RISK-TAKING BEHAVIOUR IN MALAYSIAN MANAGED FUNDS: A NON-PARAMETRIC ANALYSIS

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Abstract

Taylor's (2003) extension of the tournament model of Brown et al. (1996) proposes that using an exogenous (endogenous) benchmark induces losing (winning) managers to gamble. This presents two competing testable hypotheses that are investigated in the current study. We use a sample of Malaysian unit trusts period covering the period 1982 to 2005. We apply the non-parametric cross-product ratio methodology to test all Malaysian funds and determine whether there is empirical evidence of tournament behaviour. We then separate Malaysian funds into two main categories (conventional and Islamic) to find out whether different fund types affect the behaviour of the funds as a whole. Overall, Taylor's (2003) theory does not hold in the Malaysian fund market, as conventional funds display tournament behaviour regardless of the benchmark used. However, Islamic funds do not display any significant tournament behaviour.

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1. INTRODUCTION

In a tournament, players compete for prizes where their effort and their share of the prizes depends upon their ranking, which means that relative performance matters. Tournament contracts can be viewed as attempts to address the principal-agent problem that exists when the principal does not have full information about the ability of the agent(s).[1] Initial empirical testing of tournament models focused on sporting tournaments in golf and tennis (for example, Ehrenberg and Bognanno, 1990; Orszag, 1994). While these studies attempt to find out if tournament compensation schemes actually elicit effort responses, other researchers examine the incentive effects of tournaments on risk-taking as well as effort responses in the sporting, corporate management and fund management fields.

Three basic observations are helpful in understanding the funds application of the tournament model. First, investment funds usually receive compensation in the form of a fee that is a fixed percentage of funds under management. Therefore, an incentive exists to pursue strategies that maximize funds under management. Second, findings by Ippolito (1992), Capon, Fitzsimons and Prince (1996) and others give support to the widely held view that the crucial factor influencing the choice of fund by retail investors is past investment performance. This finding gives strong support to the interpretation of the funds flow-investment performance relationship as an implicit incentive contract. Third, researchers such as Sirri and Tufano (1992, 1998) found that while funds that recorded the highest performance during a period attracted the largest increases in funds under

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[1] Early work in this area appeared in the labour economics literature and focused on the normative aspects of tournament models (for example, Lazear and Rosen, 1981; Green and Stokey, 1983; Nalebuff and Stiglitz, 1983). Theoretical analysis indicates that under certain circumstances (for example, when participants are risk averse and output disturbances are caused by a common shock), the incentive effects of rank-order compensation schemes are considered to induce optimal levels of effort among participants.

management, funds that performed poorly were not penalized by proportionate outflows of funds under management, indicating an asymmetric structure of the investment performance-funds flow relationship.[2]

In light of these findings, Brown, Harlow and Starks (1996) [hereafter BHS] developed a tournament model for funds. Specifically, they hypothesize that fund managers who are interim losers are likely to increase fund volatility in the latter part of the assessment period to a greater extent than interim winners. BHS reached the finding that losers do indeed appear to gamble, a result that is also confirmed by Koski and Pontiff (1999). Acker and Duck (2001) developed a tournament model predicting that losing managers adopt extreme portfolios. The analyses of Goriaev, Palomino and Prat (2001) and Basak, Pavlova and Shapiro (2002) produce results similar to those of Acker and Duck (2001). However, other studies document contradictory evidence, suggesting that it is winners rather than losers who gamble (Chevalier and Ellison, 1997; Qiu, 2003). However, Busse (2001), using higher frequency data, was unable to find evidence indicating that intra-year winners or losers actively alter the risk of their portfolios in response to past performance. While the empirical results are mixed, recent theoretical developments by Taylor (2003) show that using an exogenous (endogenous) benchmark induces losing (winning) managers to gamble. The literature, therefore, presents two competing testable hypotheses that are investigated in this study.

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[2] Berkowitz and Kotowitz (2000) found that fund flows were positively related to a distributed lag of past performance, with a strong degree of inertia and exhibiting a significant nonlinear effect at the extreme levels of performance. Consistent with Sirri and Tufano (1992, 1998), and later confirmed by the results of Goriaev, Nijman and Werker (2002), they found the strongest nonlinearity to be associated with extremely good performance.

Empirical studies to date use data from markets where the calendar year, financial year and reporting year coincide, as is the case for the Kuala Lumpur Composite Index (KLCI). While in some countries (for example, Australia) reporting periods can be calendar years, financial years, and even the October-September years, the vast majority of the Malaysian companies report over the calendar year January to December (some companies may choose to report outside this period).

