How Costly is Investors' Compliance to Sharia?

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The rapid proliferation of Islamic oriented investments has placed an added urgency to better understand their risk profile. With respect to Islamic stock market indexes, this concern is more pertinent to the extent that indexes could be subject to manipulation, and because they are often used as a benchmark for Islamic mutual funds. Using the Capital Asset Pricing Model as our basis, we place the most popular Islamic index under analytical scrutiny, and ask (1) how has the Sharia selection restriction affected its performance? (2) what is the competitive risk-return tradeoff of a Sharia compliant index and (3) to what extent is a Sharia compliant index correlated with the broad stock market. Our results reveal that the most popular index is market competitive but has underperformed in relation to another morally restricted but non-Islamic index. We conclude that investors in the Muslim index are not suffering a discernible cost for complying to the Sharia restriction. Our results add a much needed guidance to Islamic investments in general and help assuage concerns that Islamic indexes have not received a minimum degree of investigation.

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1. Background & Objective

A significant trend in conventional finance has been leaning towards moral investments. In recent years, this direction has received an added impetus with the series of corporate scandals that helped reinforce the ethical dimension in investment selection. In the largest equity market, US investors have been outraged by the revelations of financial scandals, inside trading and the fraudulent research of Wall Street investment banks. Enormous severance packages like the ones awarded by the New York Stock Exchange have convinced investors that these problems are pervasive and not limited to a few organizations. With these moral setbacks, investors are increasingly keen to invest on an ethical basis. Today $1 in every $8 invested in the US follows a moral investment criteria. In many ways, this development is not unique to the US market. In fact, it is paralleled by the spectacular growth in Islamic financial institutions which also follow moral guidelines and whose assets grew 40 fold since 1982 to reach over $230bn today. Rapid growth combined with hefty profit margins have also attracted many large Western financial institutions who jumped into the fray to establish their own Islamic subsidiaries and offer financial instruments targeted directly at their Islamic clientele. Worldwide, the largest stock exchanges have responded to these dynamics by introducing indexes that track the stocks of corporations whose business and activities are compatible with Islamic law. In general the indexes represent a basket of stocks acceptable to Islamic principles (shunning unethical or highly-indebted firms, or engaged in gambling, alcohol sales and other prohibited activities). The leading product in this category is the Dow Jones Islamic Market Index (DJI).

The rapid proliferation and impressive growth of Islamic oriented investments has also placed an added urgency to better understand their risk profile. While it is clear that conventional finance operates on academically sound principles, Islamic finance has ethical and religious support but lacks the convictions of accepted financial theory. This concern enhanced the belief that Islamic institutions need to improve the disclosure of their activities and added to the view that Islamic investments, in general, do not enjoy the same level of financial transparency as their traditional counterparts.

For Islamic funds and indexes, this negative perception is significant because the absence of a reliable and independent assessment of their risks has left investors puzzled which investment alternative was most suitable to achieve their individual financial goals. On the Saudi Stock Market (Al Tadawil), more than 50% of the 130 mutual funds are Sharia compliant but specific metrics about their performance is not available. For example, the Al-Ahli US Trading Equity fund marketed by National Commercial Bank of Saudi Arabia purports to track the Russell1000 Islamic-Index. In reality, such index does not exist and the fund description provided (growth) is insufficient to determine its risk rating or market correlation. By no mean is this problem confined to Al Ahli Bank. Another fund issued by Bank Al Jazira, and indexed to the DJI (Al Khair Global Equities Fund), offers limited information about its performance and risk profile. While some mutual funds may provide this data upon request, we believe it is critical that an independent and objective research investigates the performance of these funds using sound financial theory and by applying well-accepted principles. With respect to indexes, the question is more pertinent to the extent that these could be subject to manipulation, and because they are used as a benchmark by mutual funds. We are convinced that an objective and impartial evaluation will add a much needed transparency to Islamic investments in general and help assuage concerns that Islamic indexes have not received a minimum degree of investigation.

Motivated by these challenges, we propose to place the leading Islamic index under analytical scrutiny, and ask (1) how has the Sharia selection restriction affected their performance? (2) what is the competitive risk-return tradeoff of a Sharia compliant index and (3) to what extent is a Sharia compliant index correlated with the broad stock market.

2. Significance

One of the most important problems of modern financial economics is the quantification of the tradeoff between risk and expected return. Although common sense suggests that a risky investment such as the stock market will generally yield a higher return than a risk-free investment, it was only with the development of the Capital Asset Pricing Model (CAPM) that economists were able to calculate how much. The CAPM implies that the expected return of an asset must be linearly related to the covariance of its return with the return of the market, or beta.

