# An Empirical Assessment of Islamic Equity Fund Returns


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**Abstract:**
Islamic Equity Funds (IEFs) differ fundamentally from conventional equity funds since Muslims are limited in their ability to invest in certain companies and are prohibited to pay or receive interest. The amount of academic research has lagged behind the popularity of these new and interesting funds. This paper aims to fill this gap somewhat by applying common statistical procedures as well as other mainly used performance measures to asses the performance of IEFs for the past five years. The results indicate that IEFs are relatively safe investment vehicles that do not significantly under or outperform their Islamic as well as conventional benchmarks under normal market conditions. During the bear market of 2002 IEFs did however significantly outperform the Islamic and conventional market. Furthermore IEFs seem most attractive as part of a larger fully diversified portfolio like a fund of funds, since they have good systematic risk-to-return ratios. There also seems to be a difference between the abilities of IEF managers, with the managers of Malaysian IEFs having relatively better market timing abilities and the managers of globally invested IEFs having better stock picking abilities. Interestingly, Malaysian IEFs seem to contain a discount on their returns based on their low downside risk. The results furthermore indicate the validity of the CAPM and point in the direction of efficient markets.

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## I. Introduction

Mutual funds are an interesting investment vehicle for people that whish to prosper from financial markets, but lack the knowledge, skill, or time to manage their own wealth. Over the years the number of these mutual funds has increased substantially with the assets invested in the mutual fund industry approximated at $3.7 trillion by 2003[1]. However Muslims are not allowed to invest in standard mutual funds since their faith prohibits them to invest in certain equities, like those of banks or companies that deal in pork, alcohol, pornography and certain entertainment related products. Furthermore Muslims are prohibited to either pay or receive interest, which further narrows their investment universe, excluding for example conventional bonds.

To meet the demand of Muslims who still whish to invest in equities, special Islamic Equity Funds (IEFs) have emerged rapidly since the early 90s, when Muslim scholars reached consensus regarding the permissibility of equity investing. Since then, these IEFs have gained considerable popularity among Muslim investors as well as Non-Muslim investors who see IEF investment as a form of Socially Responsible Investing. Despite this popularity, the academic literature on IEFs (and more specifically on their performance) has unfortunately lagged behind. This has negatively affected the already poor transparency on the performance of these funds. This paper intends to mitigate this by answering the question: How have IEFs performed for the past five years in comparison to their benchmarks? In addition to answering this question, the risk and returns characteristics of IEFs during difficult market conditions (bear market) are analysed. Furthermore, this paper aims to give an insight into the nature of Islamic investing, explain the rationale behind it and discuss the main opportunities and challenges for this interesting new investment industry. Finally, this paper also aims to add modestly to the literature on efficient markets and the CAPM.

The empirical research consists of five main parts. First, the average total return of IEFs is calculated and compared to their benchmarks. This is done against Islamic as well as conventional benchmarks, so the results are meaningful to Muslim as well as Non-Muslim investors. Secondly, the alpha and beta of each IEF is estimated through regression analysis. The significance of these individual alphas and betas is evaluated as well as the significance of the average alpha and beta, with the use of the t statistics on the estimated and average coefficients. Thirdly, several other performance measures are calculated to assess IEF performance like; the Sharp Ratio (SR), the Treynor Ratio (TR), the Information Ratio (IR), the Modigliani and Modigliani measure (MM), the TT measure (TT). These performance measures are all again based on Islamic as well as conventional benchmarks and the significance of the TT and MM measure is evaluated with the use of t statistics. Fourthly, the market timing ability (gamma) of IEFs is estimated with regression analysis using the Treynor and Mazuy (1966) model. Here, the alphas and betas estimated by this model are also compared to the previously estimated alphas and betas to assess which model is better. Fifthly, the risk and return characteristics of IEFs are evaluated for the bear market year 2002, by evaluating the SRs and MM measures of IEFs during this year and estimating the significance of the average MM with the use of its t statistic.

The results are broken down in three geographical categories, because the largest part of IEFs in the sample is invested either globally (category Global) or in Malaysia (category Malaysian), while a small part is invested locally elsewhere (category Other).

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[1] Martha McNeil Hamilton, The Washington Post, 2003.

The results of the first part of the research indicate that IEFs on average have underperformed their Islamic and conventional benchmarks, although this is mainly caused by the underperformance of Malaysian funds. The results of the second part indicate that adjusting for risk, IEFs slightly underperforms their Islamic and conventional benchmarks, but that this underperformance is insignificant and robust against alternative Islamic benchmarking. This result, combined with the fact that almost all betas of IEFs as well as the average beta are found to be highly significant, points in the direction of efficient markets and the validity of the CAPM. It also shows that IEFs have a low average beta (0.75) and are thus low risk investments. The third part's result shows that based on alternative performance measures, IEFs on average have outperformed their Islamic and conventional benchmarks, but again indicates that they did so insignificantly. This result also indicate that Malaysian funds are the worst performers among the three groups of IEFs and that IEFs in general are most attractive as part of a larger fully diversified portfolio, like a fund of funds. The results of the fourth part indicate that IEFs on average do not possess market timing ability. Malaysian funds are however found to be the better market timers while globally invested funds seem better at stock picking. The results of this part also indicate that a CAPM regression that does not allow for market timing underestimates alpha when gamma is positive and underestimates alpha when gamma is negative. The final part of the research shows that IEFs significantly outperformed their Islamic and conventional benchmarks during the bear market of 2002, which was somewhat expected given their low betas. Interestingly though the Malaysian funds are found to be the highest out performers while their betas are similar to the average beta of IEFs as a whole. This result was further scrutinised by estimating the downside risk of IEFs using the approach proposed by Ang *et al*. (2005). This resulted in a behavioural finance explanation of the relatively low returns on Malaysian IEFs, namely that they are less prone to downside movements of the market and are thus perceived as less risky by loss averse investors.

The remainder of the research is organised as follows. Section II describes Islamic Investing and provides a literature review. Section III gives an overview of the performance measures used in this paper and discusses the calculations, advantages and disadvantages of each measure. This section furthermore describes the data and discusses the methodology used for the empirical analysis. Section IV presents and analyzes the results. Section V concludes, gives an outlook and suggests improvements to this research.

## II. Islamic Investing

Islamic finance is a relatively new phenomenon in the arena of economics and banking (Visser 2004). Although it is common knowledge that Islamic finance is based on the prohibition of interest, its other important features are usually unknown. To clarify, the following provides a concise overview of the rationale behind Islamic finance and its main features.

### II.1 The prohibition of interest[2]

One of the most prominent features of Islamic finance is the prohibition of *riba* (interest). Literally translated *riba* means 'increase', 'addition' or 'surplus'. The *Sharia* (Islamic Law) interprets *riba* as an addition to the principle. This view implies that payment for the use of money, which is fixed beforehand, is also seen as *riba* and thus prohibited. This ban on interest is in fact not a purely Islamic trait. Visser (2004) points out that the Christian Church at various times in history banned *usura* (a technical name for interest) based on passages in the Bible.

The prohibition of *riba* in Islam is based on a number of passages from the *Quran* (the Islamic sacred book) namely *Sura* (verse) 2:275, 276 and 278, *Sura* 3:310, *Sura* 3:39 and *Sura* 4:161. Siddiqi (2004) points out that these verses imply 5 reasons why *riba* is prohibited in Islam namely that it:

***Corrupts society:*** this is derived from the association of *riba* with *fassad* (corruption) in verse 30.
***Implies improper appropriation of other people's property:*** derived from the *Quran* mentioning *riba* in verse 4:161 as "cheating others of their possessions".
***Ultimately results in negative growth:*** implied by verse 2:276 in which *riba* is mentioned to lead to "negative growth", this negative growth is interpreted as non-monetary growth, namely the decline in social welfare.
***Demeans and diminishes human personality:*** derived from verse 30, as well as from verse 2:276, where the negative growth in society can be translated to individual loss in diginity.
***Is unjust:*** derived from verse 2, Siddiqi (2004) admits that the reason why *riba* is unjust is not clearly stated in the *Quran*.

The author feels that these reasons seem to be incomplete and overlapping. Although Siddiqi admits that the reason why *riba* should be unjust is unclear, this can also be said about the other arguments. It is for example not clear at all why *riba* is an *improper* appropriation of other people's property. Neither is it clear in what way the *negative growth* in society would manifest itself. Furthermore the last argument is just a generalization of the previous arguments, which all imply the injustice of interest. Still these and similar reasons are commonly used to explain Islam's ban on *riba*.

Although the ban on *riba* is widely accepted by the Islamic community, its translation to the contemporary economic system is rather ambiguous. Some state that one form of *riba* concerned a custom in the pre-Islamic Arabia[3] (Qureshi 1991) and thus would make the ban on it irrelevant for modern day banking. A similar conclusion is reached by Kuran (1995)

[2] The following is mainly derived from Visser (2004)

[3] This was the custom that if a debt was not paid at maturity, its principle was doubled.

albeit via a different argumentation, namely that the ban on *riba* was to prevent debtors being enslaved. Other various Muslim scholars have expressed the opinion that *riba* as meant in the *Quran* manifested itself in Muhammad's time in very specific forms, and that its ban can not simply be extrapolated to all forms of contemporary interest. In fact, the Islamic theological research committee at Cairo's Al-Azhar University ruled 21-1 that loans against a fixed interest rate are not forbidden under Islam (Trouw 2002).

Still there are many Muslim scholars that do believe that the ban on *riba* is of relevance for the modern world. This is the view held by many members of the *Sharia* boards of Islamic investment companies. Although this view is quite strict in its interpretation of what *riba* means nowadays including in it bank interest as well as fixed rate interest on bonds, its proponents do relax Islamic restrictions in other ways (more on this in section II.3) to make Islamic investing possible.

### II.2 Gharar and Maysir[4]

As noted before, the ban on interest is not the only important feature of Islamic finance. Just as important are the prohibition of *gharar* (risk) and *maysir* (gambling).

*Gharar* stands for not knowing the value of a purchased good. According to Visser, the ban on *Gharar* implies that "commercial partners should exactly know the counter value which is offered in a transaction" (Visser (2004, p. 28)). This ban is derived from *hadith*[5] (record of actions and sayings of the Prophet) forbidding the purchase and sale of things like 'the catch of the diver' or 'the birds in the sky' (El-Gamal 2001). This means that purchasing goods of which the value is unknown beforehand is prohibited. That's why its prohibited for example to buy 'the catch of the diver' since beforehand the catch (and thus its value) is unknown.

*Maysir* stands for gambling and its ban comes from its explicit prohibition in the *Quran* (*Sura* 2:219, 5:90, 91). It is thus prohibited for Muslims to engage in speculation of any kind to make money, since speculation is seen as a form of gambling.

The ban on *Gharar* and *Maysir* has far reaching consequences for Muslim investors since it implies that they are prohibited to invest in futures, options and other speculation based derivatives. This also limits the scope for many structured products, which are usually a combination of real assets and derivatives.

### II.3 Equity Investment Criteria

The previous paragraphs have shown that Muslims are in many ways limited in their scope to prosper from financial markets. Investing in shares of companies is permissible however[6], albeit under strict regulations. Muslims are not allowed to invest in companies that produce or trade in forbidden goods and services. These goods and services include pork and pork related products, alcohol, gambling, pornography, conventional banking, but also

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[4] The following is mainly derived from Visser (2004)

[5] In Islam, Muslims must abide by the rules laid out in the Quran as well as by the sayings of the Prophet and the rules implied by his handlings in certain situations. These handlings and sayings have been recorded throughout the Prophet's life and are known as *hadith*.

[6] In fact until, the early 90s it was not certain that even investing in shares was permissible (Siddiqi 2002), but since The Islamic *Fiqh* Academy (a leading authority on Islamic issues) issued a decree that investing in *Sharia* compliant equities was permissible, this view has been largely adapted by the Muslim community.

entertainment related products and services like music, cinema and hotels. Furthermore investments in tobacco, arms and defence companies are also advised against.

The companies whose core activities do not include the abovementioned goods and services must furthermore adhere to additional criteria:

- The debt to total assets ratio of eligible companies may not exceed 33%.
- Interest income and other "impure" income may not exceed 5-10%[7] of total income.
- The amount of receivables may not exceed 45% of total assets.

It is clear from these criteria, that some leniency has been applied to the strict rules of not receiving or paying any interest. Note that in fact these rules imply that a company may actually pay as well as receive interest albeit to a limited amount. These concessions had to be applied since almost every firm has at least some amount of outstanding debt, as well as certain assets reaping interest income. When investing in these companies however, the amount of return made through interest is often subtracted from the total stock/fund return to purify the total return from "unclean" return.

Concluding this section, it can be stated that Muslims only have a limited amount of investments possibilities because of the ban on *riba, gharar* and *maysir* and the prohibition of certain goods like alcohol and pork. Furthermore it can be concluded that there is no consensus regarding the precise meaning of *riba* in terms of contemporary forms of interest and that the ban on *riba* has a predominantly dogmatic base rather than following economic (one might even say logical) reasoning.

## II.4 The IEF Industry[8]

Islamic Equity Funds (IEFs) are like Islamic investing a relatively new phenomenon. There is not much known about the market in which IEFs operate and how this industry evolved. The following thus give a brief overview of the history, characteristics and market of the IEF industry.

### II.4 A *History*

The first Islamic Equity Fund was found in 1986 by the North American Islamic Trust to oversee among others the funding of mosques in America. Between 1986 and 1994 the amount of IEFs as well as the value of assets invested in them was quite small.

The amount of IEFs grew rapidly however from 9 before 1994 to over 130 by the beginning of 2006, with the value of assets invested in IEFs growing from $800 mln in 1996 to $6 bln in 2003[9]. This increase in growth was caused predominantly by a decree issued by the Islamic *Fiqh*[10] Academy, which stated that Muslims were allowed to invest in equities within certain parameters, this was not certain before this time.

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[7] The maximum amount that may be earned through interest and impure income differs between 5-10%, depending on interpretation.

[8] The following is derived mainly from [redacted]

[9] (New Horizon No. 130, May 2003 p.2)

[10] Islamic jurisprudence

After the IEF market started growing in the mid 90s, demand started to arise for more transparency on these funds. There was for example no official Islamic index then to benchmark the returns of IEFs against. The Dow Jones and FTSE, who in 1999 launched the Dow Jones Islamic Market Index (DJIMI) and the FTSE Global Islamic Index Series (GIIS) respectively, first provided this benchmark. The DJIMI is a subset of 2000 *Sharia* compliant equities included in the broader Dow Jones World Index. The GIIS track about a 1000 *Sharia* compliant equities and is a subset of the FTSE World Index. Both indices are diversified through a broad range of sectors and regions, with the DJIMI having a high regional exposure to America.

Before 9/11 and the bursting of the Internet bubble, many IEFs were overweight in information technology stocks (Siddiqi 2002, Visser 2004, failaka 2002). This was because it was an attractive sector to be in and one, which included companies that passed the Islamic criteria relatively easily. The bursting of the Internet bubble in 2000 however, made Muslim investors reluctant to invest heavily in tech and substituted to more defensive sectors like healthcare. A significant part still is invested in technology stocks though. In fact the DJIMI has a 40% weight in technology and healthcare divided almost equally between these two sectors.

Nowadays most IEFs are pretty basic open-ended mutual funds, offering medium to long-term growth based on capital appreciation rather than dividend income. Growth stocks are often favoured, but there seems to be no strong preference for size. Exotic funds like "contrarian funds"[11] and other behavioural finance based funds are scarce to absent. There are however a limited amount of hedge funds and private equity funds.

IEFs are mainly offered by local players, but also some large Investment Banks like UBS, Citigroup and Merril Lynch. Another global Investment Bank, HSBC even has a daughter HSBC Amanah Finance that specifically targets a Muslim clientele.

### II.4 B *Market*

The market for IEFs is quite large, since there are approximately 1.3 billion Muslims around the world. Furthermore there is a growing middle class of Muslims around the world. India for example has a booming economy with a fast growing middle class and the second largest Muslim population around the world (174 million in 2001). Another example is Pakistan with an average GDP growth of 5% and 178 million Muslims in April 2006.

This growing middle class is interesting because the most IEFs have minimum investment thresholds between $2000-$5000, which is sufficiently modest to attract a substantial middle-class clientele (Siddiqi 2002). In fact the IEF industry has already been focussing on this segment. Failaka[12] for example states that of the 15 largest IEFs (in terms of assets) only one has a minimum investment over $25,000.

But the growing middle class is not the only interesting segment for IEFs to be in. Many "high net worth individuals" in the Middle East are excellent clients for the sellers of IEFs.

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[11] These are funds that invest in "loser" stocks which have performed badly over a certain period of time since the fund managers believe that stock markets overreact and thus that losers become winners and vice versa.

[12] From "Islamic Equity Funds: Analysis and Observations on the Current State of the Industry" –Failaka International INC (2002)

The amount of money circulating in this area has increased strongly from an already high value since the recent rise of oil prices[13]. These high net worth individuals are also targeted by some IEFs, which have a minimum investment threshold ranging from ranging from 1 to 5 million dollars.

Even non-Muslims are an interesting market for IEFs. Islamic investing is in many ways a form of Socially Responsible Investing. An industry, which had over $2.29 trillion worth of assets in 2005 in the US alone[14].

The large growth potential of IEFs however is on itself not alone to make the industry flourish. Many caveats (besides return performance) stand in the way of healthy growth in the IEF industry. Failaka for example names:

- Distribution channels: these are not properly set up yet to access the most attractive segments, namely the retail investor.
- Breadth of Products: the funds offered by Islamic investment firms are not diverse enough. There is a need for more sector and style based IEFs and exotic funds, so as to meet more specific demands of investors. Furthermore the limited amount of IEFs lowers the choice of potential investors.
- Fee Structure: the fee structure of IEFs needs to be more competitive, currently IEFs on average charge higher management fees than conventional funds.
- Client Education: there is still too much uncertainty regarding the permissibility for Muslims of investing in equity. Potential clients should thus be educated about this and convinced about the permissibility of equity investing.

In addition to this list, it can be stated that IEFs are probably not marketed very well. An example of this is the fact that many (even Muslim) investors do not know of the existence of IEFs. Ahamd (2001) also states that marketing channels of IEFs are not effective enough yet to penetrate the small and middle-class savers.

### II.4 C *Specific Risks*

Because of their nature, IEFs are exposed to specific risks that are normally not bourn by conventional funds. The most obvious risk is that of diversification. Since IEFs have a limited investment universe, they are also limited in their diversification potential. This risk may not be as severe though as might seem at first, since the amount of permissible securities is large enough and contains enough sectors and regions to provide nearly efficient diversification. This conclusion is also reached by Abdullah, Mohammad and Hassan (2002), who find that the diversification level of Islamic funds is slightly less than that of conventional but insignificantly so. This risk is however important in the sense that IEFs are unable to 'ride' the returns of certain attractive sectors.

IEFs are also prone to changing *Sharia* rules. The screening criteria for permissible stocks for example seem rather arbitrary (Visser 2004). There is for example no guarantee that Muslim scholars wont condemn a debt to total asset ratio of 33% in the near future to adapt a ratio of 25%. This would off course have major implications for the equities included in Islamic portfolios. Furthermore there is no real consensus regarding the selection criteria for

[13] Countries in the Middle East and especially the United Arab Emirates have been known to be large exporters of oil.

[14] "2005 Report on Socially Responsible Investing trends in the US" – Social Investment Forum.

permissible equities. The definition of permissible "impure" income for example already ranges from 5-10%.

Since IEFs are relatively new, they often also lack a sufficiently long track record (Ahmad 2001). This makes long-term performance evaluation more difficult. Not only because of the scarcity of data (which in some cases even limits statistical analysis) but also because the behaviour of IEFs through different bear and bull markets can't be evaluated.

Next to the lack of sufficient data another caveat of IEFs is that they are not transparent enough (Hakim and Rashidian 2002, Ahmad 2001). Until the Dow Jones and FTSE launched their Islamic indices, there were for example not even any proper benchmarks to evaluate IEF performance against. Some countries in which IEFs operate do not have well defined disclosure requirements, which limit the incentive for IEFs to be more transparent.

Since IEFs do not invest in companies with high debt to total asset ratios prone to investing in sub optimally leveraged companies. Furthermore investing in low debt companies may also mean a high exposure to companies that have difficulty in debt financing like start up companies. Since start-up companies are typically small, IEFs might have a high exposure to small growth stocks.

From another corporate finance perspective, IEFs may also run the risk of holding shares in companies that over invest. Since companies that have high interest income (which apart from banks is for most companies likely due to a large cash holding) don't pass Islamic screening criteria, IEFs can only invest in companies with relatively small amounts of cash. When these small cash holdings are a result of firms investing in bad projects, just to get rid of the cash, this will later on have a negative impact on the firm's future results. However there are plural reasons why companies have low cash holdings including that these companies are just disciplined, with no unproductive assets on their balance sheet.

IEFs can't invest in companies that have receivables that are more than 45% of total assets. This restriction implies that IEFs may run the risk of investing in illiquid companies since low receivables may mean a lower working capital and quick ratio.

One can conclude from the previous paragraphs that the IEF industry has in its short history seen extensive growth and that the market for Islamic investing is large enough to be attractive. Islamic investing however comes at the cost of extra risks and the industry still needs to evolve in certain critical areas to fully achieve its full growth potential.

## II.5 Literature Review

Fund performance evaluation has been the subject of debate among financial economists for a long time. This debate took a flight after William Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) developed the Capital Asset Pricing Model (CAPM), which is a set of predictions concerning equilibrium expected return on risky assets. The foundation for modern portfolio theory, on which the CAPM is based, was however laid down a few years earlier by Harry Markowitz in 1952 (Markowitz 1952). Mathematically the CAPM is expressed as:

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

Where $E(R_i)$ is the expected gross return on a risky security[15] i, $R_f$ is the return on a risk free asset, $R_m$ is the gross return of the market portfolio and $\beta_i$ is the sensitivity of security i's return to the market portfolio estimated by regression analysis.

Thus equation (1) shows that according to the CAPM, the expected return on any risky security should be proportional to its sensitivity to the market. This implication is made amongst others by the assumption that security prices fully reflect available information. This is commonly known in financial economics as the Efficient Market Hypothesis (EMH)[16].
Using the implications of the CAPM, one of the first studies to actually evaluate fund performance and test the EMH was by Michael Jensen (1968). Jensen systematically tested the performance of 115 mutual funds over a period of 19 years. He concluded that only fund significantly outperformed the [redacted] 500 benchmark after taking into account transaction costs and concluded that the EMH seems to hold well in practice and that mutual fund managers can't systematically outperform the market.

Although Jensen's study was pioneering in providing clarity on mutual fund performance and testing the EHM it only used a single measure to define out performance. This measure later became known in financial literature as "Jensens Aplha" (see section III.4 B).

Some years later McDonald (1974) used multiple evaluation methods to assess the performance of 123 mutual funds during 1960-1969. He concluded that the majority of the funds did not perform as well as the New York Stock Exchange (NYSE) benchmark.

Kon and Jen (1979) evaluated mutual funds taking into account that systematic risk is often non-stationary. To do this they divided the sample in three different risk regimes and ran a standard regression for each period. Kon and Jen found evidence of different levels of beta (systematic risk) suggesting that a large number of funds engage in timing activities.

Grinblatt and Titman (1989) found that abnormal performance did exist for some mutual funds during the period 1974-1984, but also found that the funds with the abnormal performance had higher management fees. After subtracting these fees and transaction costs, Grinblatt and Titman found no significant out performance indicating that investors cannot take advantage of the superior abilities of excellent portfolio managers by investing in their funds.

Chen *et al*. (1992) used a sample of 83 mutual funds over the period 1977-1984 and evaluated their performance using systematically varying parameter regression. Their main conclusion was that these funds do not possess market timing ability and that there is a trade off between market timing ability and security selection ability.

