.34										0.77
MSCI	0.26		1.02		0.82	0.08		1.02		0.10		0.08		0.04		0.84	0.07										0.90

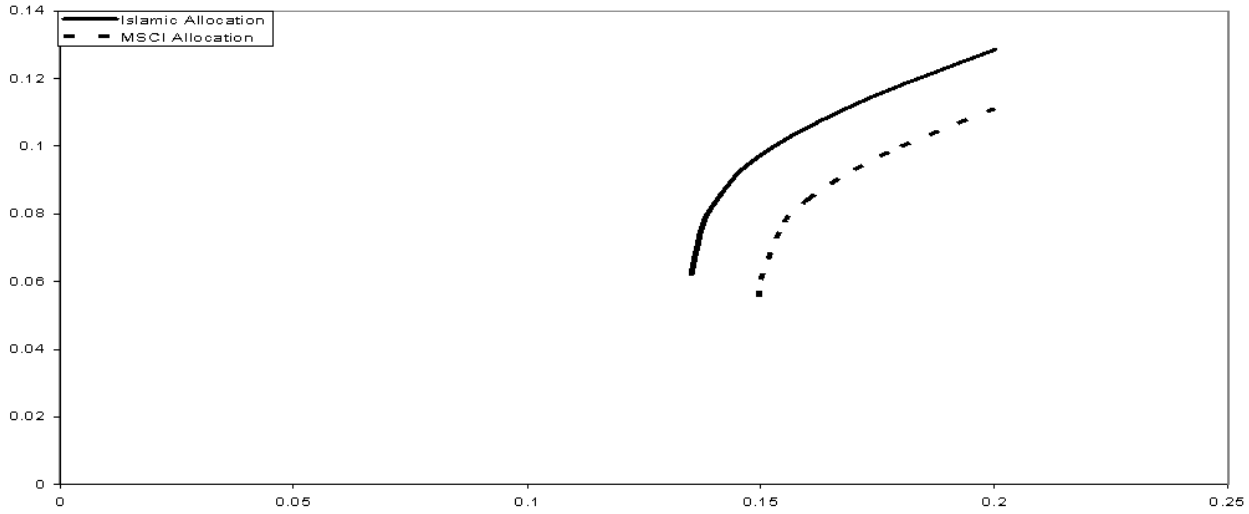
Table 3: Cointegration tests

ADF and KPSS [1st uses?] tests for stationarity have been performed on each price series. Stationarity in levels is rejected according to both tests. We conduct Johansen cointegration tests to determine if a long-term relationship exists between the markets. We evaluate whether ε_t in the cointegrating regression $x_t = \sum_{i=1}^{k} \lambda_i y_{i,t} + \sum_{i=1}^{k-1} \theta_i \Delta x_{t-i} + \varepsilon_t$ is found to be I(0) given any particular cointegrating rank. Lags and trend assumptions are established using the Akaike Info Criterion (AIC). Likelihood ratio is used as a trace statistic to determine the number of cointegration equations between the two non-stationary variables; significance is set by the critical values reported in Osterwald-Lenum (1992). a, and b indicate statistical significance at the 1, and 5 percent levels.