Using the CAPM as our theoretical basis, we estimate the beta of the most popular Islamic indexe today: the Down Jones Islamic (DJI) Index. For a proxy to the world stock market, we use one of the largest and most diversified indexes of the Dow Jones family, the Down Jones World (DJW) Index which includes over 1800 components worldwide diversified across 34 countries, 10 economic sectors, 18 market sectors, and 51 industry groups. The DJI is an Islamic equity benchmark index and a subset of the DJW index. The analysis of the correlation between the DJI and DJW indexes will yield an 'Islamic beta' and is important because the sign and magnitude of this parameter has several significant implications to investors. For example, a beta greater than 1 indicates that the Islamic index is more volatile than the market whereas a beta smaller than 1, has the opposite interpretation. In addition, a negative beta suggests that the index moves counter to the market and may be useful as a hedge against stock market downturns. Therefore, estimating the actual beta of a Sharia compliant index is critical to the understanding of its risk profile and market volatility.

In order to better evaluate the DJI, we compare its performance to one of the most popular socially responsible indexes available today, the Down Jones Sustainability World Index (DJS). The DJS shuns the stock of any company engaged in gambling, alcohol, tobacco, firearms or armaments. Socially responsible indexes are often called "Green", a reference to their environmental awareness and their investment mantra. In this case, the Green index is the closest alternative to the DJI, except that the latter also excludes companies whose cost or revenues depend on interest rates or are engaged in pork-related food products.

To the extent that the Green index is also diversified within its moral restrictions, it offers Muslim investors an important comparative analysis. Specifically, by comparing the Islamic beta to the Green's, an investor can determine the extent to which compliance with the Sharia restriction may have affected the index diversification or risk and return tradeoff. One would speculate that the Islamic beta is larger than the Green's to the extent that the Islamic index excludes more sectors and is therefore less diversified. Our study investigates this hypothesis and quantifies the added risk the Sharia restriction (as perceived by the DJI's consultative board) has imposed on the Islamic index. Moreover, by comparing the performance of the Islamic index with respect to the broad market, we determine whether its return has sufficiently compensated for its relative risk.

3. Literature Review

The Capital Asset Pricing Model that economists use to quantify stock market risk and the reward for bearing it has generated a vast literature during the past 40 years. Most of the studies have focused on testing beta and its stability. The majority of the studies have been conducted on the US stock market. The concept of an Islamic beta is novel and has not been investigated before primarily because Islamic indexes are relatively new. The traditional literature on beta is extensive and a summary of the research completed in that area is well beyond the scope of this paper. We will only cite the recent leading studies that are relevant to our analysis. For example, Pettengill et al (1995) find a positive relationship between risk and expected return utilizing monthly data of the US market. Their result lends a more recent empirical support to earlier studies by Lintner (1965), Black et al. (1972) and Fama and MacBeth (1973). International evidence of the CAPM is a more recent phenomenon documented in several Western and emerging markets. Faff (2001) for example investigates a dual beta CAPM in the Australian stock market. He finds no support for a single beta but strong evidence for a dual beta depending on whether market returns are positive or negative. Chou and Lin (2002) test the Sharp Lintner estimates the CAPM model with and without a risk-free rate for 16 OECD countries and over 17 years. Their results provide evidence that support for CAPM is pervasive. The same conclusion is attained lately in Gomez and Zapatero (2003), and Gordon and Cheong (2004).

While Islamic banking has received a fair share of research and investigation, the existing academic literature on Islamic investments is still embryonic despite their increasing popularity. We will briefly summarize the only three references we could trace. Recently, Naughton and Naughton (2000) have analyzed the development of the Islamic equities market and the significant challenges they face. While Islamic banking, based on the prohibition of interest, is well established throughout the Muslim world, the authors point that attention has now turned towards applying Islamic principles in equity markets. While common stocks are legitimate instruments in Islam, many of the practices associated with stock trading are not. These practices include speculation, short selling, margin trading, and equity futures and options, all of which would be either severely restricted or unlikely to be acceptable within an Islamic market. The authors conclude that regulatory authorities in Muslim countries will therefore find a vast array of problems in attempting to structure a trading system that will be acceptable. In a recent study, Hakim and Rashidian (2004) have examined the efficiency and intertemporal links of the Islamic stock market index. Using cointegration analysis, their results suggest that the Islamic index is not sensitive to interest rate changes and shares a stable and long-term relation with the Wilshire 5000. Kabir (2001) discuses several Islamic Stock Market Indexes in more detail.

4. Methodology

The Sharpe, Lintner and Black Capital Asset Pricing Model states that in equilibrium the expected return of any asset is a function of the risk-free rate, beta, and the expected risk premium. This risk-return relationship is predicted to be linear if the CAPM holds. Applied to the DJI, the CAPM takes the form:

(1) $$E(R_i) = R_f + \beta_i [E(R_m) - E(R_f)]$$

where $E(R_i)$ represents the expected return on the index i= DJI or Green. R_f is the risk-free rate measured by the yield on the one-month LIBOR, and $E(R_m)$ the expected return on the market, measured by the Down Jones World (DJW) Index. Beta is defined as:

$$\beta_i = \frac{Cov[R_i, R_m]}{Var[R_m]}$$

In the traditional tests of Black's zero-beta CAPM, the subscript i represents the return of individual stocks. In this case, we are applying Black's model in an international setting in which the Islamic stock index is treated as a financial asset.