In 1996 an influential study by Elton, Gruber and Blake (1996) criticized previous studies on fund performance stating that they concentrated too much on new methodologies for evaluating performance and didn't pay enough attention to biases in their data. They pointed out that fund returns are often overstated if the sample consists of funds that existed

[15] The argument also holds for a portfolio of risky securities, like a mutual fund.

[16] The EMH comes in three forms, namely the weak, semi strong and strong form. The weak form of the EMH states that security prices already reflect all information contained in the history of past prices, while the semi strong states that security prices already reflect al publicly available information including past prices. The strong form of the EMH goes even further to state that stock prices reflect all relevant information including insider information.

continuously over the sample period. Elton, Gruber and Blake argued that since funds that disappeared during this period were not included in the study there was a "survivorship bias" in their results. The reason for this bias being that funds that disappeared did so because of their poor performance. Consequently the funds that were included in the sample were the ones that did well enough to stay alive. This would then lead to overestimation of fund returns since the very bad performing funds were excluded from the sample.

Another influential paper was written by Fama and French (1993) who stated that the CAPM model was too simplistic because it omitted other factors that explain stock returns. They proposed a three-factor model, which explains stock returns not only as a function of exposure to the market but also to exposure towards a size and a value factor.

Carhart (1997) acknowledged the above-mentioned critiques and assessed mutual fund returns with a survivorship bias free sample and using a multi factor model. Carhart included all known equity funds between 1962-1993 (his sample period) in his study, so also the ones that had disappeared within the sample period. Furthermore Carhart uses a four-factor model to test for abnormal returns, this four-factor model includes the three factors as proposed by Fama and French (1993) and an additional momentum factor as proposed by Jegadeesh and Titman (1993). One of the conclusions of Carhart's study was that Mutual Funds under performed the NYSE by approximately the amount of their investment expenses. This result also indicates that although some funds might get superior returns, extra transaction costs and management fees often offset this.

More recently, Bolle and Busse (2004) use Carhart's (1997) four factor model to find that Mutual Funds, which were at the top decile the previous quarter, earned an average abnormal return of 39 basis points over the next quarter, implying persistence in out performance. When evaluated over a longer period however, this result disappears. The overall conclusion seems to be that out performance is a short-term phenomenon.

Research on the performance of Islamic Equity Funds (IEF) is much more scarce. This is partly due to the fact that IEF's are a relatively new phenomenon[17] and partly because of the lack of availability of sufficient data. Nonetheless, the following will give an overview of the available literature on IEF performance.

One of the earliest studies on Islamic Funds was not until 1997 when Annuar, Shamsher and Ngu (1997) used the model developed by Treynor and Mazuy (1966) to examine the performance of 31 Malaysian mutual funds for the period 1990-1995. Many of these funds are Islamic and thus provide a proxy for Islamic Fund performance. The results are of course biased because conventional funds are also included in the study. Annuar, Shamsher and Ngu found evidence that these Malaysian funds did outperform their benchmark, but were poor at timing the market. Unlike Chen *et al.*, Annuar, Shamsher and Ngu found a positive correlation between market timing ability and security selection ability.

Shamsher, Annuar and Taufeeq (2000) conducted a study on the performance of passive and active Malaysian funds for the period 1995-1999 using various performance measures[18].

[17] The first IEF started in the late 80's while the first official Mutual Fund was created in 1924.

[18] This study is also biased by including conventional funds in the study and thus is only a rough proxy for Islamic fund performance.

They found that there was no significant difference between active and passive funds and that they both underperformed the Kuala Lumpur Composite Index benchmark.

Ahmad (2001) provided a very rough guide to IEF performance by evaluating around 13 IEF's individually. Although Ahmed states that some Islamic Funds outperform benchmarks like the MSCI and states that the IEF industry has outperformed the banking industry, he does not back this with statistical analysis. Thus no clear conclusions can be drawn from his research regarding the performance of IEF's.

Abdullah, Mohammed and Hassan (2002) provide a more thorough analysis of the Islamic Equity Fund industry albeit only for Malaysian funds. They analyse 67 Malaysian unit trust funds including 14 Islamic and 53 Conventional Funds using multiple performance measures like the Sharp Ratio, the Modigliani Measure and the Information Ratio. Abdullah, Mohammed and Hassan conclude that both type of funds slightly underperformed the Kuala Lumpur Composite Index (KLCI) benchmark. However this under performance is statistically insignificant and thus holds no economic meaning. Abdullah, Mohammed and Hassan also find that the return of the Islamic and Conventional Funds is quite the same. Their overall conclusion is that IEF's in Malaysia follow the benchmark as well as conventional funds and that they both do this reasonably well. However when taking into account risk, Abdullah, Mohammed and Hassan find that the IEFs perform better than conventional funds during bear markets and that conventional funds perform better than IEFs during bull markets. This implies that investors have the option to switch between these funds depending on the market conditions and their personal preferences.

### II.5 A *Discussion*

It seems that the literature on Mutual fund performance (Islamic as well as conventional) is somewhat ambiguous. Presumably because of the multiple methods used to evaluate fund performance. The existence of survivorship bias may for example have overstated returns of funds in the earlier studies. It is however difficult to estimate how big this survivorship bias was for each study individually.

Furthermore the benchmarks used in several studies differ while sometimes using the same type of stocks, Jensen (1968) for example used the [redacted] 500 benchmark as opposed to McDonald (1974) and Kon and Jen (1979) who benchmark against the NYSE.

Also the benchmark used in earlier studies may not be the right benchmark to be used today, this could be because a certain sector dominates a benchmark now, which it didn't in the past. If for example a benchmark contains a significantly higher weight in the technology sector than 15 years ago, it would not be appropriate to use it to evaluate a fund (at present time) that is underweight in tech stocks. The benchmark would however have been sufficient 15 years ago when it wasn't overweight in tech stocks.

The assumption in some studies that systematic risk is stationary is also a problem in research on fund performance[19]. When evaluating funds over a long period of time it might very well be that the systematic risk changed during several sub periods. While some studies acknowledge this phenomenon, others seem to disregard it, which also makes it difficult to compare their results.

[19] For example in Jensen (1968)

Furthermore it is difficult to compare the earlier studies on Fund performance with the more recent studies because of the fact that some studies use performance measures based on the CAPM model to assess abnormal returns, while others use a multifactor model. Examples of the latter are Carhart (1997) and Bollen and Busse (2004) and examples of the former are Jensen (1968), Grinblatt and Titman (1989) and Abdullah, Mohammed and Hassan (2002).

Although the result of the literature review is difficult to assess, it seems that many studies find that Mutual funds are not able to outperform their benchmarks, at least not for sustained periods. The overall results of studies on mutual fund performance seem to imply that the semi-strong form of the EMH holds.

## III. Empirical Analysis

This section explains the main performance measures used in financial literature to evaluate mutual fund performance by. It discusses the way these measures are calculated to given an understanding of their nature, differences, caveats and advantages. Furthermore, this section describes the data used in this research and gives a detailed description of the methodology used to attain the results.

### III.1 Performance Measures

Assessing the performance of mutual funds requires an understanding on multiple facets of their returns. There are multiple dimensions that have to be taken into account when trying to understand how "well" a certain fund has performed over a specific period. The following gives an overview of the most commonly used performance measures in financial literature and discusses their caveats and advantages.

#### III.1 A *Average Return*

The most basic and simple method to evaluate fund returns[20] is by calculating the average total return and comparing it to the average return of the benchmark. Mathematically, average return is defined as:

$$\overline{R}_p = \frac{1}{n}\sum_{i=1}^{n} R_{pt} \tag{2}$$

Here $R_{pt}$ is the return on fund p at time t and $n$ represents the number of fund returns in the sample.

This way of assessing IEF performance is very simple and intuitive, but is seldom the only measure by which funds are evaluated. There are many shortcomings to this measure, but the main argument against it is that it does not take into account the risk taken to achieve a certain return.

#### III.1 B *Jensen's Alpha (alpha)*

One of the most prominent performance measures in financial literature is the one developed by Michael Jensen (1966). Jensen's model is based on the CAPM model but has some fundamental differences (explained below) and is expressed mathematically as:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \mu_t \tag{3}$$

$R_{pt}$ = the return on portfolio (or fund) p at time t
$R_{ft}$ = the return on the risk free asset at time t
$\alpha_p$ = the intercept of the model, to be estimated using regression analysis
$\beta_p$ = the systematic risk of portfolio p, to be estimated using regression analysis
$R_{mt}$ = the return of the market[21] portfolio at time t
$\mu_{pt}$ = the error term at time t

[20] Contiously compounded, see equation 14 for the formal calculation of returns.

[21] In practice, always a benchmark index is used to proxy the market since the true market return is unknown.

Equation (3) thus shows that a portfolio's excess returns are a linear function of their sensitivity to the market and that alpha is the return on that portfolio over and above that predicted by the CAPM.

When comparing equation (3) to the CAPM model one of the first differences to notice is that the CAPM is based on expected returns, while equation (3) is based on realised returns. Jensen derived this model after specifying a realised return version of the CAPM. This was important since expectations are very difficult (if not impossible) to measure and quantify and because researchers only have access to historical (realised) data most of the time.

The second prominent difference between the two models is that equation (3) allows for an intercept that is not necessarily constrained to zero. It is indeed this intercept (alpha) which is the performance measure proposed by Jensen (1968) to evaluate portfolio performance. The alpha is the return of a certain portfolio over and above the return predicted by the CAPM. Thus alpha is the return that does not "cost" any systematic risk, since it can be positive even when beta is zero. A significant and positive alpha thus implies out performance and this alpha can than be used to rank funds on.

While Jensen's model allows for an intercept that can be systematically different from zero, the original CAPM model doesn't and constrains alpha to zero. Although the CAPM doesn't imply that returns can't deviate from the expected value, it does state that this deviation is *expected* to be zero. Jensen critiqued this feature of the CAPM since it didn't allow for agents to have superior forecasting skills[22]. These forecasting skills can lead to alpha since a superior forecaster will pick securities, which systematically perform better than the market expects[23]. The CAPM model didn't allow this systematic superior forecasting since it assumes an efficient market in which agents on average can't earn superior returns.

This debate is the main reason why Jensen's alpha is often used to test the validity of the EMH. Since an average significantly positive alpha would imply that agents systematically have information regarding certain securities that the market doesn't, this would imply that markets are not efficient.

Although widely used, Jensen's alpha also has some shortcomings. For example the assumption that the beta of a portfolio is stationary is quite likely to not hold. Investors often tend to move in and out of certain sectors and between assets classes, which affects their portfolios beta. Thus, Jensen's model might imply that a certain portfolio has a large alpha, while the out performance is in fact for example due to a higher beta than historically.

Furthermore alpha is often criticized as being a proxy for other factors that determine returns except market exposure, for example Fama and French (1993).

Jensen's alpha is also not a very good measure of performance when analysing a security or fund, which is part of a larger fully diversified portfolio. As explained before, the TR is a better measure in that case.

[22] The forecasting skills may be because these agents might for example have info that the market does not posses.

[23] It is indeed the ability to forecast security prices better than the market, what makes an agent superior.

### III.1 C *The Sharpe Ratio (SR)*

Another widely used performance measure in financial literature is the Sharp Ratio. It was developed by William Sharpe (1966) in the late sixties, but its still widely used today as it provides a simple number to rank funds (or portfolios) on. Mathematically the Sharp Ratio can be described as:

$$SR = \frac{\left(\overline{R}_p - \overline{R}_f\right)}{\sigma_p} \tag{5}$$

With the variables in the nominator being:
$\overline{R}_p$ = the average return of portfolio p for the sample period
$\overline{R}_f$ = the average return of the risk free security for the sample period
And the denominator being:

$$\sigma_p = \sqrt{\frac{n}{n-1}\sum_{t=1}^{n}\frac{\left(R_{pt} - \overline{R}_p\right)^2}{n}} \tag{6}$$

Equation (6) is the standard deviation of the fund portfolio return over the sample period, with $R_{pt}$ as the return portfolio p at time t, $\overline{R}_p$ as the average return of the portfolio during the sample period and *n* representing the number of return observations in the sample.

As is clear from equation (5) the SR divides the excess return of a portfolio over the sample period by the standard deviation of the returns of that portfolio over the same period. The SR thus provides the amount of excess return a portfolio earns per unit of risk it takes (with risk being defined by $\sigma_p$).

The attractiveness of the Sharp Ratio comes from its intuitiveness and simplicity. The SR is simple because it can rank funds on the base of a single figure and intuitive since it only rewards funds with a higher ratio if their returns are higher with the same level of risk or if the risk is lowered while keeping the same level of return.

Unfortunately the SR also suffers some caveats. Hendriksson and Merton (1981) and Dybvig and Ingersoll (1982) for example show that non-linear pay offs limit the applicability of the SR as a performance measure. Goetzmann *et al.*(2002) state that SR's are prone to manipulation by option like strategies. This implies for example that with the use of these strategies the SR could decrease even with great investment strategies. For example if the returns of a certain strategy are strictly positive but volatile, the SR could indicate a poor performance compared to a portfolio that has low volatility but also has some negative returns. The returns of the former portfolio are more likely to be higher than the of the latter since they are strictly positive. But the SR in such a case would indicate the latter portfolio to be the superior one even though it has lower returns whilst having downside risk. Furthermore the SR is difficult to interpret when the average excess return of a fund is negative.

### III.1 D *The Treynor Ratio (TR)*

The Treynor Ratio (Treynor 1966) is quite similar to the SR, since it also provides a reward to risk ratio in a single number. The difference lies however lies in the definition of risk, which is the systematic risk of a portfolio rather than the total risk.
Mathematically the TR can be defined as:

$$TR = \frac{\left(\overline{R}_p - \overline{R}_f\right)}{\beta_p} \tag{7}$$

With $\overline{R}_p$ and $\overline{R}_f$ being the same as in equation (5) and $\beta_p$ being the same as in equation (3).

Equation (7) shows that the TR measures fund performance by excess returns per unit of systematic risk. This measure is often used when the portfolio to be assessed is part of a larger fully diversified investment portfolio. According to Body, Kane and Marcus (2005) in such a case, the mean excess return should be weighted against the systematic risk rather than total risk for performance evaluation. If the funds are not part of a large fully diversified portfolio, this statement does not hold. Because in that case funds that have identical systematic risk, but different total risk, will be ranked the same.

Like the SR, the TR is also prone to manipulation. Goetzmann *et al.*(2002) for example state that the TR can be made as large as possible by reducing (manipulating) beta.

However the TR is a better measure of performance than the SR when a fund or security is a candidate to be part of a larger fully diversified portfolio[24]. The TR is better than the SR in such a case because for example if fund A and B have an equal excess return, but fund A's returns have a higher standard deviation, the SR will show fund A to be the better one. However, if fund B has a lower systematic risk than A, it might still be the better fund since part of the total risk can be diversified away when pooling it together with the rest of the large diversified portfolio.

[24] See Body, Kane and Marcus (2005) pp. 872-874 for a stylised example of why this might be so.

### III.1 E *The Information Ratio (IR)*

The information ratio is a performance measure often used to evaluate actively managed funds. It is the ratio of average active return to active risk and was first mentioned by Treynor and Black (1973) as the *appraisal ratio* and later by Grinold (1989) as the information ratio. Mathematically it is expressed as:

$$IR = \frac{\overline{R}_{pat}}{\psi} \tag{8}$$

Where $R_{pat}$ is defined as:

$$R_{pat} = R_{pt} - R_{mt} \tag{9}$$

And $\psi_p$ is defined as:

$$\psi_p = \sqrt{\frac{n}{n-1}\sum_{pa=1}^{n}\frac{\left(R_{pat} - \overline{R}_{pat}\right)^2}{n}} \tag{10}$$

Here $R_{pt}$ and $R_{mt}$ are as defined in equation (3), $n$ is the number of return observations and the bar above $R_{pat}$ indicates an average.

Equation (10) shows that active risk ($\psi_p$) is simply the standard deviation of the difference between returns of portfolio p and the benchmark return. This statistic is often called the "tracking error" since it indicates how well a certain portfolio follows its benchmark.

As equation (8) shows that the information ratio indicates the portfolio return above the benchmark index per unit of active risk. If this active risk is low it means the portfolio returns don't deviate too much from the benchmark returns. One can imagine that a fund that tracks the market quite well, but has a higher return is quite attractive.

Body, Kane and Marcus (2005) explain that when a certain portfolio has an alpha and is mixed with a passive index portfolio, the appropriate measure to use for evaluation purposes is the IR, since it give the benefit-to-cost ratio of mixing the active portfolio with the passive one.

The IR is a backward looking ratio though, based on historical data, which is a property that all the performance measures discussed possess. It is also less easy to understand than for example the SR and difficult to interpret when negative. Furthermore Goodwin (1998) states that the IR is quite sensitive to the benchmark chosen to evaluate a certain portfolio against, meaning that it can give different results when evaluating it against different benchmarks.

### III.1 F *The Modigliani and Modigliani Measure (MM)*

The MM measure is actually just an extension of the SR, which is often used because it is easier to understand than the SR. The MM was developed by Modigliani and Modigliani (1997) and transforms the SR of a fund to a return percentage. It is mathematically expressed as:

$$MM = \left(SR_p - SR_m\right)\sigma_m \tag{11}$$

Where $SR_p$ and $SR_m$ represent the Sharp Ratios of the portfolio and the market respectively and $\sigma_m$ is the standard deviation of the market return.

This measure effectively tells the difference in returns of portfolio p and the market, if they had the same standard deviation. Suppose for example[25] that the risk free asset has an average annual return of 6%. Furthermore suppose that the average annual return of portfolio p and the market is 35% and 28% respectively, while they have a standard deviation of 42% and 30% respectively. Portfolio p could match the standard deviation of the market by investing (30/42) in portfolio p and investing the remainder in the risk free asset. This would give a return of 26.7%[26], which is 1.3% less than the market return of 28%.

The MM is -1.3% (=26.7-28), which means that portfolio p is would have an average annual return 1.3% less than the market if it had the same level of risk as the market.

This measure is interesting because it evaluates performance of a fund relative to the market rather than giving an absolute measure like the SR. It does however suffer from the caveat that it is benchmark sensitive.

### III.1 G *The TT measure (TT)*

Like the MM, the TT is also an extension of a different performance measure (namely the TR) to make it somewhat more understandable. Body, Kane and Marcus (2005) propose this measure and state it as:

$$TT = TR - \left(\overline{R}_m - \overline{R}_f\right) \tag{12}$$

Here TR and $\overline{R}_f$ are as defined in equation (7) and (5) respectively and $\overline{R}_m$ is the average return on the market portfolio.

The TT thus gives the excess return of a fund per unit of systematic risk above the excess return on the market (which by definition has a beta of one). Note that the TT of a fund can be seen as simply the difference between the TR of the market and the TR of that fund.

### III.1 H *Market Timing Ability (gamma)*

The previously discussed performance measures mainly relate to the ability of a fund manager to pick the right stocks and assume constant means and risk.

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[25] This example is taken from Body, Kane and Marcus (2005) pp. 868-869

[26] =(30/42)*35+ (1-(30/42))*6

Treynor and Mazuy (1966) however propose a model which allows for the ability of fund mangers to partially shift their managed capital between a safe asset (for example cash) and risky securities depending on whether the market is expected to do well or bad. Mathematically their model is expressed as:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \gamma_p\left[R_{mt} - R_{ft}\right]^2 + \mu_{pt} \qquad (13)$$

With $R_{pt}$, $R_{ft}$, $\alpha_p$, $\beta_p$ and $\mu_{pt}$ as defined in equation (3) and $\gamma_p$ being the coefficient that implies market timing ability, to be estimated through regression analysis.

As is clear from equation (13), Treynor and Mazuy's model is just an extension of Jensen's model by adding a quadratic term to it. This model thus indicates a quadratic relationship between a fund's excess returns and the market excess returns if fund managers are successful in timing the market. The implication is that a fund manager will increase its funds exposure the market when he/she thinks the market will do well. If this is true and the fund manager is successful, $\gamma_p$ should be positive and statistically significant.

This model is a valuable addition to the previously discussed performance measures since it provides a robustness test for the other model next to providing another performance measure. It does however posses some similar caveats as the previously discussed models, like for example the dependence on a subjectively chosen benchmark and not allowing for factors other than the market to explain stock returns.

### III.1 I *Conclusion*

One can conclude from the previous assessment of performance evaluation methods that there is no one superior method. The appropriate measure to use rather depends on the purpose of the fund use. More particularly it depends on the fund being the only asset in which is invested (in which case the SR, MM or alpha seem most useful), or being part of a bigger diversified portfolio (in which case the TR seems to be the better measure) or is an active portfolio to be mixed with a passive one (in which case the IR seems to be better). Furthermore Jensen's measure is also useful for tests on the EMH and evaluating the stock picking abilities of a fund manager.

## III.2 Data

The following section aims to provide a concise description of the empirical data used in this paper. In addition this section will describe the selection process of the dataset and explain its origin.

The dataset consists of weekly unit prices[27] of 59 Islamic Equity Funds obtained from a Bloomberg terminal at UBS Investment Bank in Amsterdam. This sample was screened form a larger sample to only include Islamic funds that predominantly invest in equity. The sample represents nearly half of the total IEFs in existence in the world[28].

[27] Units are effectively shares of a mutual fund. Rising Net Asset Values are thus directly translated in unit fund prices.

[28] According to Failaka International, the total amount of IEFs in the world is about 130.

After screening for equity investments the original sample was screened for availability of data, each fund with less than 30 data points[29] was excluded from the dataset. After this, funds were screened for missing data points within the sample period. Each fund with more than 15 missing data points was omitted from the sample. Furthermore funds that had missing data for a continuous period (for example 10 weeks in a row) were omitted from the sample. Some of the remaining funds still had some missing data points within the sample period, this was mitigated by replacing the missing data point with the average price of the previous and next period. Thus a missing data point a time t ($P_t$) was replaced by $(P_{t-1}+P_{t+1})/2$.

The unit prices are adjusted for dividends and date from 17-08-2001 to 25-08-2006, meaning that each fund has a maximum of 261 data points and 260 returns. This period is chosen on the base of availability, since the system didn't seem to get prices any further back.

The proxy for the risk free rate is the weekly quoted yield on a three-month US Treasury Bill during the sample period. Bond yields are always quoted to represent an annual return. Therefore the annual yields were transformed into weekly yields by dividing them by 52.

The amount of survivorship bias in this paper is difficult to assess since no reliable information seems to be available on which IEFs have disappeared due to low returns. Furthermore in general, funds that are dissolved often don't just go away but are merged into another fund, this leads to the fact that past performance data on the funds is deleted from hard copy sources as well as computerised sources (Elton, Gruber and Blake 1996). This dataset also seems to consist of only surviving funds since no fund in the dataset was found to stop reporting return data (which would indicate that the fund has stopped existing) before the end of the sample period. Correspondence with Bloomberg (the source of the dataset) also indicated that data on dissolved or merged IEFs during the sample period is unavailable. Presumably for the same reason mentioned above, namely that after merging the disappearing fund's historic data is deleted.

Table A1 in the Appendix shows the list of funds included in the eventual sample set. The list includes some additional info on each fund like its main objective, location, main sector exposure, and geographical focus. Unfortunately many IEFs have don't seem to have prospectuses available or don't disclose information on the funds in detail when a prospectus is available, thus some information is unavailable for certain funds.

As the Appendix (Table A1) shows, most IEFs in the sample are located in Asia and Malaysia in particular. However there are also some IEFs located in the US and Luxembourg and Canada. This implies that the IEF industry although concentrated in Asia (which holds the bulk of the worlds Muslim population) is also present in the West albeit to a moderate extent.

The most liked sectors of the IEFs in the sample seem to be Basic Materials (oil, gas, steel etc.), Technology, and Information Technology. Other liked sectors include Telecommunication, Health Care and Consumer Goods. Although Information Technology is still quite popular to IEF managers, the most liked sector is Basic Materials. This understandable, since oil and gas prices have been rising recently giving oil and gas

[29] This is commonly believed to be the minimum amount of data points needed to perform adequate statistical analysis.

companies high profits. Health Care and Consumer Goods are sectors which are also liked because of their non-cyclical nature.