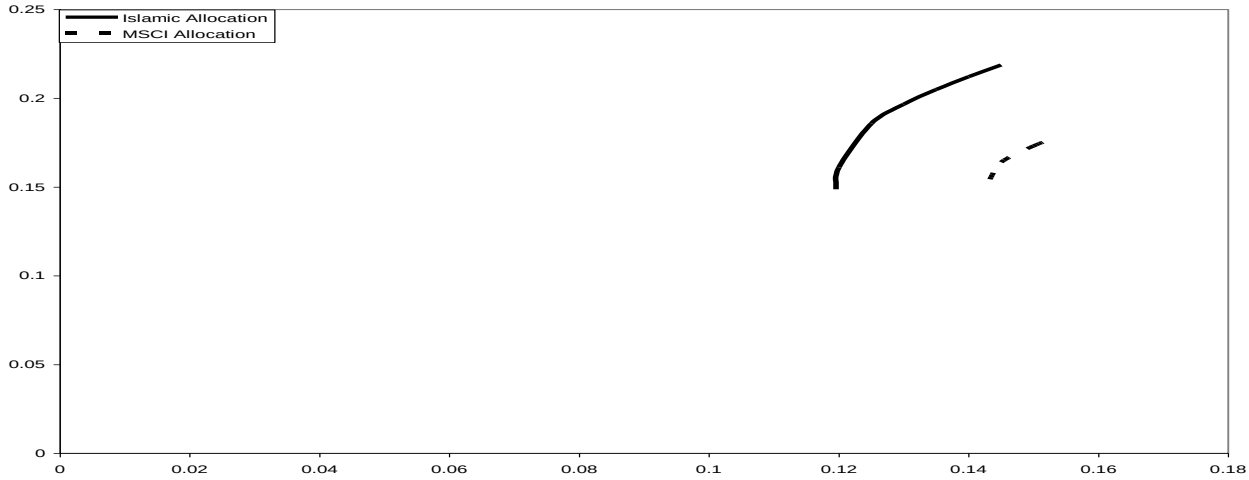
	Dow Islamic Price Series: Canada, USA, Asia-Pacific, Europe, Emerging				MSCI Price Series: Canada, USA, Asia-Pacific, Europe, Emerging				
	1996:01 to 2005:12 (N=120) Trend assumption: No deterministic trend				1996:01 to 2005:12 (N=120) Trend assumption: Quadratic deterministic trend				
No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value	No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value
None [a]	0.29	84.86	76.07	84.45	None [a]	0.27	88.89	77.74	85.78
At most 1	0.19	45.44	53.12	60.16	At most 1	0.18	52.38	54.64	61.24
At most 2	0.10	21.36	34.91	41.07	At most 2	0.14	29.16	34.55	40.49
At most 3	0.06	9.57	19.96	24.60	At most 3	0.08	11.77	18.17	23.46
At most 4	0.03	3.03	9.24	12.97	At most 4	0.01	2.02	3.74	6.4
	1996:01 to 2000:12 (N=60) Trend assumption: Quadratic deterministic trend				1996:01 to 2000:12 (N=60) Trend assumption: Quadratic deterministic trend				
No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value	No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value
None [a]	0.80	146.95	77.74	85.78	None [a]	0.56	99.19	77.74	85.78
At most 1 [b]	0.36	60.29	54.64	61.24	At most 1 [b]	0.42	54.76	54.64	61.24
At most 2 [b]	0.32	36.28	34.55	40.49	At most 2 [b]	0.36	35.44	34.55	40.49
At most 3	0.25	15.77	18.17	23.46	At most 3	0.15	8.99	18.17	23.46
At most 4	0.01	0.32	3.74	6.40	At most 4	0.01	0.40	3.74	6.4
	2001:01 to 2005:12 (N=60) Trend assumption: Quadratic deterministic trend				2001:01 to 2005:12 (N=60) Trend assumption: Linear deterministic trend				
No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value	No. of CE(s)	Eigenvalue	Trace statistic	5 percent critical value	1 percent critical value
None [a]	0.47	107.71	77.74	85.78	None [a]	0.50	100.32	87.31	96.58
At most 1 [a]	0.39	69.77	54.64	61.24	At most 1	0.34	59.04	62.99	70.05
At most 2 [b]	0.33	40.08	34.55	40.49	At most 2	0.23	34.52	42.44	48.45
At most 3	0.21	15.96	18.17	23.46	At most 3	0.18	18.81	25.32	30.45
At most 4	0.03	2.14	3.74	6.40	At most 4	0.11	6.94	12.25	16.26

Figure 1: Efficient frontiers

Panel A: 1996-2005



Panel B: 1996-2000



Panel C: 2001-2005