Against this background, the current study uses a non-parametric approach to look for evidence of tournament (gaming) behaviour in the performance of fund managers in Malaysia. In doing so, we extend the tournaments literature by examining the performance of three data sets pertaining to the performance and evidence of tournament behaviour in (i) all managed funds in Malaysia, (ii) Islamic funds, and (iii) conventional funds. The analysis is based on calendar years over the period 1982 to 2005, using a range of within-year assessment periods against both exogenous (KLCI) and endogenous (median return) benchmarks. A major motivation for choosing the Malaysian data of unit trusts is to investigate and examine the behaviour of funds operating in an economy with the following three characteristics: (i) an emerging market in the rapidly expanding Asian economy, (ii) a market that has a reporting period in line with the calendar year, and (iii) an economy with a strong presence of Islamic funds (Shariah) and Muslim population.

The Islamic sector is singled out in particular due to the fact that Islamic economics proceeds in accordance with Islamic law and therefore influences and restricts fund managers' investment decisions. As the Qur'an speaks against usury (interest) in the context of early Muslim society, it generally calls for the removal of interest rates from financial

transactions, with the ultimate objective of producing more of an 'Islamic society'. However, there are liberal movements within Islam that deny the need for this tendency, since they generally see Islam as compatible with modern secular institutions and law.

Today, there are over 250 Islamic financial institutions globally with approximately $230 billion in assets. However, the vast wealth of Islamic funds under management is not welldiversified, as Saudi Arabia controls 70% of all assets under management. The primary fund management companies that cater to these investors are Citibank (Saudi American Bank), HSBC (Saudi British Bank/Al Amanah), Al Rajhi and Al Ahli. Outside the Muslim world, London is the world's hub of Islamic banking activity although its banks offer few retail products to the Muslim community. In Southeast Asia, Malaysia is an aggressive force, holding 9% of Muslim finances. Reciprocally, Islamic banking comprises 10% of Malaysian finances. With Saudi Arabia being a market leader, Malaysia's goal of being the number one player in the Islamic fund industry remains a challenge.

The basic thrust of our findings can be summarized as follows. Generally, our results suggest that winning managers are likely to decrease risk and losing managers are likely to increase risk regardless of the benchmark used. Therefore, our findings support the Brown et al. (1996) model, as the use of an endogenous benchmark contradicts Taylor's (2003) claim. Furthermore, our results produce no strong evidence of tournament behaviour within Malaysian Islamic funds. The Islamic behaviour can be attributed to their attitude to investment, which is in accordance with strict Shariah laws.

The remainder of this paper is structured as follows. Section 2 provides a brief review of the most relevant literature. In Section 3 the data and methodology are described, while Section 4 outlines the research goal and hypotheses. The research findings are presented in Section 5, and Section 6 presents some concluding remarks.

2. LITERATURE REVIEW

In light of the finding of an asymmetric structure to the investment performance-funds flow relationship, Brown, Harlow and Starks (1996) place portfolio management within the framework of a multi-period, multi-game tournament, focusing on the possible strategic responses of funds identified at interim ranking stages as likely to be ultimate "winners" or "losers". BHS hypothesize that fund managers who are interim losers (in the sense of being below the median performance for the first part of the assessment period) are likely to increase fund volatility in the latter part of the assessment period to a greater extent than interim winners. This strategy of increasing volatility is based on the expectation that higher volatility gives the losing manager a better chance of a major performance reversal that would redeem their ranking and, hence, secure a major tournament prize at year end. While greater volatility also increases the risk of experiencing an even more disastrous full year performance, the losing manager would take the view that because of the tournament nature of the fund industry (coupled with the asymmetric response of news flows to performance), they have nothing much to lose. BHS found that losers do indeed appear to gamble: in a sample of growth-oriented mutual funds, mid-year losers tend to increase fund volatility in the second half-year to a greater extent than mid-year winners. This result is also confirmed by Koski and Pontiff (1999).

In a similar vein, Chen and Pennacchi (2001) show that funds with poor performance relative to an exogenous benchmark have an incentive to increase the tracking error of the fund. Interestingly, they show that an increase in tracking error does not necessarily equate to an increase in the fund's volatility, as measured by BHS. Acker and Duck (2001) developed a tournament model predicting that losing managers adopt extreme portfolios (defined in terms of market exposure) and that the portfolios will be more extreme the further behind the manager becomes and the nearer the final ranking period. Their model incorporates fund size and managers' expectations about market movements. Goriaev, Palomino and Prat (2001) and Basak, Pavlova and Shapiro (2002) produce results that are similar to those of Acker and Duck (2002).