Equation (1) links the return on the Islamic index to the market premium and is traditionally known as the security market line (SML). To estimate the model, it is common to express it in terms of excess returns $Z_i \equiv R_i - R_f$ as follows:

$$E(Z_i) = \beta_i [E(Z_m)]$$

and

$$\beta_i = \frac{Cov[Z_i, Z_m]}{Var[Z_m]}$$

where Z_m is the excess return on the market. The usual estimator of beta is the least squares estimator of the slope coefficient of the excess market return in the following econometric model:

(2) $$Z_{it} = \alpha_0 + \beta_i Z_{mt} + u_{it}$$

Because there is an abundance of evidence that the error terms u_{it} are non-normal (and non-iid), we propose to estimate the model using a Generalized Method of Moments (GMM) technique based on Hansen (1982)[1]. This will ensure that the estimated results are robust to the large evidence of heteroskedasticity and temporal dependence in stock returns. Testing the model in (2) typically focuses on three implications: (a) the intercept

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[1] The GMM requires the definition of orthogonality conditions:

$$h_T(\alpha, \beta) = \frac{1}{T} \sum_{t=1}^{T} f_t(\alpha, \beta)$$

$$f_t(\alpha, \beta) = \begin{pmatrix} u_{it} \\ Z_{mt} \cdot u_{it} \end{pmatrix}$$

The GMM estimator is obtained by minimizing a quadratic form of the sample moments:

$$\min h_T'(\theta) W_T h_T(\theta)$$

over the parameter space $\theta = (\alpha, \beta)$, where

$$h_T(\theta) = \frac{1}{T} \sum_{t=1}^{T} u_{it}(\theta).Z_{it} \quad ; \qquad u_{it}(\theta) = Z_{it} - \alpha_0 + \beta_i Z_{mt}$$

and W_T is a 2X2 weighting matrix

is zero, (b) beta completely captures the variation of expected returns, and (c) the market risk premium $E(Z_m)$ is positive. Because market movements may not have a symmetric effect on beta, our analysis will distinguish between up and down markets.

An important complexity in the estimation of equation (2) is that the slope coefficient is not stable over time. This seemingly innocuous characteristic violates a fundamental assumption of CAPM which posits a simple and stable linear relationship between an asset's systematic risk and its expected return. There is now an overwhelming empirical evidence on the time variation in beta. These time dynamics are the main source of highly volatile coefficient estimates and the cause of large pricing errors. As a result, the application of standard least squares (or GMM for that matter) will produce wide varying and unreliable estimates. In response, many critics of CAPM (Ferson and Korajczyk 1995, and Jaganathan and Wang 1996) have advocated that because beta and the market risk premium vary over time, static CAPM should be improved by incorporating time variation directly in the estimation. This extension yields the conditional CAPM, in which investors update their estimates of the means, variances and covariances of asset returns each period to reflect an expansion of the information set upon which portfolio selection is based, implying that expected excess returns vary with time to reflect time variation in systematic risk.

To address the time variation problem in beta, we adopt the same recursive approach used by several leading studies including Pettengill et al. (1995), and more recently Faff (2001), and Elsas et al (2003). The estimation and testing of beta is performed in 2 steps. In the first step, the betas of DJI and the Green indexes (the two morally restricted indexes) are estimated from equation (2) using a GMM methodology and where the lagged value of the independent variable is used as an instrument. Fore each restricted index, the first beta coefficient (β_1) is estimated using the initial 20 observations. The other estimated betas ($\beta_{i,t}$) are then updated each week, up to the last week, yielding 223 coefficients. The mean of the estimated betas is computed to determine the risk of each index relative to the market and to compare its performance in relation to the other restricted index.

In the second step, the estimated betas are used as independent variables to test the validity of the CAPM for that index. To that end, the following regression will be performed:

$$Z_{it} = \gamma_{0t} + \gamma_{1t}\delta\hat{\beta}_{i,t-1} + \gamma_{2t}(1-\delta)\hat{\beta}_{i,t-1} + \gamma_{3t}\hat{\beta}^2_{i,t-1} + u_{it} \qquad (3)$$

where $\hat{\beta}_i$ represents the estimated betas from equation (2) and a dummy variable δ is used to separate the up and down market effects. There is a considerable empirical support for a dual beta approach that allows the market sensitivity to vary with the market trend both in the US and in other stock markets (Pettengill at. al. 1995, Faff 2001). To deal with the potential of bull/bear dual beta, we set the value of the dummy variable to one (δ=1) when the realized market premium is positive ($Z_m > 0$). When the realized market premium is negative ($Z_m < 0$), the value of the dummy variable is zero (δ=0).