Furthermore, there do not seem to be any sector specific IEFs in the sample set. Although occasionally some IEFs prospectuses claim to focus on small rather than large stocks or vice versa no specific focus on a particular sector is mentioned.

Most of the funds in the sample set have an investment horizon of 3-5 years or longer than 5 years, which is quite normal for mutual funds. Almost all IEFs focus on capital appreciation rather than dividend income. This is also not surprising since most IEFs invest in growth stocks (which often don't pay out dividend).

Since the IEFs can only invest in *sharia* compliant equities, there performance needs to be evaluated against *sharia* compliant market indices. The Dow Jones Islamic Market Index (DJIMI) is the main Islamic benchmark used to evaluate globally invested IEFs. However since many IEFs only invest in local equities, they furthermore require a market index that represents the local universe of eligible equities. Accordingly, each fund has been assigned its appropriate market index given its geographic focus[30].

Since IEFs may even be interesting to Non-Muslim investors, their performance is also benchmarked against conventional non-Islamic benchmarks. Again, the geographic focus of the funds has been taken into account. Table A2 in the Appendix, shows the most appropriate Islamic and conventional market indices for each IEF, these are the main indices used to evaluate the IEF performance by and are used in most of the calculations and regressions in this paper.

Data on the market indices and the US 3 month T-bill was obtained from Thomson Financial DataStream. There are a total of 17 benchmark indices chosen to evaluate the IEF returns against, with 11 Islamic and 6 conventional.

### III.3 Methodology

The unit prices of the dataset were in some instances quoted in local currencies (See Appendix table A1). These are converted to USD first since all but the Malaysian benchmarks are quoted in USD. The Malaysian funds (quoted in Malaysian Ringit) are however not converted to USD since all the Malaysian Benchmark indices are also quoted in MYR.

To convert the currencies of the unit prices into USD, the exchange rates of each of the required currencies to USD are obtained on a weekly base from DataStream. These are all local direct quotes meaning they state the amount of local currency paid for a single US dollar. At each point in time in the dataset the unit price of a fund quoted in local currency is converted into USD by dividing the unit price by its appropriate exchange rate to the USD[31].

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[30] Each funds geographic focus is based on its prospectus or its description in Bloomberg.

[31] The Oasis Crescent Equity Fund (OACREQU) for example was quoted in South African Rand (ZAR) and its unit price was 143.1 at 28-08-2001. The exchange rate at 28-08-2001 was 8.365 ZAR for one USD, so the unit price of OACREQU at 28-08-2001 was (143.1/8.365) 17.1 USD approximately.

Following this, the unit prices are converted into continuously compounded returns using the conventional formula[32]:

$$R_{pt} = LN\left(\frac{P_t}{P_{t-1}}\right) * 100 \qquad (14)$$

Here, $P_t$ is the unit price of fund p at time t and $P_{t-1}$ is the unit price of fund p at time t-1 (thus in the previous week) an LN represents the natural logarithm. Benchmark returns are calculated in the same way by taking the natural logarithm of the ratio between the index's value at time t to its previous value and then multiplying with 100.

Excess returns are obtained by subtracting the weekly returns of a 3-month US T-bill at time t from the returns of each fund and benchmark at time t. One might argue that since interest is forbidden in the Islam, it would not make sense to subtract a risk free rate from total returns. However the discussion in section II.1 has shown that *riba* is not easily translated to modern definitions of interest and that no consensus exits to the notion that for example loans against a fixed rate are non permissible. Furthermore some permissible Islamic financial products[33] have implicit (risk free) interest components which are not called interest but which do would provide a risk free return, thus implying that Muslim investors do indeed have an opportunity to invest in risk free assets. This is also seen in financial literature on IEF performance. Abdullah, Mohammed and Hassan (2002) for example also subtract a risk free rate.

The next step includes the calculation of the average annualised total returns of IEFs as in equation (2). Since each fund's average return is based on weekly data, it is annualised by multiplying it with 52. In the same way the average annualised total returns of Islamic and conventional benchmarks are calculated. The IEF's are then divided in three categories based on their geographical focus; IEFs investing globally (Global), IEFs investing in only the Malaysian market (Malaysian) and IEF's investing locally elsewhere (Other). This division is upheld throughout the thesis to clarify the possible differences between these differently focussed groups. The returns of the benchmarks and IEF categories are then compared to specify out or underperformance.

The following step includes the estimation of alphas and betas for each fund using the model derived by Jensen (1966) as expressed in equation (3). The regressions are performed using the Ordinary Least Squares (OLS) method. This step consists of three parts. Each part regresses IEF excess returns against a different set of benchmarks, namely Islamic benchmarks, alternative Islamic benchmarks and conventional benchmarks. Table A3 in the Appendix displays the appropriate benchmarks used for each fund during the three parts of this step.

In each part of this step, the following two hypotheses are tested for each fund:

$H_0$: $\alpha = 0$ versus $H_1$: $\alpha \neq 0$ (HP1)
$H_0$: $\beta = 0$ versus $H_1$: $\beta \neq 0$ (HP2)

[32] See Brooks (2002) for a discussion on why this is the preferred way of calculating returns.
[33] An example is the *Murabaha* contract, See Visser (2004) chapter 5 for more examples and a description of *Murabaha* contracts.

Furthermore to test the validity of the EHM and CAPM the following two hypotheses are also tested:

$H_0$: $\bar{\alpha} = 0$ versus $H_1$: $\bar{\alpha} \neq 0$ (HP3)

$H_0$: $\bar{\beta} = 0$ versus $H_1$: $\bar{\beta} \neq 0$ (HP4)

The first hypothesis (HP1) evaluates out- or under performance of a fund, which is implied in case, the $H_0$ of HP1 is rejected. The second hypothesis (HP2) tests whether a fund's excess returns are a function of the market's excess returns, which is implied when $H_0$ is not rejected.

The third hypothesis (HP3) tests whether funds can on average outperform the market, implied by a rejection of $H_0$. In case this hypothesis is rejected this would imply that markets are not likely to be efficient since fund managers can systematically outperform the market. The fourth hypothesis tests (HP4) whether the market excess returns can on average explain fund excess returns, which is implied by a rejection of $H_0$. If this $H_0$ is rejected it implies that the CAPM is likely to be a valid model for explaining fund returns.

To test HP2 and HP3, the t ratios of the alphas and betas estimated in the previous step are obtained by dividing the means of the alphas and betas by their standard errors. Formally these t ratios for alpha and beta are defined as:

$$t_\alpha = \frac{\bar{\alpha}}{\sigma_\alpha / \sqrt{n}} \tag{15}$$

and

$$t_\beta = \frac{\bar{\beta}}{\sigma_\beta / \sqrt{n}} \tag{16}$$

Here the bars represent averages and $\sigma_\alpha$ and $\sigma_\beta$ are the standard deviations of the estimated alphas and betas respectively and $n$ is the number of estimated alphas and betas[34]. This method of calculating t ratios is common in finance; see for example Brooks (2005) for a textbook explanation, Fama and French (1996) and Goodwin (1998). These calculated t statistics are then compared to the critical t statistic and $H_0$ is rejected if the absolute value of the calculated t statistic exceeds the absolute value of the critical t statistic[35].

Following this procedure the Sharp ratio of the funds are calculated as in equation (5). Since this Sharp ratio is based on weekly returns, it is annualised by multiplying the average excess return (the nominator of equation 5) with 52 and by multiplying the standard deviation of the

[34] Note that the denominator of equation (14) and (15) represent standard errors.

[35] The value of the critical t statistic depends on the number of observations, the number of explanatory variables and the chosen levels of significance. With these variables being 59, 2 and 5% respectively the required t statistic becomes 2.00.

market return (the denominator of equation 5) with the square root of 52[36]. This is the conventional way in finance of annualising returns and standard deviations[37].

Furthermore, with the use of the betas obtained from the previous regressions, the Treynor ratios of the funds are calculated as in equation (7). Thus each fund will have two Treynor ratios, each one representing evaluation against an Islamic and a conventional benchmark (see Table A2 to see which benchmarks are used for each fund).

In addition the IR, MM and TT of each fund is calculated as in equations (8), (11) and (12) respectively. Again there are two IRs, MMs and TTs for each fund, one based on an Islamic and one based on a conventional benchmark (see Table A2 in the Appendix to see which benchmarks are used). All these ratios are presented in annual terms and are annualized as follows: the TR is annualised by multiplying its nominator with 52, the TT is annualised by multiplying it with 52, the IR is annualised by multiplying its nominator with 52 and its denominator with √52 (same as with the SR) and since the MM consists of two SRs it is annualised simply by annualising its SR components as described above and by multiplying $\sigma_m$ with √52.

With the uses of the obtained MMs and TTs of this procedure the following two hypotheses will be tested:

$H_0$: $\overline{MM} = 0$ versus $H_1$: $\overline{MM} \neq 0$ (HP5)
$H_0$: $\overline{TT} = 0$ versus $H_1$: $\overline{TT} \neq 0$ (HP6)

These hypotheses thus test whether IEFs are able to significantly out perform their benchmarks corrected for their total (MM) and systematic (TT) risk. This out performance is implied when $H_0$ is rejected. The hypotheses are tested by calculating t ratios on MM and TT in the same way as with the alphas and betas, namely by dividing the means of the MMs and TTs by their standard errors and comparing this t statistic to the critical t statistic.

The next section uses the Islamic benchmarks displayed in table A2 of the Appendix to estimate the market timing ability, alpha and beta using the Treynor and Mazuy model. This is done by running a regression of IEF excess returns on their benchmark excess returns and squared benchmark excess returns, as in equation (12) for each fund separately.

Formally, the following three hypotheses are tested here for each fund:

$H_0$: $\alpha = 0$ versus $H_1$: $\alpha \neq 0$ (HP7)
$H_0$: $\beta = 0$ versus $H_1$: $\beta \neq 0$ (HP8)
$H_0$: $\gamma = 0$ versus $H_1$: $\gamma \neq 0$ (HP9)

This model also provides some robustness checks to evaluate the previous findings against. If the estimated betas and alphas for example in this model were very different from Jensen's model this would imply that Jensen's model might be inadequate. Furthermore HP4 and HP5 are tested again to check whether the previous conclusions hold when using a model that

[36] Thus the annual SR is in this case is $\frac{\left(\overline{R}_p - \overline{R}_m\right) * 52}{\sigma_m * \sqrt{52}}$

[37] See Grinold and Kahn (2005) and Goodwin (1998).

allows for varying systematic risk and mean return. In addition to this the following hypothesis is tested:

$H_0: \bar{\gamma} = 0$ versus $H_1: \bar{\gamma} \neq 0$ (HP10)

This hypothesis tests the overall ability of IEF managers to outguess the market. If $H_0$ is rejected this implies that IEF managers are systematically able to outguess the market. Again this test is performed in the usual way by calculating the t ratio of the gammas.

The final part of the analysis consists of evaluating whether IEFs out perform their benchmarks in a bear market. Abdullah, Mohammed and Hassan (2002) for example find that IEFs perform better during bear periods than conventional funds. To see if IEFs outperform their Islamic and conventional benchmarks the Sharp Ratios and MM measures of the IEFs are calculated for the year 2002. Two MM measures are calculated for each fund, one based on Islamic benchmarks and one on conventional benchmarks (see Table 2A of the Appendix for the benchmarks used). This year is chosen because it was the worst year in the sample period for the market as a whole. In fact it was the only year during which all of the benchmarks had negative average excess returns. The year 2002 is also intuitively explained as a bear market since it contains the aftermath of the bursting Internet bubble and the tumult that followed in stock markets after 9/11.

Formally this procedure tests HP5 again, but only for the year 2002. This test is also performed by calculating the t ratios on the MM measures and comparing them to the critical t value. If the null hypothesis holds in this case, it implies that IEFs cannot significantly outperform their benchmarks in bear markets. If $H_0$ is rejected however it implies that IEFs significantly outperform their benchmarks in a bear market and are thus interesting investment vehicles in times the market is not doing well.
This test should however be interpreted with care, since only one "bad" year is available and a bear market is usually interpreted as lasting several years. It can still be useful though since it gives a hint to how IEF's fare in terms of risk and returns during bear markets.

The results of all the describe procedures above are presented in the next section.

## IV. Results

The following section displays and discusses the results of the research conducted for this paper. This section will present the results form the various regressions and calculations described in the previous sections and will derive conclusions and compare the results of the different procedures. Furthermore some robustness analysis is conducted in the final part to evaluate IEF performance during a bear market year (2002).

### IV.1 Overall Total Returns

To get a basic overview of IEF performance for the past five years, table 1 displays the average annualised total returns of IEFs and their appropriate Islamic and conventional benchmarks. As mentioned before, the output is divided in three categories, namely IEFs that invest globally (category Global), IEFs investing in only the Malaysian market (category Malaysia) and IEFs investing in other local markets (category Other).

Table 1 shows that the overall average annualised return of IEFs for the past five years is 5.32%. This indicates that IEFs in the category Other are on average the best performing IEFs (average return 9.14%), while the worst performing category of IEFs among the three the category Malaysia (average return 3.74%). When comparing the returns of IEFs to their benchmarks, table 1 shows that IEFs in the category Global have outperformed their Islamic as well as their conventional benchmarks. The return on the DJIMI and the DJSWDC is 4.26% and 5.30%, while the return of globally invested IEFs is 6.37%. The Malaysian IEFs however have underperformed their Islamic (KLSI) as well as conventional (KLCI) benchmarks by 195 and 363 basis points (bps) respectively. Furthermore the IEFs in the category Other have underperformed the average of their Islamic benchmarks by 83 bps and has outperformed the average of its conventional benchmarks by 47 bps. Another interesting result is that the Islamic benchmarks on average have outperformed the conventional indices, this indicates that the effect of Islamic screening criteria has on average had positive effect on returns for the past five years.

These results should be interpreted with caution since no adjustment has yet been made to reflect the risk of IEFs and their benchmarks. Furthermore the conclusions based on this result are not backed by statistical analysis and thus should not be generalised. Both issues are accounted for in the following sections.

**Table 1**
**Average Annualised Total Returns of IEFs and their Benchmark Indices**

Table 1 contains the summary statistics of calculating average annualised total returns of 59 IEFs and their Islamic and conventional benchmarks for the period 17-08-2001 to 25-08-2006. Continuously compounded weekly returns of each fund or benchmark are averaged as:

$$\overline{R}_p = \frac{1}{n}\sum_{i=1}^{n} R_{pt}$$

Here $R_{pt}$ is the return on fund or benchmark p at time t, and n represents the number of returns per fund. The weekly average return of each fund or benchmark is annualised by multiplying it with 52. IEFs are divided in three categories based on their geographical focus: IEFs investing in worldwide equities (Global), IEFs investing in only the Malaysian market (Malaysian) and IEFs investing in other local regions/countries (Other). Because the IEFs in the category Other have different benchmarks, the returns of these benchmarks are merged into a single average (Average of Indices) for comparison reasons. The Appendix (Table A2) contains the list of appropriate benchmarks for each fund in the category Other. The returns ($\overline{R}$) presented for each category are the average of each $\overline{R}_p$ within that category.

| IEF Category | | Islamic Benchmarks | | Conventional Benchmarks | |
|---|---|---|---|---|---|
| | $\overline{R}$ | | $\overline{R}$ | | $\overline{R}$ |
| **Global** | 6.37 | DJIMI | 4.26 | DJSWDC | 5.30 |
| **Malaysian** | 3.74 | KLSI | 5.69 | KLCI | 7.37 |
| **Other** | 9.14 | Avg. of Indices | 9.97 | Avg. of Indices | 7.98 |
| **Overall** | **5.32** | | **8.31** | | **7.51** |

## IV.2 Jensen's Model

The second set of results is from estimating Jensen's version of the CAPM as described in the previous section, where the alphas and betas of IEFs are estimated. Table 2a shows the outcome of estimating equation (3) using Islamic benchmarks (see Appendix Table A3, column 'Islamic Benchmark') to proxy the market and displays the alphas, betas, t statistics and $R^2$ of each regression.

When looking at table 2a, the first impression is that the model is a fairly good fit for the data. The average as well as the median $R^2$ of the data is 62% meaning that the bulk of fund returns are explained by their sensitivity to the market. This is reasonably high given the fact that this model only has one factor explaining fund returns. When looking at the regional categories of IEFs, the $R^2$ of Global, Malaysian and Other IEFs is 66%, 60% and 62%

respectively. This implies that the model fits all three categories of funds almost equally well since difference in $R^2$ between the three categories is relatively small.

Table 2a shows that the average annualised[38] alpha of IEFs is -0,12 and with a t statistic of -0.14. The former implies that IEFs on average have underperformed their benchmark by 0.12% annually, although the latter implies that this underperformance is insignificant. Thus the null hypothesis that average alpha is zero cannot be rejected and IEFs have not been able to systematically outperform their benchmarks during the sample period, at least not based on Jensens's measure. This result indicates that the EMH is likely to hold.

[38] Alpha is annualised by multiplying it with 52.

**Table 2a**
**Regression Output for CAPM using Islamic Indices**

Table 2a contains the summary results of several CAPM regressions of weekly IEF excess returns on selected Islamic Benchmark excess returns for the period 17-08-2001 to 25-08-2006. For each IEF, the following regression is run:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \mu_t$$

Here $R_{pt}$-$R_{ft}$ is the excess return of fund p at time t over the return on a US 3month T-bill, $\mu_t$ is the error term at time t, $R_{mt}$- $R_{ft}$ is the excess return of the market portfolio at time t, and $\alpha_p$ (Alpha) and $\beta_p$ (Beta) are coefficients to be estimated through OLS. Here, alpha and beta indicate out performance and systematic risk respectively. IEFs are divided into three categories based on their geographical focus: IEFs investing in worldwide equities (Global), IEFs investing in only the Malaysian market (Malaysian) and IEFs investing in other local regions/countries (Other). Furthermore, "Overall" represents the sample as a whole. The market portfolio for funds in the category Global is represented by the Dow Jones Islamic Market Index (DJIMI) and the market portfolio for funds in the category Malaysian is represented by the Kuala Lumpur Syariah Index (KLSI). The funds in the category Other are benchmarked against several different Islamic Indices. The Appendix (Table A3, column 'Islamic Benchmark') shows which benchmark is used for each fund and shows the detailed results of the output (Table B1, column 'Islamic Benchmarks'). The columns Alpha, Beta, $R^2$ represent the average output value for each category, while N represents the number of funds per category. In addition the median and extreme values of the sample as a whole are provided. Furthermore t statistics for the coefficients are calculated for each category by dividing the mean of the coefficient by its standard error. These t statistics are in parentheses under the mean of the coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | Alpha | Beta | $R^2$ | N (funds) |
|---|---|---|---|---|
| **Global** | 0.0295 | 0.7843*** | 0.6576 | 21 |
| | (0.9245) | (14.6777) | | |
| **Malaysian** | -0.0299 | 0.7321*** | 0.6030 | 31 |
| | (-1.6024) | (31.9640) | | |
| **Other** | 0.0253 | 0.7086*** | 0.6204 | 7 |
| | (1.5448) | (8.7581) | | |
| **Overall** | -0.0022 | 0.7479*** | 0.6245 | 59 |
| | (-0.1439) | (30.8704) | | |
| Median | -0.0014 | 0.7500 | 0.6230 | 21 |
| Minimum | -0.3255 | 0.2006 | 0.0926 | 7 |
| Maximum | 0.4577 | 1.0831 | 0.9683 | 31 |

When looking at the three categories of IEFs this conclusion holds with the average annualised alpha of the categories Global, Malaysian and Other being 1.53, -1.55 and 1.32 respectively and having t ratios of 0.92, -1.60 and 1.54, with the last three numbers are all implying insignificance[39] at conventional levels. The t statistics on these categories should be interpreted with care though since they are based on a low number of observations. The number of funds in the categories Malaysian, Global and Other is 31, 21 and 7 respectively, but the t statistics are presented anyway for comparison reasons. Thus globally and locally invested IEFs slightly outperform their benchmarks by 1.53% and 1.32% respectively, but this is offset by slight underperformance of Malaysian funds of 1.55%. Individually, some

[39] This significance is determined taking into account the degrees of freedom for each category.

IEFs do however out outperform their benchmarks[40] implying that some IEFs do possess superior stock picking ability. In total 8 IEFs had significant positive alphas, 3 of which are global funds and 5 are Malaysian.

The funds with the highest three significant alphas are OACREQU, FGPUREQ and GEBRKAH[41], which have annualized alphas of 23.8%, 21.65% and 7.37% respectively. There are on the other hand also 6 funds that under perform their benchmarks as implied by their negative and significant alphas. The three worst under performers are ABMLTII, BHLPDAZ and MAYDANA which have annualised alphas of -16.93%, -13.21% and -8.79% respectively.

When evaluating systematic risk, it is noticeable that the average beta of the IEFs is 0.75, which implies that IEFs on average are less risky than the market. This indicates that IEF managers are reasonably risk averse. Low betas of funds are often believed to imply that these funds mainly invest in blue chip companies (which have a relatively low sensitivity to the market). But this seems unlikely to be the main reason that IEFs have a low beta. IEFs seem to focus more on growth stocks, which are believed to provide capital appreciation rather than dividend income. Growth stocks are often small start up companies, which are relatively volatile. As mentioned before, these companies are also more likely to be eligible according to Islamic criteria since they are likely to be mostly funded by equity (since start up companies for example have difficulty finding big loans because of the uncertainty of their returns). Another possible explanation for the low betas is that IEFs hold relatively large amounts of cash, this has in fact explicitly been stated in some of the prospectuses of the IEFs in the sample.

Table 2a also shows that the t ratio on the estimated betas of IEFs is 30.87, which implies significance at the 1% level. Thus the hypothesis that the average beta of IEFs is zero is rejected with 99% confidence. This result seems to imply that the CAPM is indeed a valid model to explain returns of risky assets. When looking at the individual betas of the IEFs, this conclusion also holds since all of the estimated betas are significant at the 1% level with t values going from a significant 2.73 to as high as 88.84. On average the globally invested funds seem to have a slightly higher systematic risk (beta 0.78) than the Malaysian funds (beta 0.73) and the other locally invested funds seem to have the least systematic risk (beta 0.71), but the differences are not big. This implies that the risk characteristics of IEFs invested in different regions do not differ substantially.

### IV.2 A *Alternative Islamic Benchmarks*

To see if the results described above are sensitive to the benchmark that is chosen, equation (3) is estimated for each fund, but against different Islamic benchmarks[42]. Table 2b displays these results and shows that the results are quite similar. Since there is only one Islamic benchmark available for the Malaysian market, these funds were benchmarked against a conventional index (the KLCI). This makes comparisons between the different regional categories of IEFs more difficult and the overall result should thus be interpreted with caution, since it includes Islamic as well as conventional benchmarking.

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[40] Implied by the fact that the null hypothesis that alpha is zero is rejected for these funds.

[41] See Table B1, column 'Islamic Benchmarks'.

[42] See See Table A3, column 'Alternative Benchmarks' to see which benchmark is used for each fund.