However, other studies document contradictory evidence, suggesting that it is winners rather than losers who gamble. For example, Chevalier and Ellison (1997) believe that funds that record returns in excess of a benchmark in the first nine months of the calendar year increase their volatility in the remaining quarter. Qiu (2003) found that midyear losers have less incentive to increase the risk of their funds relative to mid-year winners. Moreover, the evidence indicates that the managers of funds whose performance is close to that of the top performing funds have a greater incentive to increase the risk of the fund than the managers at the top who display a tendency to lock in the performance of their funds. It was also found that termination risk and multiple-manager arrangements reduce the risk taking incentives for losing funds. However, Busse (2001), using higher frequency data, was unable to find evidence for the proposition that intra-year winners or losers actively alter the risk of their portfolios in response to past performance.

While the empirical results are mixed, recent theoretical developments by Taylor (2003) suggest that the choice of the tournament benchmark for deciding winners and losers influences strategic responses by participants. Specifically, he argues that using an exogenous benchmark (such as a market index) induces losing managers to gamble while winning managers tend to index to lock in their lead. In contrast, using an endogenous benchmark (such as the median fund performance) induces winning managers to gamble. In this case the argument is that the winner expects the loser to gamble, and so the winner gambles in order to maintain his or her lead. As the loser recognizes that the winner has a higher probability of success (and given the asymmetric nature of the funds flow-investment performance relationship), the optimal strategy for the loser is not to gamble but to index. While this result is contrary to the predictions and empirical findings of BHS, it is consistent with the results of Chevalier and Ellison (1997) and also the findings of Palomino and Prat (2003) who examine the impact of contract design on fund managers' decisions regarding effort and risk taking.

The research conducted by Hallahan and Faff (2004) reinforces the findings of Taylor (2003). By analyzing the Australian superannuation system, they conclude that when an endogenous benchmark is used (that is, median fund performance) winners are more likely to take on extra risk while losers tend to reduce risk. This result is particularly evident in the examination of financial year results and to a lesser extent in calendar–year results. When exogenous benchmarks (such as a market index) are used, losers in the interim period increase risk, while winning managers index in an effort to protect their position. Overall, the evidence suggests that the financial press and investors are obsessed with end of financial year and calendar year results, making ranking at the end of these periods of

immense importance for fund managers. Further analysis conducted by Hallahan and Faff (2004) indicates that when tournaments are conducted with a September end, interim winners reduce risk and interim losers increase risk. The opposite is true for the tournaments conducted with a financial year end. By investigating sub-periods, they reveal a strong pattern of less negative (more positive) association between interim performance and risk shifting for the September-based (financial year) tournaments. Hallahan and Faff (2004) also contend that while the fund age does not affect tournament behaviour in September-end or financial year tournaments, there is evidence indicating that older funds actively practice conventional tournament behaviour (i.e., increase risk when they are interim losers) in the case of calendar years.

3. RESEARCH FRAMEWORK

This research is about unit trusts. Therefore, it may be beneficial to say something about them. Unit trusts are a form of collective investment that allow investors with similar investment objectives to pool their funds to be invested in a portfolio of securities or other assets. A professional fund manager then invests the pooled funds in a portfolio which may include cash, bonds, deposits, shares, property, and commodities. Unit holders do not purchase the securities in the portfolio directly, whereas the ownership of the fund is divided into units of entitlement. As the fund increases or decreases in value, the value of each unit increases or decreases accordingly. Unit trust investors are typically those with small amounts to invest, who neither have the time nor the inclination to hold portfolios of direct investments or shares. Rather, they prefer to invest in a secure, reputable investment vehicle that suits their purposes. Unit trusts allow investors to have easy access to a wide range of investment exposures not normally available to them.

3.1 Malaysian Unit Trusts

Malaysia introduced the unit trust concept relatively early compared to its Asian neighbours, when, a unit trust was first established in 1959 by a company called Malayan Unit Trust Ltd. The unit trust industry in Malaysia has therefore only a short history of more than four decades. The first two decades in the history of the unit trust industry were characterised by slow growth in the sales of units and a lack of public interest in the new investment product. Only five new unit trust management companies were established, with a total of 18 funds introduced over that period. The 1980s also witnessed the emergence of unit trust management companies, which were subsidiaries of financial institutions. Their participation facilitated the marketing and distribution of unit trusts through the banks branch network, which widened investor reach.