Regression (3) is performed for each week of the testing period (which begins after the initial 20 estimated betas and yields 203 estimated gammas)[2]. Our estimation produces 203 estimated coefficients for each γ_{0t} , γ_{1t}, γ_{2t}, γ_{3t}. Standard t-tests for statistical significance are applied on the mean estimated coefficients ($\bar{\gamma}_j = \sum_t \gamma_{jt}/n$ for $j = 1, 2, 3$). The hypothesis tested are:

H1: The intercept is the same as the risk-free rate:

H_0: $\gamma_0 = 0$; H_a: $\gamma_0 \neq 0$

H2a: The estimated risk premium is positive in up markets:

H_0: $\gamma_1 = 0$; H_a: $\gamma_1 > 0$

H2b: The estimated risk premium is negative in down markets:

H_0: $\gamma_2 = 0$; H_a: $\gamma_2 < 0$

[2] The estimation methodology is recursive. The initial beta (β_1) is estimated using the first 20 observations, the second beta (β_2) uses 21 observations, and so on, up to the last observation (243th week). The initial gamma (γ_1) is estimated using the first 20 betas (β_1 , …,β_{20}) as independent variables. The second gamma (γ_2) is estimated using 21 betas, and so on.

H3: The risk return relationship of the two Islamic indexes is expected to be linear

H_0: $\gamma_3 = 0$; H_a: $\gamma_3 < 0$

5. Data Description

Launched in February 1999, the DJI represents the first worldwide Islamic equity index created by an independent provider and consistent with Islamic Sharia principles as interpreted by its publisher. The index has been a very successful benchmark for many Islamic mutual funds throughout the world. Dow Jones Inc. also publishes other Islamic equity indexes that are specific to a region or industry and which we do not use in this study. Prior to the introduction of DJI, Islamic funds sponsors established their own internal benchmarks to measure their performance raising doubts about potential conflicts of interest. The Green index we use is also published by Dow Jones under the name Dow Jones Sustainability (DJS) World index. This index consists of more than 300 stocks worldwide that represent the top 10% of the leading sustainability companies in 60 industry groups and the 34 countries covered by the biggest companies in the Dow Jones Global Indexes. At the end of July 2004, the market capitalization of the DJS World exceeded $6.2 trillion. To be included in the DJS, a company must meet several eligibility criteria and its core business must exclude tobacco, gambling, alcohol, firearms and armaments. The DJI and DJS indexes are both subsets of the Dow Jones World Index, a broad and comprehensive measure of the world market comprising 1800 components diversified across 34 countries, 10 economic sectors, 18 market sectors, and 51 industry groups. Our data includes 243 weekly observations on each of these indexes between January 5, 2000 and August 30, 2004. The data is complemented with weekly observations on the 30 days LIBOR, a proxy of the risk-free rate.

6. Results and Implications

The study examines the efficiency of the Dow Jones Islamic Index with respect to equity returns worldwide using weekly data compiled by Dow Jones Incorporated. The Dow Jones Islamic Index includes over 1300 individual securities whereas the Dow Jones World Index has over 1800. Our study also examines performance of a non-Islamic but socially responsible (or "Green") index which excludes tobacco, armaments, gambling, and alcohol-related companies without the Sharia restriction on interest rates or pork-related food products. The Green index is a close alternative to the DJI allowing for a direct comparison and evaluation of the cost of complying to the Sharia restrictions.

The 30-day LIBOR is used as the risk-free rate. All indexes are value-weighted indices, and returns are calculated in terms of US dollars. The DJ world index is also a weighted combination of returns from stocks over the world's capital markets. The sample period starts from January 5, 2000 to August 30, 2004, with a total of 243 weekly observations. We divide the study period into two equal subsamples. The choice of the division point was arbitrarily determined by examining the graph of the indexes and which experienced a major reversal in their trend in October 2002.

Means, standard deviations, skewness, as well as excess kurtosis of the monthly returns for the full sample and for the two subsamples are provided in Table 1. Over the full sample period, the Dow Jones World Index had the lowest negative return (-4.31% per annum) while the DJ Islamic Index had the worst return averaging –7.37% per annum. During this period, the Green had the highest volatility of 2.57% per week or 18.5% per annum (2.57% x $\sqrt{52}$). To some extent, these results are misleading because over the entire period, the indexes were in a steady decline as equity markets worldwide were suffering in the aftermath of the burst in the equity bubble of 1998-2000. If we turn our attention to the second sample period (Oct 02 – Aug 04) where equity prices were rising, we notice that the Green index also lead in terms of average volatility (σ = 1.96% per week or 14.1% per year) but not in average return (0.0029 per week vs. 0.0036).