## Table 2b
## Regression Output for CAPM using Alternative Islamic Indices

Table 2b contains the summary results of several CAPM regressions of weekly IEF excess returns on Alternative Islamic Benchmark excess returns for the period 17-08-2001 to 25-08-2006. For each IEF, the following regression is run:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \mu_t$$

Here $R_{pt}$-$R_{ft}$ is the excess return of fund p at time t over the return on a US 3month T-bill, $\mu_t$ is the error term at time t, $R_{mt}$- $R_{ft}$ is the excess return of the market portfolio at time t, and $\alpha_p$ (Alpha) and $\beta_p$ (Beta) are coefficients to be estimated through OLS. Here, alpha and beta indicate out performance and systematic risk respectively. IEFs are divided into three categories based on their geographical focus: IEFs investing in worldwide equities (Global), IEFs investing in only the Malaysian market (Malaysian) and IEFs investing in other local regions/countries (Other). Furthermore, "Overall" represents the sample as a whole. The market portfolio for funds in the category Global is represented by the FTSE Islamic Global Index (FISMGL). Since there is only one Islamic benchmark for the Malaysian market, the market portfolio for funds in the category Malaysian is represented by a conventional Index, the Kuala Lumpur Composite Index (KLCI). The funds in the category Other are benchmarked against several different Islamic indices. The Appendix (Table A3, column 'Alternative Islamic Benchmark') shows which benchmark is used for each fund and shows the detailed results of the output (Table B1, column 'Alternative Islamic Benchmarks'). The columns Alpha, Beta, $R^2$ represent the average output value for each category, while N represents number of funds per category. In addition the median and extreme values of the sample as a whole are provided. Furthermore t statistics for the coefficients are calculated for each category by dividing the mean of the coefficient by its standard error. These t statistics are in parentheses under the mean of the coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | Alpha | Beta | $R^2$ | N (funds) |
|---|---|---|---|---|
| **Global** | 0.0192 | 0.7887*** | 0.6580 | 21 |
| | (0.6092) | (14.7349) | | |
| **Malaysian** | -0.0415** | 0.6449*** | 0.5455 | 31 |
| | (-2.1871) | (30.2279) | | |
| **Other** | 0.0250* | 0.6989*** | 0.5645 | 7 |
| | (2.1285) | (8.6611) | | |
| **Overall** | -0.0120 | 0.7025*** | 0.5878 | 59 |
| | (-0.7748) | (27.9667) | | |
| Median | -0.0168 | 0.6867 | 0.5842 | 21 |
| Minimum | -0.3392 | 0.2039 | 0.0623 | 7 |
| Maximum | 0.4531 | 1.0864 | 0.9610 | 31 |

Table 2b shows that the average goodness of fit ($R^2$) of the IEFs is 59%, which is the quite close to the $R^2$ seen in table 2a (62%). The average $R^2$ of the Malaysian funds is however somewhat lower than in table 1 (55% as opposed to 60%). This is as expected since a conventional benchmark is likely to be inferior to an Islamic benchmark for the obvious reason that the former doesn't reflect the true investable universe for Muslim investors. The average $R^2$ for the IEFs in the category Other is also somewhat lower than in table 1 (56% as opposed to 62%). Overall these results seem to suggest that the benchmarks used in the previous estimation are the more suitable ones, but the difference is not large.

The average annualised alpha of IEFs is -0.62% and has a t ratio of -0.77 and is thus also insignificant at the conventional significance levels. Furthermore the average annualised alpha of IEFs in the category Malaysian (-2.16%) is also quite close to the average annualised alpha estimated for this category previously (-1.55%). The t ratio (-2.18) on the alphas of Malaysian funds however shows that Malaysian IEFs significantly under perform the KLCI. Thus, Malaysian IEFs seem to significantly under perform their conventional benchmark but don't significantly under perform their Islamic benchmark. Furthermore other locally invested funds (column 'Other') do seem to significantly out perform their benchmarks by 1.3% annually. This is somewhat understandable since table 1 has shown that conventional benchmarks for the category Other have lower returns than their Islamic counterparts.

Regarding betas, similar results as table 2a are seen. The average beta of IEFs benchmarked against alternative Islamic indices is 0.70, which is only slightly lower than the average beta seen in table 2a (0.75). Notice that this lower average beta is mainly caused by the Malaysian funds, which have an average beta of 0.64 as opposed to 0.73 in table 2a. This implies that Malaysian IEFs are less sensitive to conventional market movements than to Islamic market movements. Again this is as expected since the conventional market includes stocks that the Islamic market doesn't, thus making the IEFs less sensitive to its (the conventional market) movements. Note however that the t ratio on the betas in table 2b is 27.97, which is still statistically significant at the 1% level, just like in table 2a. This is an interesting result since it implies that the market excess return has a significant influence on fund excess returns irrespective of the chosen benchmark and thus further advocates the validity of the CAPM.

When evaluating the IEFs individually (see the Appendix Table B1, column 'Alternative Islamic Benchmarks') it is interesting to see that funds that have significant alphas (either positive or negative) mostly stay significant even after benchmarking against a different index. This result even holds for the Malaysian funds, which were benchmarked against a non-Islamic index in the second step. Of the 14 significant alphas that were estimated in the first step, only 3 become insignificant when benchmarking against a different index[43]. Of these 3 alphas, 2 were significant at only a 10% level in the first place. Furthermore, only 2 alphas that were not significant when benchmarking against the first set of benchmarks became significant, when using different benchmarks[44]. These alphas are also significant at only the 10% level though. Also, the signs of all alphas that stay significant do not change, which further adds to the robustness of the model.

The result for betas is even more robust, with all the betas estimated against the second set of benchmarks staying significant at the 1% confidence level expect one[45]. This fund (ALFASHL[46]) has a beta which is still significant at the 5% level but is an anomaly in the overall dataset. It has a very low beta and $R^2$ (0.32 and 9% respectively), which does not seem to be because of improper benchmarking[47]. The reason for the low $R^2$ and beta remains unclear.

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[43] These alphas belong to the funds: AMAGX, INGEISL and PRLRASL.

[44] These alphas belong to the funds: SUTEGRO and BBMBDPI.

[45] See, Table B1, column 'Alternative Islamic Benchmarks' of the Appendix.

[46] Alfanar Asia LTD.

[47] This fund's excess returns were regressed against several different benchmarks, all resulting in a lower $R^2$ than in table 1. Several inquiries to the fund manager via mail regarding a possible explanation why this fund co varies so little against with the Asian market (in which it states to invest in its Bloomberg description), did not lead to a reply.

### IV.2 B *Conventional Benchmarks*

As discussed before, IEFs may be an interesting investment even for non-Muslims, those for example who see IEFs as a type of Socially Responsible Investing. Table 2c therefore displays the results of regressing IEF excess returns on excess returns of conventional benchmark indices.

The results in Table 2c show that the average $R^2$ of IEFs benchmarked against conventional indices is 57%. This indicates that the quality of conventional indices as proxies for the market is poorer than Islamic indices. The difference however is rather small (5%) indicating that the conventional market is still able to explain the bulk of IEF returns.

The average annualised alpha is -0.69% and has a t statistic of -0.81 which indicates that the alpha is insignificantly different from zero at the conventional levels, this was the same conclusion drawn from table1 and thus also seems to advocate an efficient market and the notion that IEF managers cannot systematically outperform their conventional or Islamic benchmarks. Again, Malaysian IEFs significantly under perform their conventional benchmark, in this case by 2.19% annually, this is similar to the results seen in table 2b. Other locally invested IEFs (category Other) also behave similar to table 2b, they significantly outperform their benchmark indices. This result is however based on only seven alphas and should thus be interpreted with much care.

The average beta of IEFs benchmarked against conventional indices is 0.67, which is lower than 0.75 as shown in Table 2c. This difference is similar to the result seen previously when comparing average beta of Malaysian funds between table 2a and 2b and are most likely to be because of the same reason. IEFs have lower sensitivities to conventional benchmarks since they do not invest in some of the stocks listed on them (the conventional markets). Note that the t statistic on the betas is 28.39, which is quite close to the t ratio calculated in table 2a (30.87) and also implies significance of beta at the 1% level. Again this indicates that the validity of the CAPM.

An individual evaluation of the results in, also leads to the conclusion that the alphas of IEFs seem robust against different benchmarks (see the Appendix, Table B1, column 'Conventional Benchmarks'). There are 5 funds that have a significantly positive alpha, which are all the same funds that display a significant positive alpha when benchmarked against the first set of Islamic indices. The amount of funds that significantly outperform their conventional benchmarks is lower than the amount of funds that outperform their Islamic benchmarks (8). This is because the conventional benchmarks have had somewhat higher returns than Islamic benchmarks during the sample period.

Furthermore, the alphas of three funds become insignificant when their returns are benchmarked against a conventional index and only one alpha becomes significant which wasn't significant when benchmarked against an Islamic index. This leads to 5 outperforming funds and 6 underperforming funds.

## Table 2c
## Regression Output for CAPM using Conventional Indices

Table 2c contains the summary results of several CAPM regressions of weekly IEF excess returns on several conventional benchmark excess returns for the period 17-08-2001 to 25-08-2006. For each IEF, the following regression is run:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \mu_t$$

Here $R_{pt}$-$R_{ft}$ is the excess return of fund p at time t over the return on a US 3month T-bill, $\mu_t$ is the error term at time t, $R_{mt}$- $R_{ft}$ is the excess return of the market portfolio at time t, and $\alpha_p$ (Alpha) and $\beta_p$ (Beta) are coefficients to be estimated through OLS. Here, alpha and beta indicate out performance and systematic risk respectively. IEFs are divided into three categories based on their geographical focus: IEFs investing in worldwide equities (Global), IEFs investing in only the Malaysian market (Malaysian) and IEFs investing in other local regions/countries (Other). Furthermore, "Overall" represents the sample as a whole. The market portfolio for funds in the category Global is represented by the Dow Jones World Composite Index (DJSWDC). The market portfolio for funds in the category Malaysian is represented by the Dow Jones Total Market Malaysia Index (DJTMMAL). The funds in the category Other are benchmarked against several different conventional indices. The Appendix (Table A3, column 'Conventional Benchmark') shows which benchmark is used for each fund and shows the detailed results of the output (Table B1, column 'Conventional Benchmarks'). The columns Alpha, Beta, $R^2$ represent the average output value for each category, while N represents number of funds per category. In addition the median and extreme values of the sample as a whole are provided. Furthermore t statistics for the coefficients are calculated for each category by dividing the mean of the coefficient by its standard error. These t statistics are in parentheses under the mean of the coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | Alpha | Beta | $R^2$ | N (funds) |
|---|---|---|---|---|
| **Global** | 0.0124<br>(0.3908) | 0.7411***<br>(14.9766) | 0.6135 | 21 |
| **Malaysian** | -0.0422**<br>(-2.2523) | 0.6200***<br>(32.2622) | 0.5502 | 31 |
| **Other** | 0.0384***<br>(4.6182) | 0.6581***<br>(7.3642) | 0.5487 | 7 |
| **Overall** | -0.0132<br>(-0.8140) | 0.6676***<br>(28.3939) | 0.5725 | 59 |
| Median | -0.0137 | 0.6556 | 0.5721 | 21 |
| Minimum | -0.3429 | 0.1647 | 0.0245 | 7 |
| Maximum | 0.4484 | 1.0650 | 0.9149 | 59 |

The overall conclusion of the previous results is that IEFs on average do not seem to either under or out perform their benchmarks significantly. This result holds when evaluating their performance against alternative Islamic benchmarks as well as conventional benchmarks. Furthermore IEFs seem to be low beta funds, which is likely due to large cash holdings and partially due to investments in blue chip companies. This low beta is robust against alternative Islamic benchmarking, but becomes somewhat lower when benchmarking IEFs against conventional market indices. The reason for this being that the conventional market includes stocks that the Islamic market doesn't, thus making IEFs less sensitive to conventional markets.

The results furthermore seem to point in the direction of efficient markets and the validity of the CAPM, implied by highly significant betas and overall insignificant alphas.

### IV.3 Alternative Performance Measures

The next section discusses the results of calculating some other commonly used performance measures to evaluate IEF performance. Since all of the above performance measures except the SR are dependant on a benchmark, they are calculated using an Islamic index as well as a conventional index, with Table A2 in the Appendix depicting the benchmarks used for each fund. Table 3 displays the results of calculating the various performance measures. The results are divided in main two columns, performance measures calculated using Islamic (column 'Islamic') and conventional (column 'conventional') benchmarks. The two main columns are subdivided in MM, TR, TT and IR, which represent average of these measures for each category of IEFs.

When looking at the Sharp Ratios in table 3, it becomes clear that globally invested IEFs on average (SR 0.26) have better risk return characteristics than Malaysian IEFs (SR 0.21). Furthermore the IEFs in the category Other on average have highest SR and thus are according to Sharp's measure the best performing IEFs. Overall this result looks similar to the results in table 2a, b and c, which also show that one average the Malaysian IEFs perform less than the other two groups.

Individually, the funds with the three highest SRs are FGPUREQ, OACREQU and GEBRKAH, with SRs of 1.51, 1.37 and 1.08 respectively[48]. These are the same three funds that were also the top 3 out performers based on alpha. The only difference is that the SR ranks FGPUREQ higher than OACREQU, while alpha does the opposite.

Although the SR is insightful by ranking the IEFs and making comparisons between them, it does not indicate how well the funds have done relative to the market. The MM measure does make this possible. When looking at table 3 in the column 'Islamic', it becomes clear that the overall average MM measure of IEFs is 0.40. This implies that on average IEFs would have outperformed their Islamic benchmarks during the sample period if they were as risky (had the same standard deviation) as them by 40 bps annually. The t ratio on these MM measures is however 0.48, which is not significant at conventional levels. Thus the hypothesis that the average MM is zero (HP5) cannot be rejected and IEFs on average on average seem to have the same risk return characteristics as their benchmarks. This result indicates the same conclusion based on evaluating Jensen's measure, namely that IEFs are not able to significantly outperform their benchmarks. The top 3 out performing funds based on the MM measure are FGPUREQ, OACREQU and HSBCGLE with MM measures of 21.21, 19.04 and 10.7 respectively[49].

[48] See Table C1, column 'Islamic', sub column 'SR' in the Appendix.

[49] See Table C1, column 'Islamic', sub column 'MM' in the Appendix.

**Table 3**
**Several Risk Adjusted Performance Measures based on Islamic and Conventional Benchmarks**

This table contains the mean results of calculating several risk-adjusted performance measures for weekly IEF returns using Islamic and conventional benchmarks to proxy the market. The following measures are calculated: the Sharp Ratio (SR), the Treynor Ratio (TR), the Modigliani and Modigliani (MM) measure, the TT measure (TT) and the Information Ratio (IR). The SR is calculated as the ratio of a fund's average excess return (return over a 3 month US T-bill) to the standard deviation of its total returns (see equation 5), while the TR divides the same average excess return of a fund by its beta (see equation 7). The MM measure is calculated by multiplying the standard deviation of the benchmark total returns by the difference between the SR of a fund and the SR of the benchmark (see equation 11). The IR is the ratio of the fund return in excess of the return on the benchmark to the standard deviation of this difference, thus the active return to active risk ratio (see equation 8). The TT measure is simply the difference between the TR and the average excess return of the benchmark (see equation 12). All performance measures are presented on an annual base (see section III.3 for the annualising procedure). The benchmarks used to calculate the performance measures are divided in two categories; Islamic benchmarks and conventional benchmarks. The Islamic benchmark used for IEFs in the category Global is the DJIMI, while this is the KLSI for IEFs in the category Malaysian. The several different Islamic benchmarks used for IEFs in the category Other can be found in the Appendix (Table A2). The conventional benchmark used for IEFs in the category Global is the DJSWDC, while this is the KLCI for IEFs in the category Malaysian. Again, the benchmarks used for IEFs in the category Other are in the Appendix (Table A2). Detailed results are also presented in the Appendix (Table C1). Furthermore t statistics on the overall MM and TT are calculated by dividing the mean of these measures by their standard errors. The t statistics are in parentheses under the mean of these measures. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| | | Islamic | | | | Conventional | | | |
|---|---|---|---|---|---|---|---|---|---|
| Category | **SR** | **MM** | **TR** | **TT** | **IR** | **MM** | **TR** | **TT** | **IR** |
| **Global** | 0.2691 | 2.1840 | 6.1195 | 4.0524 | -0.108 | 1.1550 | 6.1078 | 2.9961 | -0.237 |
| **Malaysian** | 0.2064 | -1.1193 | 2.3076 | -1.1992 | -0.285 | -2.5743 | 2.6547 | -0.8521 | -0.446 |
| **Other** | 0.4562 | 1.7632 | 9.9609 | 3.4924 | -0.103 | 0.8414 | 11.7615 | 4.6863 | -0.051 |
| **Overall** | 0.2584 | 0.3984 (0.4818) | 4.5724 | 1.2266 (0.9582) | -0.200 | -0.8417 (-0.9719) | 4.9642 | 1.1747 (0.8599) | -0.325 |
| Median | 0.2805 | 0.3399 | 4.0604 | 0.4837 | -0.198 | -0.9002 | 4.5532 | 0.5641 | -0.340 |
| Minimum | -0.916 | -14.085 | -16.939 | -20.446 | -2.108 | -16.725 | -19.944 | -23.451 | -1.986 |
| Maximum | 1.5131 | 21.2108 | 53.1986 | 51.1315 | 1.3534 | 20.8566 | 53.2705 | 50.1588 | 1.2205 |

Again the first two funds are also out performers based on previous measures. The fact that for example GEBRKAH has been replaced with HSBCGLE is because the latter is better than GEBRKAH in outperforming its benchmark, even though GEBRAKAH has a better SR. This is difference in ranking is one of the caveats as well as advantages of benchmark related measures (as discussed before in section III.1), they are insightful in providing a view on relative performance but fail to given an absolute measure.

To assess how IEFs have performed per unit of systematic risk (beta) the overall mean TR in table 3 in the column 'Islamic' must be looked at. This TR is 4.57, meaning that on average IEFs earn 4.57% annually per unit of systematic risk. IEFs in the category Other have on average the best systematic risk return characteristics (TR 9.96), while the Malaysian funds fare worst (TR 2.31). Individually, the 3 best performing funds based on the TR are

OACREQU, FGPUREQ and NAVSAMI, which have a TR of 53.2, 28.7 and 22.3 respectively[50]. This implies that these funds would be the best IEFs to include in a broader well-diversified portfolio like for example an Islamic fund of funds.

To see however how the systematic risk return relationship of IEFs compares to the market the TT measure must be looked at. In table 3 it can be seen that the average TT measure for IEFs is 1.23, which means that IEFs have one average outperformed their benchmarks by 1.23% annually given their systematic risk. The t ratio on these measures is 0.96, which is not significant at the conventional levels. Thus the null hypothesis that TT is zero cannot be rejected and IEFs don't seem able to outperform their benchmarks significantly based on their TR. Note though that on average, the out performance of IEFs is higher per unit of systematic risk than per unit of total risk (TT>MM). This implies that IEFs are more attractive as funds that could be pooled together with a larger fully diversified portfolio than as individual investment vehicles.

Individually, the top three performing IEFs based on the TT measure are OACREQU, FGPUREQ and SAMETFI, which have TT measures of 51.13, 26.64 and 18.41 respectively. It is interesting to see that FGPUREQ and OACREQU are outperforming funds based on multiple performance measures. This out performance seems to already have been recognized in the IEF industry, OACREQU for example has recently won the Failaka Islamic Fund Awards 2005 as the best performing Global Equity Fund[51].

Next the active management skills of IEFs are evaluated by looking at their IR. Table 3, shows that the average annualised IR of IEFs (benchmarked against Islamic indices) is -0.20. This means that IEFs on average have underperformed their benchmarks by 20 bps annually per unit of active risk. This underperformance is quite small though and not really distinguishable from zero. The noticeable part of this result is that neither category of funds is able to outperform its benchmarks on average. The three average IRs are all negative although the Malaysian average IR is the lowest (-0.29). The top 3 funds based on their Islamic IR are FGPUREQ, GEBRAKAH and INGSYAR, who's IRs are 1.35, 1.31 and 1.25 respectively[52]. These are indeed exceptionally high IRs. Grinold and Kahn (2005) for example state that an IR of 0.5 is "good", an IR of 0.75 is "very good" and an IR of 1 or above is "exceptional". Thus although on average IEFs don't seem able to outperform there benchmarks based on their IR, individually some IEFs are exceptionally good[53]. These funds would be good candidates to mix with a passive fund since they give a very good active return per unit of active risk.

### IV.3 A *Performance Measures with Conventional Benchmarks*

The next step is to assess to what extent IEF performance is dependant on choosing an Islamic or conventional benchmark. To do this table 3 needs to be looked at again although the focus will now be on the column 'Conventional'.

Table 3 shows that the average MM measure of IEFs benchmarked against conventional indices is -0.84. This implies that IEFs on average would have underperformed their

[50] See Table C1, column 'Islamic', sub column 'TR' in the Appendix.
[51] See [redacted]
[52] See Table C1, column 'Islamic', sub column 'IR' in the Appendix.
[53] In total 6 of the 59 IEFs in the sample (10%) have an IR that is higher than 1.

conventional benchmarks by 84 bps annually, if they both had the same level of risk. Although this underperformance is slightly higher than when using an Islamic benchmark, it is still insignificantly different from zero. Note that the t ratio on these MM measures is -0.97, which does not imply significance at conventional levels. Thus the null hypothesis that MM is zero can still not be rejected and IEFs on average don't seem to either under or outperform their conventional benchmarks significantly based on this measure.

Individually, the three best performing funds according to the MM measure are FGPUREQ, OACREQU and HSBCGLE, which have MM measures of 20.86, 18.62 and 9.38 respectively. Note that this is the same ranking as the one given when benchmarking IEFs against Islamic indices. It is furthermore noteworthy that SAMETFI[54] has a close fourth place in the ranking based on an Islamic as well as a conventional benchmark, with an MM measure of 10.5 based an Islamic and 9.36 based on a conventional benchmark. This indicates that the top out performers based on Islamic benchmarks stay top out performers based conventional benchmarks

The average TR of IEFs benchmarked against a conventional index is 4.96, meaning that on average IEFs earn 4.96% annually per unit of systematic risk. This is quite similar to the previous Islamic benchmark based TR, which is 4.57. This result is intuitive because table 3 has shown that the betas of IEFs are somewhat lower when benchmarked against conventional indices. Since this is the denominator in the calculation of the TR one would expect that this measure would be higher when benchmarking IEFs against conventional indices. Individually, the top three performing funds according to their conventional based TR measure are OACREQU, FGPUREQ and SAMETFI, with TR ratios of 53.27, 29.19 and 18.47 respectively[55].

Table 3 also shows that the average TT measure of IEFs benchmarked against conventional indices is 1.17. This indicates that IEFs outperform their conventional benchmarks by 1.17% annually per unit of systematic risk. Note that this average TT measure is slightly lower than the average TT when IEFs are benchmarked against Islamic indices (1.23) while the TR in the former case is higher. This seems somewhat puzzling, since Table 1 has shown that the average return on conventional benchmarks is somewhat lower than on Islamic benchmarks. Thus, it more intuitive that IEFs on average outperform the conventional benchmarks more based on their TT measure, since they have lower betas (denominator in the TR is lower) while the return on the conventional benchmark is also lower (thus the TR of the market is lower). The reason that this is not the case seems to be because some IEFs have negative average excess returns, which also make the TR negative. Lower betas thus punish the funds with negative returns more. This punishment seems to more than offset the higher TT given to other funds. The difference however is not substantial and the t ratio on TT measures based on conventional benchmarks is 0.86, which still implies insignificance at the conventional levels. Thus the null hypothesis that the TT measure based on conventional benchmarks is zero cannot be rejected and IEFs do not seem to be able to outperform their conventional benchmarks significantly during the sample period. The three best performing funds according to their TT measures are OACREQU, FGPUREQ and SAMETFI, which have TT measures of 50.16, 26.08 and 15.36 respectively[56]. This is again the same ranking as

[54] See Table C1, column 'Conventional', sub column 'MM' in the Appendix.

[55] See Table C1, column 'Conventional', sub column 'TR' in the Appendix.

[56] Note that ALFASHL has a higher TT measure than SAMETFI. Still ALFASHL is not included in the top 3 ranking since its beta is insignificantly different from zero at the conventional levels.

based on Islamic benchmarks and thus further advocates the notion that performance measures based Islamic benchmarks overall give the same ranking as based on conventional benchmarks.