Although the pace of growth of unit trust funds has moderated since the financial crisis of 1997-98, it has nevertheless maintained its upward trend in terms of the number of units in circulation and unit holders. The period also saw Shariah funds continue to gain popularity in terms of the increasing number of funds offered by a host of unit trust providers. The rise in Islamic funds could be attributed to Islam being the official religion of Malaysia (according to the 2000 census figures, approximately 60% of the population practiced Islam). The modern Islamic fund management industry was born in the 1970s, when a new class of oil-rich Arab investors, celebrating the 15th century of the Islamic calendar (Hijra) in 1976, sought a culturally-aware alternative to the "profit at all costs" mentality of western investing, particularly in interest-dealings. The industry has been growing ever since:

Islamic banking is active in 75 countries and is growing at 15% globally, with an estimated $1 trillion worth of assets under management.

Islamic mutual funds or Islamic unit trust funds are managed in compliance with the Shariah principles. Islamic mutual funds typically engage a Shariah board to advise and ensure that its investment operations and portfolios are managed in compliance with Shariah principles. There are different categories of Islamic funds in Malaysia and the typical products these funds invest in are Shariah-compliant equities, Islamic bonds and Mudharabah deposits. With today's pace of development in the Islamic financial systems, and together with an estimated 1.2 billion Muslims globally, the management of liquidity is a challenge due to the relative scarcity of Islamic capital market instruments. The challenge for Malaysia and the Islamic capital markets globally is to step up its efforts in term of product development, harmonisation of Shariah's views and establishment of a global Islamic financial system framework.

Today there are a variety of Islamic capital market products and services to meet the needs of those who seek to invest in compliance with Shariah principles. The Islamic capital market has grown in sophistication and Islamic forms of product structuring, project financing, stockbroking, asset management and venture capital services are becoming increasingly available in Malaysia. Table 1 displays the Malaysian unit trust sector performance for the year ending September 2006.

3.2 Data and Sampling

The data were supplied by Standard & Poor's, an independent research house that, among other things, monitors the managed funds industry. The data set consists of monthly index series return data for the period 1982 to 2005 for managed funds in existence over this period. A fund is included in our analysis for each full year in which it was present in the data set, thereby largely avoiding the major survivorship bias problem arising when funds that do not survive for the full sample period are absent from the database.[3]

For each fund in the sample, data are available from either 1982 or the first entire year of operation, if inception is later than this date. The index series reflects changes in the value of an investment in a fund over time, and is based on a notional $10,000 investment in the fund. Monthly index values are calculated by reference to the month-end exit price of the fund, which is net of management fees, assuming reinvestment of all cash and bonus unit distributions. The index series, therefore, gives representative returns that an actual investor may have achieved and measures the monthly performance of the fund.

Consistent with the theoretical insights of Goriaev, Palomino and Prat (2001) and Taylor (2003), we define fund winners/losers in relation to two alternative types of benchmark: (a) an endogenous benchmark – the 'median' manager (that is, being above/below the median performance of similar funds for the first part of the assessment period), and (b) an exogenous benchmark- the Kuala Lumpur Composite Index (that is, being above/below this market index return for the first part of the assessment period).

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[3] A number of studies such as Grinblatt and Titman (1989), Brown, Goetzman, Ibbotson and Ross (1992), Carpenter and Lynch (1999) and Carhart, Carpenter, Lynch and Musto (2002) document the economic significance of survivorship bias in studies of equity mutual fund performance, particularly in relation to the issue of persistence in performance. However, and as noted by Del Guercio and Tkac (2002), studies by Sirri and Tufano (1998), Chevalier and Ellison (1997) and Goetzmann and Peles (1997) found that survivorship bias does not affect inferences about the funds flow-performance relationship and, therefore, is not a major issue in studies involving annual tournaments.

Islamic fund performance receives substantial coverage in the Malaysian financial and popular press. Due to the rapid pace of growth in the Islamic fund sector, investors and media commentators are keen to get an operational understanding of the industry. However, a vast majority of assets are held by conventional funds, which implies a strong interest from the public in relation to the strategic attitudes of conventional fund managers. It is interesting to gain an overall perspective of whether tournament behaviour exists in the Malaysian managed fund industry, and if so, to what extent the different sectors affect the overall industry. Accordingly, we suggest three annual tournament scenarios: (a) Islamic funds, (b) conventional funds, and (c) the overall Malaysian managed fund industry.

3.3 Some Descriptive Statistics

Table 2 provides a summary of the break up of the funds management industry in the Malaysian data set. The data extends back to 1982 when only one fund was in operation. Our research is, therefore, unsuitable for any period prior to 1993. From 1993 we initiate our analysis as the Malaysian managed fund industry has a total of twenty-five funds. We therefore conduct our analysis for the twelve years between 1993 and 2005 inclusive. Table 3 displays various descriptive statistics relating to the Malaysian managed funds industry over the period 31 December 2004 to 31 December 2005. It provides information on the change in the number of funds functioning over the year, both conventional and Islamic, and also the amount of funds under management (FUM) in those funds. The Islamic funds sample sizes increased at a compound rate of approximately 30% per year over the period of the analysis, conventional funds at 20.2% per year, while all Malaysian managed funds increased at a rate of 21.6% per year.