Comparing the Islamic index to the Green index indicates that their risk profiles are relatively identical when the risk is measured in its entirety (both systematic and unsystematic). Their coefficients of variation (total risk per unit of return) are also similar (0.75 for the Green vs. 0.79 for DJI). However, this risk comparison ignores the fact that a ranking of portfolios based on total risk is only useful if the indexes under consideration represent fully diversified portfolios. If this is not the case, portfolios with identical total risk, but different unsystematic risk, will be rated the same. A better measure of the portfolio performance is based on Treynor's ratio which measures beta risk and which we discuss below in this section.

Skewness and excess kurtosis statistics for each series, the full sample period and for the subperiods are also presented in Table 1. The returns of the series are negatively skewed, a result in line with other studies on stock returns in the US and other countries (for example Chou and Lin, 2002). The results also indicate that the index returns have fat-tailed distributions because the kurtosis is > 3. The Jarque Bera test of normality is also refuted at the 1% significance level for the first and the entire time periods. During the second time period, the series are more well-behaved. It appears that the non-normality can be attributed to the first subperiod during which returns deviate substantially from normality in terms of skewness and excess kurtosis.

Table II presents the regression results of the conditional CAPM market model using the OLS and the GMM estimations. For the DJI index, the mean beta coefficients are 1.03 and 0.94 using the OLS and the GMM estimation techniques respectively. For the Green index, the coefficients are 1.00 and 0.572 respectively. For both indexes, the OLS estimates are consistently higher. However the OLS results are predicated on the assumption that the error terms are iid with a limiting distribution that is multivariate normal. However, the Jarque Bera tests on returns in Table I had revealed substantial deviation from normality for all indexes[3]. When the return distribution is unknown, a non-parametric and robust estimator like the GMM can provide more consistent and reliable estimates of the betas. Like the OLS, the GMM estimates also show that the beta of the DJI is larger than the Green's, an indication of a higher systematic risk. The tests for a larger coefficient [Ho: β *(DJI)* > β *(Green)*], are confirms at 5% significance for both estimation techniques.

We elaborate on the preceding finding about the magnitude of the beta coefficient of the two indexes to derive specific practical implications about their performances. To that end, we use a common yardstick of fund performance the Treynor Ratio[4] (TR) to construct a measure of risk-adjusted return. Like the Sharpe ratio, TR is a measure of the

[3] In fact, the deviation from normality was more severe for the Green index as indicated by its excessively large Jarque-Bera statistic of 101.5 in Table 1 vs. 48.5 for the DJI index.

[4] TR is sometimes called Reward-to-Variability-Ratio. It is defined as: $TR_i = \frac{R_i - R_f}{\beta_i} = Z_i / \beta_i$ for i = DJI or Green.

risk return tradeoff and relates excess return to risk. However, unlike the Sharpe Ratio, TR uses systematic risk instead of total risk. The higher the Treynor Ratio, the better the performance under analysis. TR is a ranking criterion only. In this case, a ranking of individual indexes based on the TR measure is useful because the two indexes under consideration are subsets of a broader, and fully diversified market portfolio represented by the DJW. Computing Treynor's Ratio for the period October 02 – August 04, after equity markets reversed their trend from a prolonged downturn, shows that the TR for the Green index is almost double that of the DJI index (30.7% vs 16.7% from Table II). We attribute the underperformance of the DJI to a combination of lower average return and higher systematic volatility. Due to the limited time period, it would be difficult to argue unequivocally that the underperformance of the DJI is the result of its limited diversification. When we look at the entire period, the lower return and higher systematic risk of the DJI (mean return –7.37%, beta 0.948) in relation to the Green index (-6.22% and 0.572) remain a problem. To the extent that the DIJ has almost double the systematic risk of the Green, one would conjecture that the compliance to Sharia, as perceived by the DJI is costing Muslim investors twice the risk exposure of the closest non-Islamic index alternative. The implications of this result are not limited to the DJI but are also relevant for hedging and asset allocation. Because a large number of Islamic mutual funds are benchmarked to the DJI, their risk exposure is likely to be more elevated than if they were measured against the Green index.

While the systematic risk of the DJI index is high relative to the Green index, the DJI is by no means a poor index. In fact, its market risk level is in line, if not safer than what one would expect from an Islamic index that shuns several business sectors. Specifically, its beta of 0.948 suggests that the DJI is less sensitive to fluctuations in systematic risk than the DJW. This is a comforting result because it indicates that fund managers who track the DJI index perfectly are exposed to no more risk than the stock market worldwide. Despite its investment restriction and limited relative diversification, the exclusion of several industries from the DJI index did not seem to have hurt its diversification, but may have actually contributed to reduce its market risk. On a risk-adjusted basis, the performance of the DJI is also in line with the entire market as indicated by its TR of 16.3% vs. 18.68% for the market (DJW). In short, our analysis shows that the index is competitive with the broad stock entire but underperforms the socially responsible index with similar investment restrictions.