Regarding the active management skills of IEF managers table 3 shows that the average IR based on conventional benchmarks is -0.33, which is a little lower than based on Islamic benchmarks (-0.20). Thus IEF managers seem to be a little worse at outperforming conventional benchmarks than Islamic benchmarks, again the difference is rather small. The three best actively managed funds based on conventional benchmarks are FGPUREQ, OACREQU and INGSYAR, with an annual IR of 1.22, 1.18 and 0.82 respectively. Table C1 (column 'Conventional', sub column 'IR') in the Appendix furthermore shows that only 2 out of 59 IEFs (3%) are able to earn exceptional active returns when benchmarked against conventional benchmarks. The previous section (see note 55) has shown the number of IEFs with exceptional active returns is substantially higher (10%). This looks intuitive since active mangers of IEFs are not likely to focus on outperforming conventional benchmarks.

The overall conclusion of this section is that several performance measures next to alpha also show that IEFs have on average not been able to either out or under perform their benchmarks significantly. The null hypotheses that MM and TT are zero could not be rejected. This result is robust when benchmarking IEFs against conventional benchmarks. IEFs do seem to slightly outperform (0.40%) their Islamic benchmarks while they slightly under perform (-0.80%) their conventional benchmarks according to their MM measure. The TT measure however shows that IEFs slightly outperform their Islamic as well as conventional benchmarks by 1.23% and 1.17% respectively. The IR shows that IEFs on average are poor active managers, with this result holding for Islamic (IR -0.20) as well as conventional benchmarks (IR -0.33). The amount of funds that have exceptionally high IRs however is substantially more when using Islamic (6) rather than conventional (2) benchmarks. Furthermore the best two performing IEFs seem to be OACREQU and FGPUREQ, which have top 3 ranks in almost every performance measure. The top ranked list does vary though depending on which performance measure is used. This variability is less when basing the same performance measure on different classes (Islamic or conventional) of benchmarks. Thus the composition of the top ranked list changes less when moving between Islamic and conventional benchmarks than when moving between performance measures with the same benchmark. This indicates that fund performance rankings are more sensitive to the performance measures used than to the chosen benchmarks.

### IV.4 Treynor and Mazuy's Model

The following section discusses the results obtained from estimating equation (13) while using Islamic benchmarks (displayed in the Appendix, in Table A2, column' Islamic benchmark'). In this section the market timing ability of IEFs is tested and whether the previous conclusions drawn regarding alpha and beta still hold when allowing for varying systematic risk. Table 4 shows the output derived from this analysis. Since this model uses the same Islamic benchmarks as in table 2a it is best to compare its result with table 2a rather than table 2b.

## Table 4
## Market Timing Ability of IEF managers

Table 4 contains the results of applying the multivariate regression model of Treynor and Mazuy (1966), to estimate the market timing ability of IEF fund managers in the sample using Islamic benchmarks to proxy the market. For each fund the following regression is run:

$$R_{pt} - R_{ft} = \alpha_p + \beta_p\left[R_{mt} - R_{ft}\right] + \gamma_p\left[R_{mt} - R_{ft}\right]^2 + \mu_{pt}$$

Here, $R_{pt}$-$R_{ft}$ is the excess return of fund p at time t over the return on a US 3 month T-bill, $\mu_t$ is the error term at time t, $R_{mt}$- $R_{ft}$ is the excess return of the market portfolio at time t, and $\alpha_p$ (Alpha), $\beta_p$ (Beta) and $\gamma_p$ (Gamma) are coefficients to be estimated through OLS. Here, alpha and beta indicate out performance and systematic risk respectively, while gamma indicates market timing ability. The market portfolio for funds in the category Global is represented by the DJIMI, while it is represented by the KLSI for funds in the category Malaysian. The funds in the category Other are benchmarked against several different Islamic indices. The Appendix (Table A2, column 'Islamic Benchmark') shows which benchmark is used for each fund and shows the detailed results of the output (Table D1). The columns Alpha, Beta, Gamma, $R^2$ and Adj $R^2$ (adjusted $R^2$) represent the average output value for each category, while N represents number of funds per category. In addition the median and extreme values of the sample as a whole are provided. Furthermore, t statistics for the coefficients are calculated for each category by dividing the mean of the coefficient by its standard error. These t statistics are in parentheses under the mean of the coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | Alpha | Beta | Gamma | $R^2$ | Adj $R^2$ | N (funds) |
|---|---|---|---|---|---|---|
| **Global** | 0.0716 | 0.7753*** | -0.0109** | 0.6617 | 0.6584 | 21 |
| | (1.5657) | (14.6265) | (-2.2223) | | | |
| **Malaysian** | -0.0370** | 0.7356*** | 0.0019 | 0.6086 | 0.6043 | 31 |
| | (-1.8583) | (30.8208) | (0.3187) | | | |
| **Other** | 0.0284 | 0.7143*** | -0.0012 | 0.6238 | 0.6179 | 7 |
| | (0.9373) | (9.0839) | (-0.1949) | | | |
| **Overall** | 0.0094 | 0.7472*** | -0.0030 | 0.6293 | 0.6251 | 59 |
| | (0.4595) | (30.9254) | (-0.8317) | | | |
| Median | 0.0009 | 0.7584 | -0.0003 | 0.6233 | 0.6203 | 21 |
| Minimum | -0.3202 | 0.2039 | -0.1120 | 0.0997 | 0.0747 | 7 |
| Maximum | 0.6643 | 1.0489 | 0.0997 | 0.9683 | 0.9681 | 31 |

When looking at table 4, the first thing to notice is the $R^2$ (0.63) and Adjusted $R^2$ (0.63) which both indicate that a large amount (63%) of the excess returns of IEFs is explained by this model[57]. Note though that the explanatory power of this model is only marginally (1%) higher than Jensen's model. Thus adding a quadratic term to Jensen's model improves its explaining power slightly but not really substantially. This model does can however substantially improve the insight into the characteristics of IEFs as the next section will show.

[57] When performing a multivariate regression analysis it is common econometric practice to also evaluate the adjusted $R^2$ next to the common $R^2$ since the latter might give a wrong picture when using a lot of explanatory variables. The reason for this is that the normal $R^2$ never decreases when adding extra variables but can increase even when the extra variables do not really add explanation power to the model. The Adjusted $R^2$ corrects for this caveat.

When looking at alpha it is noteworthy that average alpha for Globally invested IEFs is higher (3.72% annualised) than estimated with Jensen's model (1.53% annualised). The t ratio on this alpha is however 1.57, which is still not significant at conventional levels. In fact the overall image regarding alpha is quite the same as the one displayed by table 2a. The average annualised alpha of IEFs as a whole is just 49 bps (-12 bps in table 2a), which is positive but statistically insignificant since it has a t statistic of 0.46. Furthermore the median alpha is 0.00, just like the median alpha of IEFs benchmarked against Islamic indices in table 2a. Note however, that the Malaysian IEFs as a category now significantly under perform their benchmark as implied by the negatively significant alpha (-1.9% annually). This was not shown to be significant in table 2a, when estimating alpha via the Jensen CAPM.

This effect is explained when scrutinizing the IEFs individually. An individual assessment of the IEFs (see Table B1, column 'Alpha' of the Appendix) reveals that the amount of positive significant alphas estimated with the Treynor and Mazuy model is less than with the Jensen CAPM (7 as opposed to 8) while the amount of significantly negative alphas is higher (9 as opposed to 5). The reason for this seems to be that the model used to estimate the alphas in table 2a in some cases underestimates the amount of alpha since it for example does not take into account bad market timing ability. Alpha (which indicates stock selection abilities) in the former model is thus mixed with gamma (which indicates market timing abilities). The second model is able to extract alpha from gamma and thus the alpha increases when bad market timing ability is present. This notion is better understood when evaluating alpha together with gamma as is done below.

Table 4 displays that the average market timing ability (as measured by the coefficient gamma) of IEFs is 0.00 and has a t statistic of -0.83. Thus the null hypothesis that IEF managers cannot consistently outguess the market is not rejected. This result is as expected since a positive and significant average gamma would have meant that IEF managers are able to consistently predict whether the market is about to go up or down, which is quite unlikely since this would have to mean that they can consistently predict the future or that the market holds large inefficiencies. In fact, the overall market timing ability of IEFs in the category Global is significantly negative, meaning that the attempts of these IEF managers to time the market have adversely affected their returns.

On an individual base there are successful market timers however. In fact, Table D1 of the Appendix shows that 9 out of the 31 (29.03%) Malaysian funds in the sample have market timing ability (implied by their significantly positive Gammas). There is only 1 out of the 21 (4.76%) Globally invested funds in the sample though that has market timing ability, while the amount of funds in this category that seems to attempt market timing but is unsuccessful in doing so is (as implied by significantly negative Gammas) is 6 (28.57%). No conclusions can be drawn from the insignificant gammas of individual IEFs though since it is not clear whether market timing has been attempted but was unsuccessful, or was not attempted at all, when the gamma coefficients are insignificant. The fact that 29% of Malaysian IEFs in the sample possess market timing ability indicates that Malaysian IEFs are better than Globally invested IEFs in timing the market correctly. The Global funds on the other hand seem better at picking stocks since 4 out of 21 (19.05%) IEFs in this category have significantly positive alphas while only 3 out of the 31 (9.68%) Malaysian IEFs have significantly positive alphas.

When comparing individual results of alphas between the Treynor Model and the Jensen CAPM it becomes clear that Jensen's model underestimates alpha in some cases, while it overestimates it in other. The detailed results in the Appendix (Table D1, column 'Alpha')

show that annualised average alpha for FGPUREQ and OACREQU for example is 34.53% and 31.21% respectively (both significant at the 1% level). Jensen's model indicates that the alpha of these funds is lower at 21.65% and 23.80% respectively (see the Appendix, Table B1, column 'Islamic Benchmarks'). This difference in alphas is likely to be because the gamma of FGPUREQ and OACREQU is significantly negative meaning that their mangers' attempts to time the market have had a negative rather than positive effect on their fund's returns. This negative effect of market timing attempts is mixed with alpha in Jensen's model and thus downplays its value. When extracting the negative effect of market timing from alpha it becomes clear that these funds are very good stock pickers, but that these stock picking skills are somewhat offset by bad market timing skills. This downplaying effect of negative market timing ability on alpha is also presumed to be in for example AMANX and KUTEQIS[58], which have insignificant alphas when estimated with Jensen's model but have significantly positive alphas when applying Treynor and Mazuy's model.

When positive market timing ability is present, Jensen's model is likely to overestimate the value of alpha since it prescribes all of the out performance to stock selection abilities of the fund managers while some part of it is due to market timing ability. This presumption is a possible explanation for the fact that for example the alpha of the IEFs INGSYAR, BBMBDPI and INGEISL is significantly positive when estimating it with Jensen's model[59], while it becomes insignificant (and in the case of INGEISL even negative[60]) when estimating it with the Treynor and Mazuy model[61]. These funds thus have good market timing ability (implied by the significantly positive Gammas) but do not seem to possess superior stock selecting ability (implied by the non significant alphas).

Thus, it seems that good market timing abilities of IEF managers are often offset by bad stock selection abilities and vice versa. This result looks similar to the findings of *Chen et al* (1992), which indicates a trade off between stock selection abilities and market timing abilities.

Table 4 furthermore shows that the betas of the IEFs do not change much when estimated with the Treynor and Mazuy model. The average beta is for example in table 4 is very close to the average beta in table 2a. Furthermore, the median beta is only marginally higher when estimated with the Treynor and Mazuy model as opposed to Jensen's model. Table 4 also shows that the t ratio on the betas is 30.93, which is very close to the t ratio on betas in table 1 (30.87) and also implies statistical significance of beta at the 1% level.

Concluding; IEFs on average do not seem to be able to outguess the Islamic market. A reasonable amount of IEFs does appear to have significant market timing skills though. The bulk of these successful market timers are Malaysian funds. The Globally invested funds seem better at stock selection than the Malaysian funds, since the former category has a larger percentage of funds with a positive and significant alpha. Furthermore the use of the Treynor and Mazuy model in estimating beta and alpha is likely to be better than Jensen's model since the latter seems to overestimates alpha when market timing is successfully attempted (when gamma is positive and significant) and underestimates it when market

[58] See Table D1, column 'Alpha' of the Appendix.

[59] See Table B1, column 'Islamic Benchmarks', sub column 'Alpha' of the Appendix.

[60] The likely reason that INGEISL's alpha changes signs is because its alpha is overestimated quite severely in Jensen's model since the Gamma of this fund is very high (0.10).

[61] See Table D1, column 'Alpha' of the Appendix.

timing is unsuccessful (gamma is negative and significant). The effect on beta though seems marginal.

### IV.5 Robustness Analysis; How do IEFs Fare in a Bear Market?

The previous sections have shown that IEFs are low risk investments that have risk return characteristics that don't seem to differ significantly from their benchmarks. This result however might not be robust for different market conditions, for example a bear market. To test for this the SRs and MM measures (based on Islamic as well as conventional benchmarks[62]) of IEFs are calculated for the only year in the sample that can be classified as a bear market, namely the year 2002. The results are presented below, in table 5.

Table 5 shows a very interesting result[63]. Although the average SR of IEFs is negative (because of negative average excess returns), IEFs seem to have significantly outperformed their Islamic as well as conventional benchmarks. Table 5 shows that the average MM measure of IEFs based on Islamic benchmarks is 7.11. The fact that this figure is positive implies that IEFs on average had a better SR than their benchmark indices in 2002. Furthermore, this number indicates that if the returns and standard deviations of IEFs and their Islamic benchmarks would be as in 2002, the IEFs on average would outperform their Islamic benchmarks by 7.11% annually if they would match their risk to that of the market. Table 5 furthermore shows that this result has a t statistic of 3.27, which indicates that it is statistically significant at the 1% level[64].

Note furthermore that the Malaysian IEFs are the best performers in 2002 (they have the highest average MM, 8.46). This is a striking result since IEFs were found to be the worst performing funds among the three groups by several performance measures. The result that Malaysian funds have been the worst performers over the whole sample period among the three groups while they are the best out performers during a bear market period can be explained by taking into account some behavioural aspects of investing. Kahneman and Tversky (1979, 1992) for example state that people prefer avoiding losses to making gains of the same amount. This implies that economic agents prefer stocks that don't co vary with the market much when it goes down and thus perceive these stocks as less risky. The less risky stocks would than also require a lower return. Since the Malaysian IEFs have been the least risky funds in a bear market, it could be that the stocks included in these funds are seen as having less downside risk and thus have lower required returns than the other two groups of IEFs. This could be a possible explanation why the Malaysian funds have lower returns than the other two IEF groups. This result is scrutinised somewhat more in section IV.5 A.
Another interesting result depicted in table 5 is that IEFs in the category Other are among the least out performers between the three groups, while they were among the best according to several performance measures during normal market conditions, this is also investigated somewhat in section IV.5 A.

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[62] See Table A2 in the Appendix to see the conventional and Islamic benchmarks used.

[63] Note that some IEFs are missing in table 6. These could not be included in the sample because they did not exist yet in 2002, in total 17 funds are excluded.

[64] Like with all t statistics calculated in this thesis, the degrees of freedom are accounted for when specifying the critical t statistic. Thus the loss in degrees of freedom due to the exclusion of some IEFs (see note 65) has been taken into account when stipulating the critical t statistic.

**Table 5**
**Risk adjusted returns of IEFs during a bear market (2002)**

Table 5 contains the results of calculating the Sharp Ratio (SR) and the Modigliani and Modigliani measure (MM) of 42 IEFs for the year 2002. The SR is calculated as the ratio of a fund's average excess return (return over a 3 month US T-bill) to the standard deviation of its total returns (see equation 5). The MM measure is calculated by multiplying the standard deviation of the benchmark total returns by the difference between the SR of a fund and the SR of the benchmark (see equation 11). The benchmarks used to calculate the performance measures are divided in two categories; Islamic benchmarks and conventional benchmarks. The Islamic benchmark used for IEFs in the category Global is the DJIMI, while this is the KLSI for IEFs in the category Malaysian. The several different Islamic benchmarks used for IEFs in the category Other can be found in the Appendix (Table A2). The conventional benchmark used for IEFs in the category Global is the DJSWDC, while this is the KLCI for IEFs in the category Malaysian. Again, the benchmarks used for IEFs in the category Other are in the Appendix (Table A2). Detailed results are also presented in the Appendix (Table E1). Furthermore t statistic on the overall MM measure is calculated by dividing the mean of this measure by its standard errors. The t statistics are in parentheses under the mean of these measures. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | SR | Islamic MM | Conventional MM | N (funds) |
|---|---|---|---|---|
| **Global** | -1.2035 | 6.6775 | 6.4584 | 17 |
| **Malaysian** | -0.0311 | 8.4635 | 7.3714 | 20 |
| **Other** | -0.8939 | 3.1702 | 1.7178 | 5 |
| **Overall** | -0.6084 | 7.1104*** (3.27) | 6.3288*** (2.79) | 42 |
| Median | -0.8563 | 4.7758 | 3.8862 | 17 |
| Minimum | -1.8407 | -7.6211 | -10.8805 | 5 |
| Maximum | 2.9184 | 82.4417 | 84.1606 | 20 |

Table 5 also shows the average MM measure of IEFs benchmarked against conventional indices is 6.33, which is close to the result in the column 'Islamic'. Furthermore the t statistic of these MM measures is 2.79, which implies significance at the 1% level. In fact all three categories of IEFs on average seem to have outperformed their Islamic as well conventional benchmarks since all the average MM measures are positive.

Although this result seems strong, it does have some caveats. Note for example that the maximum value (which belongs to OACREQU) of MM is very large (based on Islamic as well as conventional benchmarks) and is far beyond the mean and median MM values. This biases the average MM measure upwards. The result however is robust against the exclusion of OACREQU. When this fund is left out of the sample the annualised mean MM based on Islamic and conventional benchmarks becomes 5.27 and 4.43 respectively. This result still implies out performance of IEFs in the year 2002 and has even more power since the t statistic now become 4.44 for MM measures based on Islamic benchmarks and 3.47 based on conventional benchmarks.

Another caveat of this approach is its dependence on the Sharp Ratio while many excess returns are negative. The negative returns namely leads to negative SRs and the SR is known to give unintuitive results when it is negative. An example can clarify: Suppose fund X has an annual standard deviation (stdv) of 10% and a mean excess return (ER) of -2%, while fund

Y has an annual stdv of 20% and an ER of -4%. The SR of both these funds is -0.2 while fund X is clearly better than Y. This trait is likely to have contaminated this result somewhat. However, the ER of IEFs during 2002 is -11.56% per annum while its stdv is 14.41%. The ER of the Islamic benchmarks on the other hand is lower (-22.42% per annum) while the average standard deviation is higher (18.43%). This is also true for the conventional benchmarks that have an ER of -17.48% and have an average stdv of 18.89%. This indicates that the inferences made from table 5 are likely to be right since the market on average had a lower return than IEFs while it was more volatile than them.

The reason that IEFs seem to have significantly outperformed their benchmarks in the bear market 2002 may be explained because of the previously mentioned notion that they hold relatively large amounts of cash and invest in blue chip companies, which makes them less sensitive to market movements and leads to out performance in bear markets.

Thus, IEFs seem to have significantly outperformed their Islamic as well as conventional benchmarks during the bear market of 2002. This is presumed to be mainly because of their relatively large cash holdings and investments in non-cyclical blue chip companies. Overall these results seem consistent with the findings of Abdullah, Mohammed and Hassan (2002), who find that IEFs perform better during bear markets than during bull markets. Of the three IEF groups Malaysian IEFs seem to have been the best out performers in 2002, while this group has been the worst performing group among the three for the sample period as a whole. The reason for this is suspected to be because these funds invest in stocks that are perceived as having less downside risk and thus having lower required returns for the period as a whole. This notion is further investigated in the next section.

### IV.5 A *Downside Risk*

The previous section has shown the interesting result that Malaysian IEFs have been the best out performers among the three IEFs groups while they are the worst performers among the three groups during the period as a whole. The conclusion that this may be due Malaysian IEFs investing in stocks that co vary less with the market when it goes down deserves some further attention.

To test this notion, the approach of Ang *et al.*(2004) is used. Ang *et al.* define downside risk, as the covariance of a security's excess return to that of the market in cases the market excess return is negative, formally:

$$\beta_p^- = \frac{\mathrm{cov}\left(r_p, r_m\right) | r_m < 0}{\mathrm{var}\left(r_m\right) | r_m < 0} \tag{17}$$

Here, $r_m$ and $r_p$ represent the excess returns of the market and fund p respectively and $\beta^-_p$ is thus the sensitivity of a fund's excess return to the market excess return conditioned for the case that the latter is negative.

To estimate this downside risk measure, the benchmark[65] returns are ranked in descending order and all the negative returns of the benchmarks are identified. After this, all positive

[65] Here, the same Islamic benchmarks are used as the ones used to estimate the Treynor and Mauzy model, namely the ones displayed in Table A2, column 'Islamic Benchmarks' of the Appendix.

excess returns of the benchmarks are removed, leaving only the negative returns. Then, for each fund, the excess returns of that fund corresponding with the negative returns of the benchmark are identified. These excess returns are then regressed against the negative excess returns of the benchmark giving the estimated $\beta^-$ of the fund. This $\beta^-$ is however contaminated with the affect of the normal unconditional beta. If for example one finds that a certain fund has a low sensitivity to the market return in bear markets, this could be because the fund just has a low unconditional beta. To extract this effect, the standard betas (estimated in the previous section) are subtracted from the beta minuses, leaving the relative beta. Ang *et al* formally define relative beta as:

$$\beta_p^r = \beta_p^- - \beta_p \tag{18}$$

The relative beta thus gives the pure downside risk of a fund, controlling for its unconditional beta. Formally the hypothesis that relative beta is on average zero is tested and is defined as:

$$H_0 : \overline{\beta}^r = 0 \text{ versus } H_1 : \overline{\beta}^r \neq 0 \tag{HP11}$$

This hypothesis is tested by calculating the t ratio of the relative betas in the same way as in equation (16). If the coefficient relative beta is found to be significant, this implies that the systematic risk of the IEFs is different in bear markets, which would be a good trait if the average relative beta is negative and a bad trait if it is positive since the former would imply that the systematic risk of IEFs is lower during bear markets while the latter implies the opposite.

Table 6 displays the summary results of this analysis[66]. A first look at the table shows that this model has substantially less power in explaining the excess returns of IEFs, since it has a lower average $R^2$ (0.46) than found in the previous results. The negative betas are all almost all significant at the 1% level though, and thus still have a significant effect on IEF returns[67].

Table 6 furthermore displays that the average relative beta of IEFs is -0.01, which means that IEFs on average co vary less with the market when it goes down. This relative beta however is not significant at the conventional levels since it has a t statistic of -0.88. When looking at the average relative beta at the group level, it becomes clear that only the Malaysian IEFs have on average a negative relative beta, while the other two groups have positive average relative betas. Furthermore this negative relative beta (-0.04) is significant at the 5% level (t statistic -2.44). This result is unlikely to be because of market timing since the results in table 5 indicate that coefficient on market timing skill (gamma) is insignificant for Malaysian IEFs overall. Also, the relative beta of the category Other is the highest among the three groups and is positive, implying that this group of IEF's has more downside risk than the other two groups, which could possibly explain its out performance during normal market sentiment. The t statistics of the other groups reveal that none of the other two groups have an average relative beta that is significantly different from zero. For the globally invested IEFs, this seems somewhat strange since they were found to be bad market timers in the previous result.

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[66] Note that some IEFs are missing in table 7, namely NTUAMEQ, PUBPBIE and PUBISOP. These fund were excluded because they did not have sufficient data points to do a regression after the ranking procedure.

[67] The two funds that have insignificant betas are SAMETFI and ALFASHL. The reason that these funds have excess returns that are not significantly affected by the market excess returns remains unclear. See Table F1 in the Appendix for the detailed results.

**Table 6**
**Downside Risk coefficients of IEFs**

Table 6 contains the summary output from running CAPM regressions of IEF excess returns on Islamic benchmark excess returns, conditioning for negative movements of the latter. For each fund, the excess returns are matched to the negative excess returns of its Islamic benchmark index. Hereafter, the excess returns of the fund are regressed on the negative excess returns of the benchmark using OLS. The estimated slope coefficient of this regression is the measure for downside risk (Beta minus), formally defined as:

$$\beta_p^- = \frac{\mathrm{cov}\left(r_p, r_m\right) | r_m < 0}{\mathrm{var}\left(r_m\right) | r_m < 0}.$$

Here $r_p$, and $r_m$ are the excess return of fund p and the benchmark index respectively. In the next step, the unconditional beta of the fund is subtracted from beta minus, giving the pure downside risk measure controlling for unconditional sensitivity to the market (Relative Beta). The benchmarks used to proxy the market are the DJIMI for IEFs in the category Global and the KLSI for IEFs in the category Malaysian. The benchmarks used for IEFs in the category Other can be found in the Appendix (Table A2, column' Islamic Benchmarks'), which also shows the detailed results (Table F1). Furthermore, t statistics for the beta minus and relative beta are calculated as the ratio between their mean and standard error. These t statistics are in parentheses under the mean of the coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively.

| Category | Beta minus | Relative Beta | $R^2$ | N (funds) |
|---|---|---|---|---|
| **Global** | 0.7798*** | 0.0043 | 0.5162 | 20 |
| | (11.0248) | (0.1410) | | |
| **Malaysian** | 0.7036*** | -0.0371** | 0.4198 | 29 |
| | (25.4081) | (-2.4363) | | |
| **Other** | 0.7479*** | 0.0393 | 0.4822 | 7 |
| | (8.8860) | (0.9603) | | |
| **Overall** | 0.7363*** | -0.0128 | 0.4620 | 56 |
| | (24.0334) | (-0.8811) | | |
| Median | 0.7289 | -0.02 | 0.4111 | 20 |
| Minimum | 0.1399 | -0.26 | 0.0554 | 7 |
| Maximum | 1.5735 | 0.49 | 0.9357 | 29 |

The t statistics should be interpreted with much care though since they are not based on many observations. The number of data points however is highest (29) for the Malaysian funds and this group thus has the most reliable t statistic of the three.

It can be concluded from this section that Malaysian IEFs seem to invest in stocks that co vary less with the market when it goes down and as a result have betas which are significantly lower than normal in a declining market. This result is consistent with the previous findings in this paper and also in financial literature. Abdullah, Mohammed and Hassan (2002) for example find that the beta of Malaysian IEFs is lower in a crisis period than during a normal period. This result indicates support of the notion that investors prefer holding stocks that co vary less with the market when it goes down and thus require less return from these stocks. This result furthermore strengthens the conclusion that Malaysian IEFs have underperformed the other two IEF groups because they are perceived as less prone to downside risk.

## V. Conclusions and outlook

Islamic Equity Funds (IEFs) are fundamentally different from conventional equity funds. The reason for this is that Muslims are limited in their scope to prosper from financial markets. They are for example prohibited to invest in companies whose core activities include: pork related products, alcohol, gambling, pornography, conventional banking and entertainment related products and services like music, cinema and hotels. Furthermore Muslims are not allowed to receive or pay *riba*, commonly interpreted as interest. This further narrows the investment potential for Muslims to companies that have a maximum debt to total asset ratio of 33%, an interest income to total income ratio of 5-10% and a receivables to total asset ratio of 45%. In addition Muslims are not allowed to invest in speculation-based derivatives like options and futures.

Despite these restrictions the IEF industry has seen rapid growth since 1996 when one of the Muslim world's leading authorities on religious matters (the Islamic *Fiqh* Academy) issued a decree that Muslims were allowed to invest in equities within certain parameters. This rapid growth was because before this time, there was no consensus in the Muslim community regarding the permissibility of equity investing.

Not only the growth, also the scope for the IEF industry seems promising. The reason for this that the middle class of the 1.3 billion Muslims around the world is increasing because many Muslims live in emerging economy countries like Pakistan and India. Furthermore the number of Muslim High Net Worth Individuals is increasing because of the large profits being made in the Middle East from high oil prices. But Muslims are not the only source of growth for IEFs. Even the Non-Muslim market offers growth potential, as IEFs are often perceived as a form of Socially Responsible Investing.

Given the growth of this interesting new investment industry, the question arises how well these IEFs have performed in the last couple of years. That is the question this paper has intended to answer. To do this, the excess returns of 59 open ended IEFs (representing nearly half of the total amount of IEFs worldwide) were used to calculate commonly used financial performance measures for the period 17-08-2001 to 25-08-2006. These performance measures are: average return, Jensens's alpha, the Sharp Ratio (SR), the Treynor Ratio (TR), the Information Ratio (IR), the Modigliani & Modigliani measure (MM) and the TT measure (TT). In addition to these measures, the market timing ability (gamma) of IEFs managers was estimated with the use the model proposed by Treynor and Mazuy (1966) and some additional analysis was done which describes certain risk and return characteristics of IEFs during bear markets.

The IEFs were divided in three categories based on their geographical focus, namely funds invested in only the Malysian market, funds investing worldwide and funds investing in other local regions/countries. This was done to prevent hiding differences between these three differently focussed IEF groups. The two main Islamic benchmark indices used in this paper to evaluate IEF performance by are the DJIMI and the KLSI, and their conventional counterpart indices are the DJWDC and the KLCI. Funds in the category Other were each benchmarked against their own appropriate Islamic and conventional index (see Appendix 1 for details on which benchmark was used for which fund).

The first performance indication came from comparing the average returns of IEFs with their benchmarks. It revealed that on average IEFs underperforms their Islamic as well as their conventional benchmarks by 2.99% and 2.19% per annum respectively. This underperformance however is mainly caused by the Malaysian funds, which under perform their Islamic (KLSI) and conventional (KLCI) benchmarks by 1.96% and 3.63% respectively while globally invested funds outperform both type of benchmarks and the funds in the category Other under perform their Islamic benchmarks but out perform their conventional benchmarks. The under performance of Malaysian funds to the KLCI (based on total returns) seem consistent with the findings of Abdullah, Mohammed and Hassan (2002) who also finds this albeit to a slightly lower extent (-1.08%).

When comparing the total returns of conventional and Islamic benchmarks, it seems that they don't differ much. The Islamic benchmarks out perform the conventional benchmarks on average by 80 bps annually. Both these results should be interpreted with care though since they are based on total, rather than risk adjusted return. The other performance procedures do correct for risk.

The first risk adjusted performance measure (alpha) was estimated for each IEF using Jensen's (1968) version of the CAPM. The results indicate that IEFs on average have not been able to either significantly outperform or underperforms the Islamic market. This result holds when benchmarking IEFs against different Islamic as well as conventional benchmarks. Furthermore IEFs seem to be low beta (average Islamic beta 0.75) funds, which indicates that IEFs are an interesting for risk averse investors. These low betas are more likely to be because of large cash holding rather than investments in blue chip companies since the latter are less eligible to pass Islamic investment criteria and since IEFs seem to invest mainly in growth stocks. IEFs also seem to co vary less with the conventional market (average conventional beta 0.67) than with the Islamic market. This is intuitive since conventional markets include many stocks that the Islamic market doesn't. Thus making IEFs less sensitive to the returns of the former than the latter.

The results based on Jensen's model also indicates the validity of the CAPM model and the EMH since all the betas based on Islamic benchmarking are significant at the 1% level, with a relatively high average $R^2$ (62%) while the alphas are on average insignificantly different from zero. Among the three categories, Malaysian funds again fare worst with an average annualised alpha of -1.55%, while the IEFs in the category Global have the highest average annualised alpha (1.53%).

The calculation of the SRs, MM measures, TT measures and TRs indicated that IEFs on average outperformed their Islamic as well as conventional benchmarks but were unable to do this significantly. These results seems in line with Hakim and Rashidian (2002) whose findings imply that Islamic screening does not significantly affect the risk return characteristics of a portfolio. Based on the IR however, IEFs on average have underperformed their Islamic as well as their conventional benchmarks, which indicates that IEFs on average are not so well at active management. Individually some exceptional IRs were achieved however. Furthermore IEFs seem more interesting based on their systematic risk to return ratio (TR) than their total risk to return ratio (SR). This is because the low betas of IEFs sufficiently compensate their returns. Thus IEFs are an interesting investment as part of a larger fully diversified portfolio, like a fund of funds. In addition, IEFs are also interesting for Non-Muslims as a type of Socially Responsible Investing, since their performance does not seem to be significantly different from conventional market indices.

To evaluate whether IEF managers are able to time the (Islamic) market and to see if the previously found results regarding the alphas and betas of IEFs hold when allowing for changing systematic risk the Treynor and Mazuy model (1966) was applied. The results of these regressions showed that IEFs on average are not able to significantly time the market since the coefficient on the market timing ability (gamma) was found to be insignificant (t statistic -0.13). This model did display some caveats of Jensen's model, namely that it seems to overestimate alpha when market timing ability is present and underestimates alpha when adverse market timing ability is present. The average annualised alpha based on this model was found to be 49 bps, which although not significant (t statistic 0.46) does imply slight out performance. All the betas using this model were found to be statistically significant at the 1% level. Thus adding robustness to the notion that market excess returns have a significant effect on fund excess returns. This model also showed that Malaysian funds on average seem to be the best market timers among the three IEF groups, while the Globally invested funds seem to be better stock pickers. On average these abilities are not significant though. The results furthermore seem to indicate a trade off between market timing ability and stock selection ability, which is similar to the result found by Chen *at al.* (1992).

IEFs have been mentioned to out perform during bear markets by Abdullah Mohammed and Hassan (2002). This proposition was tested by assessing how IEFs have fared in the bear market of 2002 (in which most market indices had negative average excess returns).To do this the SRs and MM measures of IEFs were calculated for the year 2002 based on Islamic and conventional benchmarks. The results indicated that IEFs have indeed outperformed their Islamic as well as conventional benchmarks during 2002. The t ratios on the MM measures revealed that this out performance is significant at the 1% level and does not depend on using an Islamic or conventional benchmark. The reason for this out performance mainly lies in the fact that IEFs holds sizable amounts of cash and thus co vary little with the market, which also seems to hold in bear market conditions. This result did however show a peculiar result, namely that the best out performers during 2002 were the Malaysian funds. It is furthermore unlikely that this result is because Malaysian funds have lower betas, since the average beta of Malaysian funds (0.73) was found to be quite close to the average beta of IEFs (0.75).

In attempting to explain this anomaly, the downside risk of IEFs was estimated by using the approach proposed by Ang *et al.* (2005). This approach was used to estimate the sensitivity of IEFs to the market conditioning for negative excess returns on the market. The results from his approach led to a series of downside risk measures (negative betas). From these negative betas the unconditional beta was subtracted to provide the pure downside risk. This relative beta was found to be negative (-0.04) and significant at the 5% level (t stat -2.44) for the Malaysian funds, while it was insignificant for funds in the other two categories. This indicates that Malaysian funds have significantly lower betas during market downturns than during normal market conditions. From a behavioural finance perspective this can explain the overall lower performance of Malaysian IEFs compared to the other two groups. Because people tend to strongly prefer avoiding losses to making gains of the same amount (Kahneman and Tversky 1979), they would require less return on securities that have low downside risk. Since Malaysian IEFs seem to invest in securities with low downside risk while the other two groups don't, the required return on the Malaysian funds would also have to be lower.

Despite the fact that IEFs seem interesting investments for Muslims and Non-Muslims, they do possess some specific risks that are usually not born by conventional investors. These risks include (among others): changing *Sharia* (Islamic law) rules, the lack of a sufficient

track record, high exposure to sub-optimally leveraged companies and companies with low working capital. These risks should be taken into account when assessing IEFs as an investment alternative.

It is also noteworthy to say that the future success of the IEF industry not only depends on the risk and return characteristics of IEFs. It also depends on their marketing, distribution, transparency and management costs. All three areas are yet lacking for the IEF industry to grow at its full potential (Failaka, 2002).

This thesis has added significantly to the scarce amount of academic literature on IEF performance by subjecting a large part of IEFs to extensive empirical analysis. The resulting overview of the main risk and returns characteristics of IEFs will furthermore add to the transparency of their track record. In addition, this thesis has provided an insight into the rationale of Islamic investing and its main characteristics next to giving an overview of its growth potential and challenges.

Much improvement can still be made to this paper though. All the regressions for example were performed using only the market factor as an explanatory variable for returns. This model could be substantially improved by adding additional factors to it, like the Fama and French three-factor Model (Fama and French 1996) or the Carhart four-factor model (1997), these models are known to have a much higher $R^2$ (Kothari and Warner, 2001). This was not done in this paper due to lack of data and time restrictions. In addition, there is likely to be some survivorship bias in this study. This could not be mitigated because of the unavailability of data on missing or merged IEFs. Finally, the sample period in this paper is rather short and for example does not fully include the bursting of the stock market bubble at the end of 2000, when taking this period into account, the risk return characteristics of IEFs could be affected adversely.

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## Appendix

**Table A1**
**Names, Tickers and several Characteristics of IEFs in the Sample**

| Name | Ticker | Objective | Geographic Focus | Sector | Location | Currency |
|---|---|---|---|---|---|---|
| AL DAR ISLAMIC WORLD EQUITY FUND | ADIFWOE | LT CG | Global | TECH, TEL | Luxembourg | USD |
| ALAHLI SMALL CAP TRADING EQUITY FUND | ALSCTRE | LT CG | Global | IP,IT, HC | Saudi Arabia | USD |
| AMANA GROWTH FUND | AMAGX | LT CG | Global | | United States | USD |
| SAMBA INTERNATIONAL EQUITY & TRADE FINANCE FUND | SAMETFI | LT CG | Global | | Saudi Arabia | USD |
| OASIS CRESCENT EQUITY FUND | OACREQU | UNSPFD | Global | | South Africa | ZAR |
| FUTUREGROWTH ALBARAKA EQUITY FUND A | FGPUREQ | LT CG | Global | TEL, BM | South Africa | ZAR |
| ALAHLI GLOBAL TRADING EQUITY FUND | ALGLBTE | LT CG | Global | HC, IT | Saudi Arabia | USD |
| HSBC INS TAKAFUL GLOBAL FUND | KEPTAKA | LT CG | Global | | Singapore | SGD |
| AMANA INCOME FUND | AMANX | CP | Global | | United States | USD |
| NORIBA GLOBAL EQUITY FUND | UBSISGE | LT CG | Global | HC, BM | Luxembourg | USD |
| AMANAH EQUITY FUND | NTUAMEQ | LT CG | Global | | Singapore | SGD |
| CITI ISLAMIC GLOBAL EQUITY PORTFOLIO B | CITISPB | UNSPFD | Global | | Luxembourg | USD |
| HSBC AMANAH GLOBAL EQUITY INDEX FUND | HSBCGLE | LT CG | Global | | Luxembourg | USD |
| CITI ISLAMIC GLOBAL EQUITY PORTFOLIO A | CITISPA | UNSPFD | Global | | Luxembourg | USD |
| SUT GLOBAL ETHICAL VALUE FUND | SUTEVAL | LT CG | Global | CONG, BM | Singapore | SGD |
| SUT GLOBAL ETHICAL GROWTH FUND | SUTEGRO | LT CG | Global | TEL, BM | Singapore | SGD |
| DBS MENDAKI GLOBAL FUND | DBSMEGI | MD-LT CG | Global | TECH, BM | Singapore | SGD |
| NTUC INCOME TAKAFUL FUND | NTUTAKA | LT CG | Global | BM | Singapore | SGD |
| AL KHAIR EQUITIES FUND | BAJALKH | LT CG | Global | | Saudi Arabia | SGD |
| ALLIED ASSET ADVISORS DOW JONES ISLAMIC FUND | IMANX | LT CG | Global | CONG, IT | United States | USD |
| HSBC INSURANCE TAKAFUL SINARAN FUND | KEPTSIN | LT CG | Global | BM, IT | Singapore | SGD |
| SBB DANA AL-HIKMAH | BHLBAHI | LT CG | Malaysia | | Malaysia | MYR |
| ING DANA SURIA EKUITI | INGSYAR | LT CG | Malaysia | | Malaysia | MYR |
| MAA MUTUAL AL-FAID | MAAFAID | MD-LT CG | Malaysia | | Malaysia | MYR |
| ING EKUITI ISLAM | INGEISL | LT CG | Malaysia | | Malaysia | MYR |
| AMITTIKAL | ABMLTII | INCM | Malaysia | TS, CON | Malaysia | MYR |
| MAYBAN DANA YAKIN | MAYDANA | LT CG | Malaysia | | Malaysia | MYR |
| PTB AMANAH SAHAM DARUL-IMAN | PTBASDI | MD-LT CG | Malaysia | CON | Malaysia | MYR |
| GE DANA RESTU | GEBRKAH | MD-LT CG | Malaysia | | Malaysia | MYR |
| PRULINK DANA UNGGUL | PRLRASL | MD-LT CG | Malaysia | | Malaysia | MYR |
| COMMERCE TRUST LIFE TIME DANA MUBARAK | BBMBDPI | LT CG | Malaysia | | Malaysia | MYR |
| MAA DANA MAS MAJU | MAAFAYD | MD-LT CG | Malaysia | | Malaysia | MYR |
| OSK UOB DANA ISLAM | OSKDANA | MD-LT CG | Malaysia | IP, TECH | Malaysia | MYR |
| HLG DANA MAKMUR | HLBMAKM | MD-LT CG | Malaysia | | Malaysia | MYR |
| MAYBAN LIFE DANA PREMIER EKUITI AL-AZIM | MBLAZIM | MD-LT CG | Malaysia | | Malaysia | MYR |
| PUBLIC ISLAMIC EQUITY FUND | PUBISEF | CG | Malaysia | UT, TR | Malaysia | MYR |
| SBB DANA AL-IHSAN | BHLPDAI | MD-LT CG | Malaysia | | Malaysia | MYR |
| AIA DANA DINAMIK | AIADYSY | MD-LT CG | Malaysia | | Malaysia | MYR |

| Name | Ticker | Objective | Geographic Focus | Sector | Location | Currency |
|---|---|---|---|---|---|---|
| KENANGA SYARIAH GROWTH FUND | KUTEQIS | LT CG | Malaysia | UT, IP | Malaysia | MYR |
| SBB DANA AL-IHSAN 2 | BHLPDA2 | MD-LT CG | Malaysia | | Malaysia | MYR |
| PRUDENTIAL DANA AL-ILHAM | PRUALIL | CG | Malaysia | | Malaysia | MYR |
| PB ISLAMIC EQUITY FUND | PUBPBIE | LT CG | Malaysia | | Malaysia | MYR |
| RHB ISLAMIC GROWTH FUND | RHBISGR | LT CG | Malaysia | | Malaysia | MYR |
| HWANG-DBS DANA IZDIHAR | HWAIZDI | MD-LT CG | Malaysia | TECH | Malaysia | MYR |
| AIA DANA PROGRESIF | AIAISTI | MD-LT CG | Malaysia | | Malaysia | MYR |
| ASM DANA MUTIARA | ASMFBPI | MD-LT CG | Malaysia | TS, TECH | Malaysia | MYR |
| MAAKL SYARIAH INDEX FUND | MAASYAR | LT CG | Malaysia | TS, TEL | Malaysia | MYR |
| ASM SYARIAH AGGRESSIVE | ASMBPSI | MD-LT CG | Malaysia | | Malaysia | MYR |
| AMANAH SAHAM WANITA | HIJASWI | LT CG | Malaysia | | Malaysia | MYR |
| HLA VENTURE DANA PUTRA | HLAITZA | MD-LT CG | Malaysia | | Malaysia | MYR |
| SBB DANA AL-AZAM | BHLPDAZ | MD-LT CG | Malaysia | | Malaysia | MYR |
| PUBLIC ISLAMIC OPPORTUNITIES FUND | PUBISOP | MD-LT CG | Malaysia | | Malaysia | MYR |
| ALAHLI ASIA PACIFIC TRADING EQUITY | ALASPTE | LT CG | Asia Pacific | CONG, IP | Saudi Arabia | USD |
| ALFANAR ASIA LTD | ALFASHL | LT CG | Asia Pacific | | Virgin Islands | USD |
| AL MASHAREQ JAPANESE EQUITIES FUND | BAJAMJE | LT CG | Asia Pacific | | Saudi Arabia | USD |
| HSBC INSURANCE TAKAFUL ASIA PACIFIC FUND | HITKAPF | LT CG | Asia Pacific Ex Japan | TECH | Singapore | SGD |
| ALAHLI EUROPE TRADING EQUITY | ALEURTR | LT CG | Europe | BM, CONG | Saudi Arabia | USD |
| AL THORAIYA EUROPEAN EQUITIES FUND | BAJATEE | LT CG | Europe | | Saudi Arabia | USD |
| DYNAMIC SAMI FUND | NAVSAMI | LT CG | Canada | BM | Canada | CAD |

**Objective Legend**
CG= Capital Growth
CP= Capital Preservation
INCM= Income
LT CG= Long Term Capital Growth (>5 Years)
UNSPFD= Unspecified

**Sector Legend**
BM = Basic Materials
CON = Construction
CONG = Consumer Goods
HC = Health Care
IP = Industrial Products
IT = Information Technology
TECH = Technology
TEL = Telecommunication
TR = Transport
TS = Trading/Services
UT = Utilities

## Table A2
## Most appropriate Islamic and conventional benchmark indices for the sample IEFs

| Ticker | Islamic Benchmark | Conventional Benchmark |
|---|---|---|
| **CATEGORY GLOBAL** | | |
| ADIFWOE | DJIMI | DJSWDC |
| ALSCTRE | DJIMI | DJSWDC |
| AMAGX | DJIMI | DJSWDC |
| SAMETFI | DJIMI | DJSWDC |
| OACREQU | DJIMI | DJSWDC |
| FGPUREQ | DJIMI | DJSWDC |
| ALGLBTE | DJIMI | DJSWDC |
| KEPTAKA | DJIMI | DJSWDC |
| AMANX | DJIMI | DJSWDC |
| UBSISGE | DJIMI | DJSWDC |
| NTUAMEQ | DJIMI | DJSWDC |
| CITISPB | DJIMI | DJSWDC |
| HSBCGLE | DJIMI | DJSWDC |
| CITISPA | DJIMI | DJSWDC |
| SUTEVAL | DJIMI | DJSWDC |
| SUTEGRO | DJIMI | DJSWDC |
| DBSMEGI | DJIMI | DJSWDC |
| NTUTAKA | DJIMI | DJSWDC |
| BAJALKH | DJIMI | DJSWDC |
| KEPTSIN | DJIMI | DJSWDC |
| IMANX | DJIMI | DJSWDC |

| Ticker | Islamic Benchmark | Conventional Benchmark |
|---|---|---|
| **CATEGORY MALAYSIAN** | | |
| BHLBAHI | KLSI | KLCI |
| INGSYAR | KLSI | KLCI |
| MAAFAID | KLSI | KLCI |
| INGEISL | KLSI | KLCI |
| ABMLTII | KLSI | KLCI |
| MAYDANA | KLSI | KLCI |
| PTBASDI | KLSI | KLCI |
| GEBRKAH | KLSI | KLCI |
| PRLRASL | KLSI | KLCI |
| BBMBDPI | KLSI | KLCI |
| MAAFAYD | KLSI | KLCI |
| OSKDANA | KLSI | KLCI |
| HLBMAKM | KLSI | KLCI |
| MBLAZIM | KLSI | KLCI |
| PUBISEF | KLSI | KLCI |
| BHLPDAI | KLSI | KLCI |
| AIADYSY | KLSI | KLCI |
| KUTEQIS | KLSI | KLCI |
| BHLPDA2 | KLSI | KLCI |
| PRUALIL | KLSI | KLCI |
| PUBPBIE | KLSI | KLCI |
| RHBISGR | KLSI | KLCI |
| HWAIZDI | KLSI | KLCI |
| AIAISTI | KLSI | KLCI |
| ASMFBPI | KLSI | KLCI |
| MAASYAR | KLSI | KLCI |
| ASMBPSI | KLSI | KLCI |
| HIJASWI | KLSI | KLCI |
| HLAITZA | KLSI | KLCI |
| BHLPDAZ | KLSI | KLCI |
| PUBISOP | KLSI | KLCI |
| **CATEGORY OTHER** | | |
| ALASPTE | DJIMI AP | DJAST50 |
| ALFASHL | DJIMI AP | DJAST50 |
| BAJAMJE | DJIMI AP | DJTMJAP |
| HITKAPF | DJIMIAP XJA | FTSEAP XJA |
| ALEURTR | DJIMI EU | FTSE 100 |
| BAJATEE | DJIMI EU | FTSE 100 |
| NAVSAMI | DJIMICAD | FTSE CAD |

| **LEGEND** | |
|---|---|
| DJAST50 | Dow Jones Asian Titans 50 Index |
| DJIMI | Dow Jones Islamic Market Index |

| LEGEND | |
|---|---|
| DJIMI AP | Dow Jones Islamic Market Asia Pacific Index |
| DJIMI EU | Dow Jones Islamic Market Europe Index |
| DJIMIAP XJA | Dow Jones Islamic Market Asia Pacific Ex Japan |
| DJIMICAD | Dow Jones Islamic Market Canada Index |
| DJSWDC | Dow Jones World Composite Index |
| DJTMJAP | Dow Jones Total Market Japan Index |
| FTSE 100 | FTSE 100 (in USD) |
| FTSE CAD | FTSE Canada Index |
| FTSEAP XJA | FTSE Asia Pacific Ex Japan Index |
| KLCI | Kuala Lumpur Composite Index |
| KLSI | Kuala Lumpur Syariah Index |