In our opinion, it is amiss to suggest that compliance to Sharia has harmed investors in an index or a fund that proscribe to abide by its tenets. An alternative explanation is that the application of the restriction by the patron of a Sharia compliant investment has been off the mark, either too lax or unnecessarily restrictive. Since the Sharia restrictions are generally subject to often wide interpretations, and where the potential for error can be significant. However, the rapid proliferation of Islamic investments and Islamic funds has progressed at an increasingly fast pace without the required due diligence that should accompany it. At the core of this problem is the absence of a credible authority on Sharia compliance that has resulted in every financial institution establishing its own board, a move which has also spread confusion into the Sharia parameters. Rather than a uniform Sharia investment code of conduct, there is now a slew of arbitrary parameters that every fund or index has either developed or imposed on itself[5] to comply with Sharia.

The results of the validity of the conditional CAPM are presented in Table III, and in general, they support it. For the DJI index, the null hypothesis for H1 (the intercept is the same as the risk-free rate) is not rejected at the 5% significance. This indicates that the intercept is not significantly different from zero and supports the zero-beta theory. The dual beta hypothesis (H2a and H2b) is supported for the downtrend. The sign is correct (γ_2 = -.02 and the t-test (–2.48) is statistically significant at 5%. For the uptrend, the sign of the coefficient γ_1 is correct but is not statistically insignificant from zero. Finally, the nonlinear term in not significant lending support to a linear relation between risk and return of the conditional CAPM.

The tests of the conditional CAPM applied to the Green Index are more mixed. The mean of the intercepts (γ_0) is significantly different from zero. The risk premiums of both the up and down market (γ_1 and γ_2) are all significantly different from zero but the down market trend coefficient variable (γ_2 = .0117) has the wrong sign. It is possible that

[5] For example, consider the arbitrary 5% limit on interest income to total revenues that the DJI uses to screen companies before their inclusion to the index.

a single beta coefficient is more appropriate to the Green index than the dual beta model we present. The non-linear term is also significant, indicating that the tradeoff between market risk and return may not be captured by a simple linear relationship. While these results may not support the applicability of conditional CAPM for the Green Index, they are supportive of it in the context of the Islamic index and lend further validity to the DJI's beta estimates.

7. Discussion and Conclusion

The academic literature in Islamic Finance has not kept pace with the rapid proliferation of Islamic investments and funds that claim to comply with the moral restrictions of Sharia. As a result the Islamic mutual fund industry has grown without the necessary scrutiny or due diligence that would normally accompany such expansion. At the same time, the limited information offered to investors about the performance and risk characteristics of funds that are marketed to Muslim investors has left them financially perplexed and without a financial compass to help them determine whether such funds are suitable for their investment objectives. At the center of these activities is the DJI which many funds use as a benchmark to rate themselves. This paper took aim at the DJI to analyze it s price behaviour and risk characteristics.

Our results show that the total fluctuations in the DJI have been in line with other indexes, both broader (the Dow Jones World Index) and restricted (the socially responsible index or "Green"). This evidence was based on a little over four and half years of recent observations (January 00 – Aug 04) which included the prolonged bear market between January 00 and October 02 and the reversal in worldwide equity prices since.

With respect to the behaviour of the DJI relative to stock markets worldwide, and specifically for its use as a benchmark by Islamic mutual funds, our results indicate a competitive risk adjusted return and a performance that mirrors one of the largest and most comprehensive measures of equity prices available today. The implications of this result suggest that funds who closely track the DJI index expose their clients to no more risk than what these individuals could achieve in the broad stock market without the moral restriction that the DJI Imposes on itself. As a result, we find no evidence that the compliance to Sharia, as interpreted by the DJI, has resulted in any discernible costs to investors.

To find theoretical support for our findings, we relied on the widely used conditional CAPM of modern portfolio management. Testing of the conditional Capital Asset Pricing Model confirmed our results, the applicability of a linear risk return trade-off for the DJI, and the use of beta as a relative market risk indicator. Specifically, for the DJI, we showed that the movement of stock market prices has asymmetric impact on excess return, and that the risk return relationship is explained by a single factor, beta.

The only negative finding about the DJI index is with respect to its competitiveness vis a vis another morally restricted, albeit non-Islamic, index. Measured against the largest socially responsible index, our results indicate that the performance of the DJI has been lacking. Using a standard yardstick of fund performance (the Treynor's ratio), the score for DJI is almost half that of the non-Islamic alternative. This result should prompt a revaluation of the components of the Islamic index to ensure that the companies the index tracks are not only Sharia-compliant but also market-competitive. Many indexes undertake an evaluation of their components on a regular basis and exclude companies that fall from grace and replace them with others that are deemed more representative of a sector or industry. We feel that such action may help improve the performance of this widely popular index.

Table I
Descriptive Statistics
Full Sample and Two Sub-Samples
January 5, 2000 – August 30, 2004
243 Weekly observations

	Dow Jones Islamic Index (DJI)	Dow Jones World Index (DJW)	Dow Jones Sustainability Index or GREEN (DJS)	30 days LIBOR
Jan 00 - Aug 04				
Mean	-0.0014	-0.0008	-0.0012	0.0301
Mean annualized	-0.0737	-0.0431	-0.0622	
Median	0.0002	-0.0002	0.0000	0.0184
Maximum	0.0732	0.0755	0.1013	0.0678
Minimum	-0.1145	-0.1228	-0.1295	0.0104
Std. Dev.	0.0251	0.0237	0.0257	0.0213
Skewness	-0.38	-0.49	-0.37	0.75
Kurtosis	5.1	6.0	6.1	1.8
Jarque-Bera	48.5	99.9	101.5	36.0
p-value	0.000	0.000	0.000	0.000
Observations	242	242	242	242
Jan 00 - Sept 02				
Mean	-0.0047	-0.0041	-0.0046	0.0424
Mean annualized	-0.2429	-0.2139	-0.2385	
Median	-0.0034	-0.0057	-0.0033	0.0411
Maximum	0.0732	0.0755	0.1013	0.0678
Minimum	-0.1145	-0.1228	-0.1295	0.0175
Std. Dev.	0.0286	0.0266	0.0288	0.0200
Skewness	-0.279	-0.426	-0.324	-0.066
Kurtosis	4.5	5.6	5.7	1.3
Jarque-Bera	14.6	44.7	47.2	17.2
p-value	0.0007	0.0000	0.0000	0.0002
Observations	142	142	142	142
Oct 02 - Aug 04				
Mean	0.0032	0.0038	0.0036	0.0126
Mean annualized	0.1667	0.1994	0.1881	
Median	0.0042	0.0049	0.0047	0.0117
Maximum	0.0608	0.0573	0.0650	0.0183
Minimum	-0.0347	-0.0366	-0.0423	0.0104
Std. Dev.	0.0182	0.0180	0.0196	0.0019
Skewness	0.24	0.16	0.29	1.26
Kurtosis	3.4	3.2	3.4	4.2
Jarque-Bera	1.7	0.7	2.0	32.3
p-value	0.44	0.72	0.37	0.00
Coefficient of Variation	0.79	0.65	0.75	--
Observations	100	100	100	100

Table II
OLS and GMM Estimation of Conditional CAPM
Recursive Estimation of Beta & Testing

$Z_{it} = \alpha_0 + \beta_i Z_{mt} + u_{it}$

for i = Dow Jones Islamic (DJI) and the Socially Responsible (DJS or "Green") indexes, and tests for the larger systematic risk t = 1 to T = 243

$Z_i \equiv R_i - R_f$; $Z_m \equiv R_m - R_f$; R_m = Raw Return on Dow Jones World (DJW) Index

Sample Period: Jan 00 – Aug 04 (243 weeks)

			Ho: β (DJI) > β (Green)	
	$\bar{\beta}(DJI)$	$\bar{\beta}(Green)$	t-test	p-value
OLS (Newey and West adjusted covariance)	1.0366	1.0005	9.61*	0.00
GMM (Instrument: Lagged value of DJW)	0.948	0.572	2.269*	0.0115
Treynor's Ratio = Z_i / β	16.3%	30.7%	--	--

Notes: The regression is performed recursively for each of the 243 weeks in the estimation period starting after from observation No. 20 to ensure sufficient degrees of freedom for the 1st estimated beta (β_1). The estimated betas above represent the mean values across all the estimates: $\bar{\beta} = \frac{1}{223}\sum_{t=21}^{243}\hat{\beta}_t$ where β_t *hat* is the estimated coefficient in each time period starting from the 20th week of the sample period. The t-test for Ho: β *(DJI) >* β *(Green)* are significant at 5%.