## Table A3
## Benchmarks used in the three Jensen CAPM regressions

| CATEGORY | Islamic Benchmark | Alternative Islamic | Conventional Benchmark |
|---|---|---|---|
| **GLOBAL** | DJIMI | FISMGL | DJSWDC |
| **MALAYSIAN** | KLSI | KLCI | DJTMMAL |
| **OTHER** | | | |
| ALASPTE | DJIMI AP | FISM AP | DJAST50 |
| ALFASHL | DJIMI AP | FISM AP | DJAST50 |
| BAJAMJE | DJIMI AP | FISM AP | DJTMJAP |
| HITKAPF | DJIMIAP XJA | FISM AP | FTSEAP XJA |
| ALEURTR | DJIMI EU | FISM EU | FTSE 100 |
| BAJATEE | DJIMI EU | FISM EU | FTSE 100 |
| KEPTSIN | DJIMICAD | FTSE CAD | FTSE CAD |

| LEGEND | |
|---|---|
| DJAST50 | Dow Jones Asian Titans 50 |
| DJIMI | Dow Jones Islamic Market |
| DJIMI AP | Dow Jones Islamic Market Asia |
| DJIMI EU | Dow Jones Islamic Market |
| DJIMIAP XJA | Dow Jones Islamic Market Asia |
| DJIMICAD | Dow Jones Islamic Market |
| DJSWDC | Dow Jones World Composite |
| DJTMJAP | Dow Jones Total Market Japan |
| DJTMMAL | Dow Jones Total Market |
| FISM AP | FTSE Islamic Asia Pacific |
| FISM EU | FTSE Islamic Europe Index |
| FISMGL | FTSE Islamic Global Index |
| FTSE CAD | FTSE Canada Index |

# Table B1
## Detailed results of Jensen CAPM regressions presented in table 2a, b and c

Table B1 contains the detailed results of the output presented in tables 2a (column 'Islamic Benchmarks), 2b (column 'Alternative Islamic Benchmarks') and 2c (column 'Conventional Benchmarks'). The column 'Obs' represents the number of weekly return observations per fund and the column 'TICKER' represents each fund individually. The t statistics are placed next to the estimated coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively. Significance levels for beta are not indicated since all but one fund (ALFASHL) have betas significant at 1%.

| | Islamic Benchmarks | | | | | Alternative Islamic Benchmarks | | | | | Conventional Benchmarks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TICKER** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | Obs |
| **Global** | | | | | | | | | | | | | | | | |
| ADIFWOE | -0.02 | -0.63 | 1.00 | 55.99 | 0.92 | -0.03 | -0.96 | 1.01 | 61.89 | 0.94 | -0.04 | -0.97 | 0.96 | 49.28 | 0.90 | 260 |
| ALSCTRE | 0.05 | 0.45 | 0.95 | 17.73 | 0.55 | 0.04 | 0.36 | 0.95 | 17.53 | 0.55 | 0.04 | 0.29 | 0.87 | 15.23 | 0.48 | 255 |
| AMAGX | 0.09* | 1.76 | 1.03 | 41.87 | 0.87 | 0.08 | 1.53 | 1.03 | 40.05 | 0.86 | 0.08 | 1.09 | 0.94 | 28.79 | 0.76 | 260 |
| SAMETFI | 0.04 | 0.70 | 0.20 | 5.49 | 0.23 | 0.03 | 0.61 | 0.20 | 5.65 | 0.24 | 0.03 | 0.58 | 0.22 | 6.37 | 0.29 | 103 |
| OACREQU | 0.46*** | 3.23 | 0.46 | 6.95 | 0.16 | 0.45*** | 3.21 | 0.48 | 7.21 | 0.17 | 0.45*** | 3.18 | 0.46 | 7.19 | 0.17 | 260 |
| FGPUREQ | 0.42** | 2.28 | 1.08 | 9.63 | 0.37 | 0.39** | 2.12 | 1.09 | 9.61 | 0.37 | 0.38** | 2.05 | 1.07 | 9.31 | 0.35 | 160 |
| ALGLBTE | 0.00 | 0.06 | 0.71 | 20.54 | 0.62 | 0.00 | -0.03 | 0.71 | 20.65 | 0.63 | -0.01 | -0.11 | 0.68 | 19.11 | 0.59 | 257 |
| KEPTAKA | -0.03 | -0.63 | 0.91 | 41.69 | 0.87 | -0.04 | 0.57 | 0.92 | 4.89 | 0.88 | -0.04 | -0.81 | 0.86 | 34.11 | 0.82 | 260 |
| AMANX | 0.07 | 1.27 | 0.78 | 29.04 | 0.77 | 0.07 | 1.15 | 0.78 | 28.71 | 0.76 | 0.06 | 0.94 | 0.73 | 24.99 | 0.71 | 260 |
| UBSISGE | -0.03 | -1.41 | 0.99 | 88.84 | 0.97 | -0.04 | -1.58 | 0.99 | 79.72 | 0.96 | -0.05 | -1.30 | 0.93 | 52.66 | 0.91 | 260 |
| NTUAMEQ | 0.00 | 0.06 | 0.96 | 38.04 | 0.96 | -0.02 | -0.32 | 0.97 | 32.50 | 0.95 | -0.03 | -0.42 | 0.94 | 19.40 | 0.86 | 63 |
| CITISPB | -0.02 | -0.26 | 0.53 | 11.85 | 0.35 | -0.03 | -0.31 | 0.54 | 12.04 | 0.36 | -0.03 | -0.34 | 0.50 | 11.12 | 0.32 | 260 |
| HSBCGLE | -0.03 | -0.73 | 0.84 | 31.29 | 0.85 | -0.05 | -1.17 | 0.84 | 31.41 | 0.85 | -0.06 | -1.33 | 0.83 | 29.61 | 0.84 | 174 |
| CITISPA | -0.04 | -0.40 | 0.54 | 11.87 | 0.35 | -0.04 | -0.45 | 0.54 | 12.07 | 0.36 | -0.05 | -0.48 | 0.50 | 11.14 | 0.32 | 260 |
| SUTEVAL | -0.10 | -1.43 | 0.59 | 18.32 | 0.57 | -0.10 | -1.58 | 0.60 | 19.08 | 0.59 | -0.11 | -1.62 | 0.56 | 17.45 | 0.55 | 256 |
| SUTEGRO | -0.12 | -1.52 | 0.67 | 18.38 | 0.57 | -0.13* | -1.67 | 0.69 | 19.24 | 0.59 | -0.13 | -1.64 | 0.63 | 16.64 | 0.52 | 256 |
| DBSMEGI | 0.01 | 0.09 | 1.01 | 25.40 | 0.71 | 0.00 | -0.02 | 1.02 | 26.18 | 0.73 | -0.01 | -0.08 | 0.93 | 21.79 | 0.65 | 260 |
| NTUTAKA | 0.06 | 0.69 | 0.75 | 19.97 | 0.61 | 0.05 | 0.62 | 0.76 | 20.40 | 0.62 | 0.04 | 0.51 | 0.71 | 18.85 | 0.58 | 260 |
| BAJALKH | -0.09* | -2.10 | 1.00 | 53.15 | 0.94 | -0.10** | -2.39 | 1.01 | 55.30 | 0.94 | -0.11* | -1.84 | 0.93 | 37.88 | 0.89 | 187 |
| IMANX | -0.05 | -1.25 | 1.01 | 54.68 | 0.92 | -0.06 | -1.30 | 1.00 | 47.78 | 0.90 | -0.06 | -1.02 | 0.91 | 32.18 | 0.80 | 260 |
| KEPTSIN | -0.05 | -1.06 | 0.46 | 19.59 | 0.64 | -0.07 | -1.47 | 0.43 | 17.42 | 0.58 | -0.07 | -1.47 | 0.41 | 17.19 | 0.58 | 220 |
| **Malaysian** | | | | | | | | | | | | | | | | |
| BHLBAHI | -0.06 | -1.19 | 0.73 | 20.04 | 0.70 | -0.07 | -1.20 | 0.63 | 16.85 | 0.62 | -0.06 | -1.05 | 0.60 | 16.27 | 0.61 | 173 |
| INGSYAR | 0.11*** | 2.84 | 0.88 | 31.57 | 0.83 | 0.11** | 2.28 | 0.77 | 25.38 | 0.75 | 0.11** | 2.28 | 0.77 | 25.38 | 0.75 | 211 |
| MAAFAID | 0.00 | -0.07 | 0.70 | 14.35 | 0.56 | -0.02 | -0.26 | 0.63 | 12.90 | 0.52 | -0.01 | -0.13 | 0.61 | 12.81 | 0.52 | 156 |
| INGEISL | 0.10* | 1.81 | 0.70 | 16.39 | 0.69 | 0.07 | 1.11 | 0.64 | 13.92 | 0.62 | 0.07 | 1.22 | 0.60 | 13.81 | 0.62 | 120 |
| ABMLTII | -0.33*** | -3.15 | 0.83 | 12.90 | 0.39 | -0.34*** | -3.14 | 0.70 | 11.45 | 0.34 | -0.34*** | -3.20 | 0.68 | 11.66 | 0.35 | 260 |
| MAYDANA | -0.17* | -1.94 | 0.62 | 11.51 | 0.34 | -0.18** | -2.05 | 0.55 | 10.97 | 0.32 | -0.18** | -2.10 | 0.53 | 11.22 | 0.33 | 260 |
| PTBASDI | -0.12** | -2.38 | 0.76 | 22.02 | 0.72 | -0.13** | -2.32 | 0.68 | 19.11 | 0.66 | -0.12** | -2.24 | 0.64 | 18.71 | 0.65 | 188 |
| GEBRKAH | 0.14*** | 4.44 | 0.72 | 36.34 | 0.84 | 0.13** | 3.52 | 0.64 | 31.36 | 0.79 | 0.12** | 3.68 | 0.62 | 34.38 | 0.82 | 260 |
| PRLRASL | 0.10** | 1.67 | 0.74 | 20.05 | 0.61 | 0.09 | 1.33 | 0.64 | 17.32 | 0.54 | 0.08 | 1.29 | 0.60 | 17.15 | 0.53 | 260 |

| TICKER | Islamic Benchmarks | | | | | Alternative Islamic Benchmarks | | | | | Conventional Benchmarks | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Malaysian** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | **Alpha** | t stat | **Beta** | t stat | **$R^2$** | Obs |
| BBMBDPI | -0.10 | -1.58 | 0.82 | 19.85 | 0.60 | -0.12* | -1.75 | 0.73 | 18.50 | 0.57 | -0.12* | -1.74 | 0.69 | 17.84 | 0.55 | 260 |
| MAAFAYD | -0.01 | -0.29 | 0.69 | 24.45 | 0.70 | -0.03 | -0.50 | 0.59 | 20.51 | 0.62 | -0.03 | -0.59 | 0.58 | 21.86 | 0.65 | 260 |
| OSKDANA | -0.08 | -1.19 | 0.81 | 18.02 | 0.57 | -0.09 | -1.25 | 0.69 | 15.48 | 0.49 | -0.09 | -1.29 | 0.67 | 15.97 | 0.51 | 249 |
| HLBMAKM | -0.11 | -1.30 | 0.83 | 14.88 | 0.48 | -0.12 | -1.43 | 0.74 | 14.02 | 0.45 | -0.12 | -1.48 | 0.71 | 14.24 | 0.46 | 242 |
| MBLAZIM | 0.00 | 0.01 | 0.75 | 18.62 | 0.57 | -0.01 | -0.17 | 0.64 | 15.41 | 0.48 | -0.02 | -0.25 | 0.63 | 17.28 | 0.54 | 260 |
| PUBISEF | 0.01 | 0.22 | 0.70 | 16.61 | 0.62 | 0.01 | 0.09 | 0.61 | 14.01 | 0.54 | 0.01 | 0.19 | 0.58 | 13.99 | 0.54 | 169 |
| BHLPDAI | -0.07 | -1.09 | 0.75 | 18.72 | 0.58 | -0.09 | -1.30 | 0.68 | 17.98 | 0.56 | -0.09 | -1.33 | 0.64 | 17.85 | 0.55 | 260 |
| AIADYSY | 0.02 | 0.29 | 0.47 | 13.68 | 0.42 | 0.01 | 0.12 | 0.41 | 12.35 | 0.37 | 0.01 | 0.09 | 0.39 | 12.63 | 0.38 | 260 |
| KUTEQIS | 0.03 | 0.73 | 0.69 | 29.49 | 0.79 | 0.02 | 0.43 | 0.61 | 25.41 | 0.73 | 0.01 | 0.39 | 0.59 | 26.50 | 0.75 | 236 |
| BHLPDA2 | -0.06 | -1.01 | 0.73 | 17.97 | 0.65 | -0.07 | -1.03 | 0.63 | 15.14 | 0.57 | -0.06 | -0.92 | 0.60 | 15.00 | 0.57 | 173 |
| PRUALIL | 0.02 | 0.25 | 0.97 | 19.57 | 0.65 | 0.01 | 0.14 | 0.82 | 15.89 | 0.55 | 0.02 | 0.22 | 0.79 | 16.02 | 0.55 | 208 |
| PUBPBIE | 0.03 | 0.83 | 0.65 | 19.32 | 0.88 | 0.05 | 0.94 | 0.66 | 14.27 | 0.81 | 0.01 | 0.31 | 0.64 | 15.44 | 0.83 | 51 |
| RHBISGR | -0.14** | -2.36 | 0.98 | 21.83 | 0.78 | -0.18*** | -2.71 | 0.88 | 18.11 | 0.71 | -0.17** | -2.28 | 0.81 | 15.94 | 0.66 | 134 |
| HWAIZDI | -0.02 | -0.25 | 0.79 | 11.48 | 0.40 | -0.02 | -0.20 | 0.66 | 9.75 | 0.32 | -0.02 | -0.21 | 0.65 | 10.09 | 0.34 | 202 |
| AIAISTI | 0.11** | 2.23 | 0.60 | 20.12 | 0.61 | 0.09* | 1.90 | 0.54 | 18.78 | 0.58 | 0.09* | 1.89 | 0.51 | 18.93 | 0.58 | 260 |
| ASMFBPI | -0.03 | -0.37 | 0.80 | 18.33 | 0.57 | -0.04 | -0.60 | 0.72 | 17.73 | 0.55 | -0.04 | -0.63 | 0.69 | 17.62 | 0.55 | 260 |
| MAASYAR | 0.02 | 0.46 | 0.74 | 30.40 | 0.79 | 0.00 | -0.02 | 0.67 | 28.43 | 0.77 | 0.00 | 0.00 | 0.62 | 25.67 | 0.73 | 242 |
| ASMBPSI | -0.08 | -1.09 | 0.84 | 18.20 | 0.56 | -0.10 | -1.39 | 0.79 | 19.04 | 0.58 | -0.10 | -1.40 | 0.74 | 18.57 | 0.57 | 260 |
| HIJASWI | -0.04 | -0.71 | 0.79 | 20.63 | 0.72 | -0.06 | -1.04 | 0.73 | 20.39 | 0.72 | -0.05 | -0.82 | 0.69 | 19.43 | 0.70 | 166 |
| HLAITZA | 0.06 | 0.84 | 0.34 | 8.02 | 0.20 | 0.05 | 0.75 | 0.27 | 6.54 | 0.14 | 0.05 | 0.73 | 0.27 | 7.15 | 0.17 | 260 |
| BHLPDAZ | -0.25*** | -3.53 | 0.70 | 13.84 | 0.53 | -0.26*** | -3.20 | 0.58 | 11.14 | 0.42 | -0.25*** | -3.24 | 0.57 | 11.72 | 0.45 | 173 |
| PUBISOP | 0.01 | 0.07 | 0.57 | 5.30 | 0.33 | 0.01 | 0.07 | 0.47 | 3.82 | 0.20 | -0.01 | -0.11 | 0.52 | 4.55 | 0.26 | 60 |
| **Other** | | | | | | | | | | | | | | | | |
| ALASPTE | 0.01 | 0.08 | 0.76 | 18.83 | 0.58 | 0.00 | 0.00 | 0.70 | 15.75 | 0.49 | 0.01 | 0.08 | 0.66 | 15.61 | 0.49 | 257 |
| ALFASHL | 0.06 | 0.23 | 0.32 | 2.73 | 0.09 | 0.05 | 0.19 | 0.26 | 2.20 | 0.06 | 0.06 | 0.20 | 0.16 | 1.35 | 0.02 | 75 |
| HITKAPF | -0.04 | -0.47 | 0.88 | 23.07 | 0.82 | 0.05 | 0.53 | 0.84 | 22.98 | 0.74 | 0.06 | 0.56 | 0.77 | 17.60 | 0.73 | 117 |
| BAJAMJE | 0.05 | 0.58 | 0.85 | 23.20 | 0.74 | 0.05 | 0.38 | 0.76 | 13.33 | 0.61 | 0.06 | 0.57 | 0.70 | 19.41 | 0.67 | 187 |
| ALEURTR | 0.01 | 0.08 | 0.67 | 14.09 | 0.44 | 0.01 | 0.08 | 0.67 | 14.09 | 0.41 | 0.03 | 0.27 | 0.66 | 12.58 | 0.38 | 257 |
| BAJATEE | 0.00 | -0.03 | 0.93 | 48.10 | 0.93 | -0.03 | -0.55 | 0.94 | 46.19 | 0.92 | 0.01 | 0.12 | 0.93 | 29.93 | 0.83 | 187 |
| NAVSAMI | 0.09 | 1.40 | 0.57 | 26.99 | 0.74 | 0.05 | 0.73 | 0.73 | 25.50 | 0.72 | 0.05 | 0.73 | 0.73 | 25.50 | 0.72 | 260 |

# Table C1
## Detailed Risk Adjusted Performance Measures based on Islamic and Conventional Benchmarks

Table C1 depicts the detailed results calculating several risk-adjusted performance for IEFs as described in table 3, using Islamic (column 'Islamic') and conventional (column 'Conventional') benchmarks. The column 'Ticker' represents each individual fund.

| | | Islamic | | | | Conventional | | | |
|---|---|---|---|---|---|---|---|---|---|
| **TICKER** | **SR** | **MM** | **TR** | **TT** | **IR** | **MM** | **TR** | **TT** | **IR** |
| **Global** | | | | | | | | | |
| ADIFWOE | 0.08 | -0.81 | 1.31 | -0.76 | -0.28 | -1.82 | 1.37 | -1.74 | -0.46 |
| ALSCTRE | 0.21 | 1.19 | 4.42 | 2.36 | 0.20 | 0.24 | 4.86 | 1.75 | 0.11 |
| AMAGX | 0.44 | 4.67 | 7.19 | 5.12 | 0.80 | 3.82 | 7.92 | 4.81 | 0.46 |
| SAMETFI | 0.79 | 10.05 | 20.47 | 18.41 | -0.69 | 9.36 | 18.47 | 15.36 | -0.78 |
| OACREQU | 1.37 | 19.04 | 53.20 | 51.13 | 1.24 | 18.62 | 53.27 | 50.16 | 1.18 |
| FGPUREQ | 1.51 | 21.21 | 28.70 | 26.64 | 1.35 | 20.86 | 29.19 | 26.08 | 1.22 |
| ALGLBTE | 0.07 | -0.97 | 1.47 | -0.60 | -0.01 | -1.98 | 1.54 | -1.57 | -0.11 |
| KEPTAKA | 0.00 | -2.02 | 0.07 | -2.00 | -0.30 | -3.07 | 0.07 | -3.04 | -0.40 |
| AMANX | 0.37 | 3.68 | 6.60 | 4.54 | 0.45 | 2.81 | 7.07 | 3.96 | 0.27 |
| UBSISGE | 0.00 | -2.11 | -0.02 | -2.09 | -0.64 | -3.16 | -0.03 | -3.14 | -0.61 |
| NTUAMEQ | 0.60 | 7.10 | 5.89 | 3.82 | -0.03 | 6.33 | 6.03 | 2.92 | -0.48 |
| CITISPB | -0.03 | -2.48 | -0.66 | -2.72 | -0.16 | -3.54 | -0.70 | -3.82 | -0.23 |
| HSBCGLE | 0.79 | 10.07 | 9.77 | 7.71 | -0.79 | 9.38 | 9.83 | 6.72 | -1.16 |
| CITISPA | -0.08 | -3.27 | -1.99 | -4.06 | -0.21 | -4.35 | -2.13 | -5.25 | -0.28 |
| SUTEVAL | -0.26 | -6.03 | -5.14 | -7.20 | -0.65 | -7.19 | -5.37 | -8.48 | -0.77 |
| SUTEGRO | -0.28 | -6.41 | -5.63 | -7.70 | -0.71 | -7.58 | -6.03 | -9.14 | -0.80 |
| DBSMEGI | 0.16 | 0.43 | 2.95 | 0.88 | 0.04 | -0.54 | 3.19 | 0.08 | -0.06 |
| NTUTAKA | 0.28 | 2.25 | 5.58 | 3.51 | 0.24 | 1.34 | 5.88 | 2.77 | 0.13 |
| BAJALKH | -0.27 | -6.15 | -3.78 | -5.85 | -1.11 | -7.31 | -4.07 | -7.18 | -0.98 |
| IMANX | 0.00 | -2.06 | 0.01 | -2.05 | -0.56 | -3.11 | 0.02 | -3.10 | -0.49 |
| KEPTSIN | -0.11 | -1.51 | -1.92 | -3.99 | -0.48 | -4.85 | -2.13 | -5.24 | -0.77 |
| **Malaysian** | | | | | | | | | |
| BHLBAHI | 0.34 | 0.41 | 3.77 | 0.26 | -0.97 | -0.90 | 4.32 | 0.81 | -1.08 |
| INGSYAR | 0.91 | 7.04 | 10.37 | 6.86 | 1.25 | 6.33 | 11.81 | 8.30 | 0.82 |
| MAAFAID | 0.34 | 0.41 | 4.13 | 0.63 | -0.21 | -0.91 | 4.58 | 1.07 | -0.42 |
| INGEISL | 0.58 | 3.15 | 5.11 | 1.60 | 1.14 | 2.08 | 5.63 | 2.12 | 0.59 |
| ABMLTII | -0.92 | -14.08 | -16.94 | -20.45 | -1.44 | -16.73 | -19.94 | -23.45 | -1.47 |
| MAYDANA | -0.54 | -9.69 | -10.61 | -14.12 | -0.92 | -11.92 | -11.96 | -15.47 | -1.00 |
| PTBASDI | -0.07 | -4.28 | -0.97 | -4.48 | -1.43 | -6.02 | -1.10 | -4.60 | -1.46 |
| GEBRKAH | 1.08 | 8.92 | 13.66 | 10.15 | 1.31 | 8.39 | 15.31 | 11.81 | 0.78 |
| PRLRASL | 0.70 | 4.57 | 10.41 | 6.91 | 0.57 | 3.64 | 12.10 | 8.59 | 0.30 |
| BBMBDPI | -0.21 | -5.98 | -3.17 | -6.68 | -0.76 | -7.88 | -3.56 | -7.07 | -0.88 |
| MAAFAYD | 0.18 | -1.47 | 2.48 | -1.02 | -0.27 | -2.95 | 2.88 | -0.63 | -0.43 |
| OSKDANA | 0.03 | -3.20 | 0.43 | -3.08 | -0.66 | -4.85 | 0.50 | -3.00 | -0.78 |
| HLBMAKM | -0.19 | -5.68 | -2.85 | -6.35 | -0.66 | -7.55 | -3.22 | -6.72 | -0.77 |
| MBLAZIM | 0.23 | -0.88 | 3.51 | 0.01 | -0.10 | -2.31 | 4.07 | 0.56 | -0.28 |
| PUBISEF | 0.62 | 3.62 | 7.54 | 4.04 | -0.20 | 2.60 | 8.72 | 5.21 | -0.38 |
| BHLPDAI | -0.13 | -5.04 | -2.00 | -5.51 | -0.54 | -6.86 | -2.22 | -5.73 | -0.68 |
| AIADYSY | 0.29 | -0.17 | 5.22 | 1.71 | -0.11 | -1.54 | 6.01 | 2.50 | -0.26 |
| KUTEQIS | 0.38 | 0.93 | 4.59 | 1.09 | 0.09 | -0.34 | 5.19 | 1.68 | -0.10 |
| BHLPDA2 | 0.34 | 0.47 | 3.99 | 0.48 | -0.86 | -0.83 | 4.61 | 1.10 | -0.98 |
| PRUALIL | 0.38 | 0.89 | 4.82 | 1.32 | 0.11 | -0.38 | 5.69 | 2.19 | -0.04 |
| PUBPBIE | 0.83 | 6.04 | 3.87 | 0.37 | 0.33 | 5.24 | 3.79 | 0.29 | 0.65 |
| RHBISGR | -0.60 | -10.37 | -7.04 | -10.55 | -1.48 | -12.67 | -7.78 | -11.29 | -1.72 |
| HWAIZDI | 0.33 | 0.34 | 5.26 | 1.75 | -0.27 | -0.98 | 6.36 | 2.85 | -0.34 |
| AIAISTI | 0.82 | 5.98 | 12.02 | 8.52 | 0.60 | 5.17 | 13.46 | 9.95 | 0.35 |
| ASMFBPI | 0.07 | -2.65 | 1.14 | -2.36 | -0.23 | -4.25 | 1.26 | -2.24 | -0.38 |
| MAASYAR | 0.35 | 0.49 | 4.08 | 0.57 | 0.02 | -0.82 | 4.54 | 1.03 | -0.28 |
| ASMBPSI | -0.14 | -5.13 | -2.15 | -5.66 | -0.53 | -6.95 | -2.29 | -5.80 | -0.70 |

| TICKER | | Islamic | | | | Conventional | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Malaysian** | **SR** | **MM** | **TR** | **TT** | **IR** | **MM** | **TR** | **TT** | **IR** |
| HIJASWI | 0.33 | 0.26 | 3.49 | -0.01 | -0.60 | -1.07 | 3.78 | 0.27 | -0.87 |
| HLAITZA | 0.44 | 1.63 | 11.50 | 7.99 | 0.10 | 0.43 | 14.72 | 11.22 | -0.03 |
| BHLPDAZ | -0.74 | -12.00 | -10.72 | -14.23 | -2.11 | -14.45 | -13.00 | -16.50 | -1.99 |
| PUBISOP | 0.17 | -1.24 | 4.06 | -0.22 | -0.04 | -1.40 | 4.73 | 0.08 | -0.06 |
| **Other** | | | | | | | | | |
| ALASPTE | 0.40 | 2.74 | 15.55 | 11.27 | -0.06 | 2.86 | 29.74 | 25.10 | -0.36 |
| ALFASHL | 0.92 | 9.85 | 9.95 | 2.88 | -0.63 | 5.11 | 11.35 | 0.53 | -0.01 |
| HITKAPF | 0.27 | 0.46 | 6.50 | 2.22 | 0.24 | 0.18 | 7.91 | 2.58 | 0.17 |
| BAJAMJE | 0.28 | -2.03 | 6.78 | 1.19 | -0.04 | -0.45 | 6.85 | 1.87 | 0.01 |
| ALEURTR | 0.26 | -2.36 | 4.56 | -1.03 | -0.09 | -0.76 | 4.55 | -0.42 | 0.02 |

# Table D1
## Detailed Results of Market Timing Ability

Table D1 contains the detailed output for running the regressions of IEF excess returns on their Islamic benchmark excess returns it's square, as described in table 4. The column 'Obs' represents the number of weekly return observations per fund and the column 'TICKER' represents each fund individually. The t statistics are placed next to the estimated coefficients. The ***, ** and * indicate significance at the 1%, 5% and 10% respectively. Significance levels for beta are not indicated since all betas are significant at 1%.

| TICKER | Alpha | t stat | Beta | t stat | Gamma | t stat | $R^2$ | Adj $R^2$ | Obs |
|---|---|---|---|---|---|---|---|---|---|
| **Global** | | | | | | | | | |
| ADIFWOE | -0.02 | -0.59 | 1.00 | 54.25 | 0.00 | 0.06 | 0.92 | 0.92 | 260 |
| ALSCTRE | 0.20 | 1.62 | 0.91 | 16.68 | -0.03*** | -2.75 | 0.57 | 0.56 | 255 |
| AMAGX | 0.17*** | 3.02 | 1.01 | 40.58 | -0.02*** | -3.18 | 0.88 | 0.88 | 260 |
| SAMETFI | 0.01 | 0.20 | 0.20 | 5.50 | 0.01 | 0.59 | 0.23 | 0.22 | 103 |
| OACREQU | 0.60*** | 3.81 | 0.43 | 6.27 | -0.03** | -2.03 | 0.17 | 0.16 | 260 |
| FGPUREQ | 0.66*** | 3.08 | 1.05 | 9.32 | -0.09** | -2.11 | 0.39 | 0.38 | 160 |
| ALGLBTE | 0.00 | 0.00 | 0.71 | 19.83 | 0.00 | 0.12 | 0.62 | 0.62 | 257 |
| KEPTAKA | -0.04 | -0.78 | 0.91 | 40.42 | 0.00 | 0.49 | 0.87 | 0.87 | 260 |
| AMANX | 0.15** | 2.31 | 0.76 | 27.78 | -0.02*** | -2.60 | 0.77 | 0.77 | 260 |
| UBSISGE | -0.03 | -1.20 | 0.99 | 85.82 | 0.00 | -0.13 | 0.97 | 0.97 | 260 |
| NTUAMEQ | 0.03 | 0.51 | 0.96 | 37.50 | -0.01 | -0.88 | 0.96 | 0.96 | 63 |
| CITISPB | 0.04 | 0.42 | 0.52 | 11.13 | -0.02 | -1.45 | 0.36 | 0.35 | 260 |
| HSBCGLE | -0.03 | -0.62 | 0.84 | 31.09 | 0.00 | 0.02 | 0.85 | 0.85 | 174 |
| CITISPA | 0.03 | 0.28 | 0.52 | 11.15 | -0.02 | -1.44 | 0.36 | 0.35 | 260 |
| SUTEVAL | -0.17** | -2.23 | 0.60 | 18.42 | 0.02** | 2.12 | 0.58 | 0.57 | 256 |
| SUTEGRO | -0.14 | -1.63 | 0.68 | 17.99 | 0.01 | 0.61 | 0.57 | 0.57 | 256 |
| DBSMEGI | 0.07 | 0.76 | 1.00 | 24.35 | -0.01 | -1.52 | 0.72 | 0.71 | 260 |
| NTUTAKA | 0.13 | 1.42 | 0.73 | 18.97 | -0.02 | -1.78 | 0.61 | 0.61 | 260 |
| BAJALKH | -0.12** | -2.49 | 1.01 | 51.71 | 0.01 | 1.36 | 0.94 | 0.94 | 187 |
| IMANX | 0.01 | 0.13 | 1.00 | 53.11 | -0.01*** | -2.87 | 0.92 | 0.92 | 260 |
| KEPTSIN | -0.05 | -0.92 | 0.46 | 19.35 | 0.00 | -0.01 | 0.64 | 0.63 | 220 |
| **Malaysian** | | | | | | | | | |
| BHLBAHI | -0.05 | -0.91 | 0.73 | 19.98 | 0.00 | -0.28 | 0.70 | 0.70 | 173 |
| INGSYAR | 0.07 | 1.51 | 0.87 | 31.59 | 0.02** | 2.06 | 0.83 | 0.83 | 211 |
| MAAFAID | 0.03 | 0.37 | 0.71 | 14.30 | -0.02 | -0.87 | 0.57 | 0.57 | 156 |
| INGEISL | -0.06 | -1.03 | 0.80 | 18.80 | 0.10*** | 5.41 | 0.76 | 0.75 | 120 |
| ABMLTII | -0.32*** | -2.81 | 0.83 | 12.72 | 0.00 | -0.11 | 0.39 | 0.39 | 260 |
| MAYDANA | -0.19** | -2.02 | 0.63 | 11.46 | 0.01 | 0.63 | 0.34 | 0.34 | 260 |
| PTBASDI | -0.18*** | -3.25 | 0.75 | 21.76 | 0.03** | 2.42 | 0.73 | 0.73 | 188 |
| GEBRKAH | 0.12*** | 3.52 | 0.73 | 36.15 | 0.01 | 1.22 | 0.84 | 0.84 | 260 |
| PRLRASL | 0.08 | 1.24 | 0.74 | 19.90 | 0.01 | 0.65 | 0.61 | 0.61 | 260 |
| BBMBDPI | -0.18** | -2.51 | 0.84 | 20.21 | 0.03** | 2.54 | 0.61 | 0.61 | 260 |
| MAAFAYD | 0.02 | 0.40 | 0.68 | 24.02 | -0.01 | -1.56 | 0.70 | 0.70 | 260 |
| OSKDANA | 0.00 | 0.01 | 0.83 | 18.26 | -0.04** | -2.19 | 0.58 | 0.57 | 249 |
| HLBMAKM | -0.07 | -0.71 | 0.84 | 14.88 | -0.02 | -0.80 | 0.48 | 0.48 | 242 |
| MBLAZIM | -0.06 | -0.80 | 0.76 | 18.80 | 0.02** | 1.94 | 0.58 | 0.58 | 260 |
| PUBISEF | 0.05 | 0.79 | 0.71 | 16.68 | -0.02 | -1.25 | 0.63 | 0.62 | 169 |
| BHLPDAI | -0.11 | -1.63 | 0.76 | 18.77 | 0.02 | 1.52 | 0.58 | 0.58 | 260 |
| AIADYSY | -0.01 | -0.20 | 0.47 | 13.70 | 0.01 | 1.11 | 0.42 | 0.42 | 260 |
| KUTEQIS | 0.07** | 1.84 | 0.69 | 29.87 | -0.02** | -2.40 | 0.79 | 0.79 | 236 |
| BHLPDA2 | -0.03 | -0.51 | 0.73 | 17.96 | -0.01 | -0.79 | 0.65 | 0.65 | 173 |
| PRUALIL | 0.02 | 0.23 | 0.97 | 19.47 | 0.00 | -0.03 | 0.65 | 0.65 | 208 |
| PUBPBIE | 0.01 | 0.23 | 0.66 | 16.91 | 0.02 | 0.71 | 0.89 | 0.88 | 51 |
| RHBISGR | -0.11* | -1.67 | 0.97 | 20.18 | -0.01 | -0.66 | 0.78 | 0.78 | 134 |
| HWAIZDI | -0.01 | -0.05 | 0.80 | 11.41 | -0.01 | -0.37 | 0.40 | 0.39 | 202 |
| AIAISTI | 0.10** | 1.89 | 0.59 | 19.35 | 0.00 | 0.32 | 0.60 | 0.59 | 260 |
| ASMFBPI | -0.09 | -1.23 | 0.81 | 18.57 | 0.03** | 2.14 | 0.57 | 0.57 | 260 |
| MAASYAR | 0.02 | 0.40 | 0.74 | 30.28 | 0.00 | -0.01 | 0.79 | 0.79 | 242 |
| ASMBPSI | -0.15** | -1.93 | 0.86 | 18.47 | 0.03** | 2.24 | 0.57 | 0.57 | 260 |
| HIJASWI | -0.09 | -1.55 | 0.79 | 20.72 | 0.03* | 1.95 | 0.73 | 0.72 | 166 |

| TICKER | Alpha | t stat | Beta | t stat | Gamma | t stat | $R^2$ | Adj $R^2$ | Obs |
|---|---|---|---|---|---|---|---|---|---|
| **Malaysian** | | | | | | | | | |
| HLAITZA | 0.06 | 0.86 | 0.34 | 7.86 | 0.00 | -0.23 | 0.20 | 0.19 | 260 |
| BHLPDAZ | -0.22*** | -2.71 | 0.70 | 13.85 | -0.02 | -0.81 | 0.53 | 0.52 | 173 |
| PUBISOP | 0.15 | 1.01 | 0.49 | 4.10 | -0.11 | -1.58 | 0.35 | 0.33 | 60 |
| **Other** | | | | | | | | | |
| ALASPTE | -0.03 | -0.29 | 0.76 | 18.82 | 0.01 | 0.71 | 0.58 | 0.58 | 257 |
| ALFASHL | -0.06 | -0.19 | 0.34 | 2.82 | 0.02 | 0.76 | 0.10 | 0.07 | 75 |
| HITKAPF | 0.04 | 0.40 | 0.85 | 23.12 | 0.00 | 0.19 | 0.74 | 0.74 | 117 |
| BAJAMJE | -0.03 | -0.27 | 0.87 | 22.14 | 0.00 | -0.20 | 0.82 | 0.82 | 187 |
| ALEURTR | 0.18 | 1.47 | 0.67 | 14.33 | -0.03*** | -3.03 | 0.46 | 0.45 | 257 |
| BAJATEE | 0.03 | 0.50 | 0.94 | 46.68 | -0.01** | -2.15 | 0.92 | 0.92 | 187 |
| NAVSAMI | 0.07 | 0.85 | 0.57 | 25.85 | 0.00 | 0.49 | 0.74 | 0.74 | 260 |

## Table E1
## Detailed Risk Adjusted Returns of IEFs during a bear market (2002)

Table E1 contains the detailed results of calculating the Sharp Ratio (SR) and the Modigliani and Modigliani measure (MM) of 42 IEFs for the year 2002 as described in table 5. The column 'Ticker' represents each individual fund, and the columns 'Islamic' and 'Conventional' represent calculations using an Islamic benchmark and a conventional benchmark respectively.

| | | Islamic | Conventional |
|---|---|---|---|
| **TICKER** | **SR** | **MM** | **MM** |
| **Global** | | | |
| ADIFWOE | -1.38 | 3.37 | 3.12 |
| ALSCTRE | -1.19 | 6.97 | 6.80 |
| AMAGX | -1.63 | -1.29 | -1.66 |
| OACREQU | 2.92 | 82.44 | 84.16 |
| ALGLBTE | -1.44 | 2.31 | 2.03 |
| KEPTAKA | -1.68 | -2.20 | -2.59 |
| AMANX | -1.41 | 2.77 | 2.50 |
| UBSISGE | -1.61 | -0.93 | -1.29 |
| CITISPB | -1.66 | -1.86 | -2.24 |
| CITISPA | -1.70 | -2.53 | -2.93 |
| SUTEVAL | -1.34 | 4.05 | 3.81 |
| SUTEGRO | -1.83 | -4.87 | -5.34 |
| DBSMEGI | -1.84 | -5.09 | -5.55 |
| NTUTAKA | -1.20 | 6.63 | 6.45 |
| BAJALKH | -1.47 | 1.71 | 1.41 |
| IMANX | -1.52 | 0.78 | 0.46 |
| KEPTSIN | -0.45 | 21.25 | 20.65 |
| **Malaysian** | | | |
| INGSYAR | -0.30 | 5.46 | 3.96 |
| ABMLTII | -1.41 | -6.92 | -10.08 |
| MAYDANA | -0.48 | 3.41 | 1.64 |
| GEBRKAH | 0.66 | 16.19 | 16.14 |
| PRLRASL | 0.34 | 12.59 | 12.06 |
| BBMBDPI | -0.69 | 1.16 | -0.91 |
| MAAFAYD | 0.12 | 10.11 | 9.24 |
| OSKDANA | 0.51 | 14.53 | 14.25 |
| HLBMAKM | 0.63 | 15.83 | 15.74 |
| MBLAZIM | 0.13 | 10.27 | 9.43 |
| BHLPDAI | -0.39 | 4.50 | 2.88 |
| AIADYSY | 0.11 | 10.03 | 9.15 |
| KUTEQIS | -1.48 | -7.62 | -10.88 |
| PRUALIL | 0.55 | 14.94 | 14.72 |
| HWAIZDI | 0.51 | 14.50 | 14.23 |
| AIAISTI | 0.69 | 16.54 | 16.54 |
| ASMFBPI | 0.60 | 15.52 | 15.38 |
| MAASYAR | -1.15 | -3.99 | -6.76 |
| ASMBPSI | 0.03 | 9.11 | 8.10 |
| HLAITZA | 0.38 | 13.09 | 12.63 |
| **Other** | | | |
| ALASPTE | -0.83 | -2.23 | -2.93 |
| BAJAMJE | -0.24 | 10.72 | 6.11 |
| ALEURTR | -0.88 | 7.30 | 8.95 |
| BAJATEE | -1.00 | 5.05 | 7.05 |
| NAVSAMI | -1.52 | -4.99 | -10.60 |

## Table F1
## Detailed results on Downside Risk of IEFs

This table contains the detailed results of the 42 regressions performed of IEF excess returns on Islamic benchmark excess returns, conditioned for the case that the latter is negative. The procedure is described in table 6. The column 'Ticker' represents each individual IEF, while the column's Beta and Relative Beta represent the downside risk measures and $R^2$ is the 'goodness of fit' of the model for each fund.

| TICKER | Beta Minus | t stat | Relative Beta | $R^2$ |
|---|---|---|---|---|
| **Global** | | | | |
| ADIFWOE | 0.97 | 22.66 | -0.03 | 0.82 |
| ALSCTRE | 0.98 | 8.80 | 0.02 | 0.41 |
| AMAGX | 1.05 | 20.42 | 0.01 | 0.79 |
| SAMETFI | 0.14 | 1.47 | -0.06 | 0.06 |
| OACREQU | 0.59 | 3.93 | 0.13 | 0.12 |
| FGPUREQ | 1.57 | 6.34 | 0.49 | 0.40 |
| ALGLBTE | 0.66 | 9.18 | -0.05 | 0.43 |
| KEPTAKA | 0.83 | 14.37 | -0.08 | 0.65 |
| AMANX | 0.86 | 14.74 | 0.08 | 0.66 |
| UBSISGE | 1.01 | 40.37 | 0.02 | 0.94 |
| CITISPB | 0.53 | 6.15 | 0.00 | 0.25 |
| HSBCGLE | 0.79 | 15.35 | -0.04 | 0.79 |
| CITISPA | 0.54 | 11.87 | 0.00 | 0.35 |
| SUTEVAL | 0.39 | 6.19 | -0.20 | 0.26 |
| SUTEGRO | 0.59 | 8.01 | -0.08 | 0.37 |
| DBSMEGI | 0.92 | 12.74 | -0.09 | 0.59 |
| NTUTAKA | 0.73 | 8.96 | -0.02 | 0.42 |
| BAJALKH | 0.96 | 20.60 | -0.05 | 0.84 |
| IMANX | 1.09 | 24.91 | 0.08 | 0.85 |
| KEPTSIN | 0.40 | 6.91 | -0.06 | 0.33 |
| **Malaysian** | | | | |
| BHLBAHI | 0.77 | 16.20 | 0.05 | 0.78 |
| INGSYAR | 0.77 | 11.99 | -0.10 | 0.59 |
| MAAFAID | 0.70 | 5.16 | 0.00 | 0.27 |
| INGEISL | 0.44 | 4.68 | -0.26 | 0.28 |
| ABMLTII | 0.94 | 7.00 | 0.11 | 0.28 |
| MAYDANA | 0.46 | 3.53 | -0.17 | 0.09 |
| PTBASDI | 0.59 | 6.90 | -0.17 | 0.35 |
| GEBRKAH | 0.68 | 20.53 | -0.04 | 0.77 |
| PRLRASL | 0.73 | 9.26 | -0.01 | 0.41 |
| BBMBDPI | 0.75 | 10.59 | -0.08 | 0.47 |
| MAAFAYD | 0.72 | 13.01 | 0.03 | 0.58 |
| OSKDANA | 0.88 | 13.19 | 0.07 | 0.59 |
| HLBMAKM | 0.79 | 5.61 | -0.04 | 0.21 |
| MBLAZIM | 0.64 | 8.06 | -0.10 | 0.34 |
| PUBISEF | 0.67 | 5.65 | -0.03 | 0.30 |
| BHLPDAI | 0.64 | 6.11 | -0.11 | 0.23 |
| AIADYSY | 0.41 | 6.03 | -0.06 | 0.23 |
| KUTEQIS | 0.70 | 15.47 | 0.00 | 0.68 |
| BHLPDA2 | 0.77 | 10.56 | 0.04 | 0.59 |
| PRUALIL | 0.90 | 7.05 | -0.06 | 0.33 |
| RHBISGR | 0.98 | 10.60 | 0.00 | 0.64 |
| HWAIZDI | 0.83 | 5.89 | 0.04 | 0.27 |
| AIAISTI | 0.58 | 9.81 | -0.02 | 0.44 |
| ASMFBPI | 0.70 | 7.82 | -0.10 | 0.33 |
| MAASYAR | 0.76 | 13.55 | 0.02 | 0.61 |
| ASMBPSI | 0.72 | 7.25 | -0.12 | 0.30 |
| HIJASWI | 0.80 | 13.69 | 0.01 | 0.71 |
| HLAITZA | 0.38 | 4.16 | 0.04 | 0.12 |
| BHLPDAZ | 0.70 | 6.76 | 0.00 | 0.38 |

| TICKER | Beta Minus | t stat | Relative Beta | $R^2$ |
|---|---|---|---|---|
| **Other** | | | | |
| ALASPTE | 0.82 | 9.01 | 0.06 | 0.39 |
| ALFASHL | 0.39 | 1.64 | 0.07 | 0.07 |
| HITKAPF | 0.93 | 9.34 | 0.05 | 0.70 |
| BAJAMJE | 0.69 | 7.94 | -0.16 | 0.41 |
| ALEURTR | 0.85 | 8.69 | 0.19 | 0.40 |
| BAJATEE | 1.01 | 19.68 | 0.09 | 0.84 |
| NAVSAMI | 0.53 | 11.66 | -0.03 | 0.55 |