Treynor's ratios are computed based on the GMM coefficient estimates of beta (above), and (from Table I) the mean LIBOR rate, the positive mean returns for the DJI and the Green indexes between Oct 02 – Aug 04: LIBOR = 1.26%; DJI = 16.7%; Green = 18.8%. During this period, the mean positive return for the DJW was 19.94% and its beta, by definition, is one. Its TR is therefore 19.94% - 1.26% = 18.68%

** Significant at 5% level.*

Table III
Testing of the Conditional CAPM
Applied to the Dow Jones Islamic Index (DJI) and the Green Index (DJS)

$$Z_{it} = \gamma_{0t} + \gamma_{1t}\delta\hat{\beta}_{i,t-1} + \gamma_{2t}(1-\delta)\hat{\beta}_{i,t-1} + \gamma_{3t}\hat{\beta}^2_{i,t-1} + u_{it}$$

where as $Z_i \equiv R_i - R_f$, and δ=1when $Z_m > 0$ (the realized market premium is positive), and δ=0 when $Z_m < 0$

Sample Period: Jan 00 – Aug 04 (243 weeks)

	Dow Jones Islamic Index (DJI)			Green Index (DJS)		
Coefficient	Mean Value	t-test	P-value	Mean Value	t-test	P-value
Mean γ_0	0.0034	0.5701	0.2845	-0.0091*	-0.4102	<0.0001
Mean γ_1	0.0049	0.5877	0.2787	0.0234*	5.6635	<0.0001
Mean γ_2	-0.0205*	-2.4813	0.0069	0.0117*	2.8841	0.0022
Mean γ_3	0.0033	1.1609	0.1235	-0.0091*	-4.1024	<0.0001

Notes: The estimation methodology is recursive. The initial beta (β_1) is estimated using the first 20 observations, the second beta (β_2) uses 21 observations, and so on, up to the last observation (243 rd week). The initial gamma (γ_1) is estimated using the first 20 betas (β_1 , …,β_{20}) as independent variables. The second gamma (γ_2) is estimated using 21 betas, and so on. The estimation produces 203 estimated coefficients for each γ_{0t} , γ_{1t}, γ_{2t}, γ_{3t}.

t-test are applied on the mean estimated coefficients: $\bar{\gamma}_j = \sum_t^n \gamma_{jt} / n$ for *j = 1, 2, 3*, and n = # of estimated gammas.

** Significant at 5% level.*

Bibliography

Chen M: Risk and Return: CAPM and CCAPM. *Quarterly Review of Economics and Finance*, Vol 43, No. 2, p.369, Summer 2003.

Chou P., and Lin M.: Tests of International Asset Pricing Model With and Without a Riskless Asset. *Applied Financial Economics*, Vol 12, No. 12, p. 873, Dec 2002.

Elsas R., El Shaer M., and Theissen E.: Beta and Returns Revisited: Evidence From the German Stock Market. *Journal of International Financial Markets, Institutions & Money*, Vol 13, No. 1, p. 1, Feb 2003.

Faff R.: A Multivariate Test of a Dual Beta CAPM: Australian Evidence. *The Financial Review* 36, pp 157-174, 2001.

Fama E. and MacBeth J.: Risk, Return and Equilibrium: Empirical Tests. *Journal of Political Economy*, 81, 607-36, 1973.

Ferson, W. E. and R. A. Korajczyk (1995): "Do Arbitrage Pricing Models Explain the Predictability of Stock Returns?," *Journal of Business,* 68, 309-349.

Gomez J. P. and Zapatero F.: Asset Pricing Implications of Benchmarking: A Two-Factor CAPM. *European Journal of Finance*, Vol 9, No. 4, p.343, Aug 2003.

Ghysels, E. (1998): "On Stable Factor Structures in the Pricing of Risk: Do Time Varying Betas Help or Hurt?," *Journal of Finance,* 53, 549-573.

Kabir, H.: Islamic Mutual Fund Investment, The Independent, Bengladesh, 4/16/2001.

Hakim S. and Rashidian R.: *Emerging Issues in Islamic Financial System*, ICFAI Books, Forthcoming 2004.

Hansen, L. P. (1982) Large sample properties of generalized method of moments estimators, *Econometrica,* ***50,*** 1029-54.

Jagannathan, R, and Z. Wang (1996): "The Conditional CAPM and the Cross-Section of Expected Returns," *Journal of Finance,* 51, 3-53.

Pettengill G. N., Sundaram S., Mathur I.: The Conditional Relation Between Beta and Returns. *Journal of Financial and Quantitative Analys*is, 30, 101-116, 1995.

Tang G., and Shum W. C.: The Risk-Return Relations in the Singapore Stock Market. *Pacific Basin Finance Journal*, Vol 12, No. 2, p. 179, Apr 2004.

______________________: The Relationship Between Unsystematic Risk, Skewness and Stock Returns During Up and Down Markets. *International Business Review,* Vol 12, No. 5, p. 523, Oct 2003.

MEED: Allied Asset Advisors Funds. *Middle East Economic Digest*, Sept 1, 2000 v44 i35 p21.

Naughton Shahnaz and Tony Naughton: Religion, Ethics and Stock Trading: The Case of an Islamic Equities Market. *Journal of Business Ethics*, Jan 2000, Vol 23 No. 2 p145 (15).

Newey, Whitney and Kenneth West (1987b) "A Simple Positive Semi-Definite, Heteroskedasticity and Autocorrelation Consistent Covariance Matrix," *Econometrica*, 55, 703–708.