3.4 Methodology

We choose to apply a non-parametric 'contingency table/ *CPR*'[4] framework as the basis of our empirical analysis. This choice is founded on several considerations. First, contingency tables are the primary framework within which Brown, Harlow and Starks (1996) performed their investigation. Given that the purpose of our paper is to find out whether their findings hold in a different data set, for comparability purposes, analysing contingency tables is a natural choice. Second, the application of contingency tables and *CPRs* is common in other areas of the fund performance literature (see, for example, Goetzmann and Ibbotson, 1994; Kahn and Rudd, 1995; Phelps and Detzel, 1997). Third, the application of the contingency table approach is quite straightforward and the consequent relative ease of understanding that it affords an audience beyond the academic sphere (for example, investment advisors and even everyday investors) is a positive. Such wide-ranging penetration of knowledge is of great appeal in the funds management research area, since it holds such obvious and direct interest to investment industry participants. Accordingly, we now explain the contingency table/ *CPR* setup.

Recall that BHS hypothesized that fund managers who are interim losers are likely to increase fund volatility in the latter part of the assessment period to a greater extent than interim winners. This behaviour is captured in the predicted relationship between the "risk adjustment ratios" of loser portfolios and winner portfolios:

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[4] CPR stands for cross-product ratio.

$$(\sigma_{2L}/\sigma_{1L}) > (\sigma_{2w}/\sigma_{1w}) \tag{1}$$

where s1 and s2 represent the portfolio risk levels in the first and second periods (of each year), respectively, and the subscripts *L* and *W* denote loser and winner.

For each performance year we establish two classifications: In the first classification we identify interim winners and losers on the basis of the fund's relative return between the commencement of the year and month *M*, where *M* ranges from the third month to the ninth month of the relevant year. This means that for each performance year tournament we calculate seven interim ranking periods ranging from three months to nine months. Discrete monthly return data was provided by Standard & Poor's for each fund. Following BHS, we calculate the *M*-month compound return of each fund *j*, in tournament year *y* (denoted *RTN* $_{jMy}$) as:

$$RTN_{jMy} = [(1+r_{j1y})\ (1+r_{j2y})\ldots\ (1+r_{jMy})] - 1 \tag{2}$$

where r_{jMy} is the monthly change in the fund's index series value as reported by Standard & Poor's.

In the second classification we construct the 'risk adjustment ratio', *RAR*, which is the ratio of fund volatility before and after the interim assessment period. This measure of (relative) changes in the risk of the fund's portfolio is calculated as:

$$RAR_{jMy} = \sqrt{\left(\frac{\sum_{m=M+1}^{12}\left(r_{jmy} - \overline{r}_{j(12-M)y}\right)^2}{(12-M)-1}\right)} \div \sqrt{\left(\frac{\sum_{M=1}^{M}\left(r_{jmy} - \overline{r}_{jMy}\right)^2}{M-1}\right)} \tag{3}$$

We then classify the (*RTN*, *RAR*) pairs for each fund, in each tournament, based upon whether the fund is a (a) winner (above benchmark return in the assessment period) or loser (below benchmark return in the assessment period), and (b) whether the fund is of a high *RAR* (has increased its risk in the second period, i.e. *RAR* > 1) or low *RAR* (has decreased its risk in the second period, i.e. *RAR* < 1). Specifically, we require cell counts of the four joint *RTN*/*RAR* classifications of funds: (a) *NWH* – the number of winning funds with high *RAR*; (b) *NWL* – the number of winning funds with low *RAR*; (c) *NLH* – the number of losing funds with high *RAR*; and (d) *NLL* – the number of losing funds with low *RAR*. Based on these classifications we then generate 2x2 contingency tables, upon which tests of association are conducted. The non-parametric contingency table analysis is used to identify the frequency with which funds defined as winners or losers during the assessment part of the tournament period increased or decreased their risk level in the succeeding period.

To test for independence from period to period, the contingency table results can be summarized by the use of the cross-product ratio (Fienberg, 1980) or the odds-ratio (Christensen, 1990) which gives the ratio:

$$CPR = \frac{(N_{WH} * N_{LL})}{(N_{WL} * N_{LH})} \tag{4}$$

The *CPR* is a basic measure of association for 2x2 tables. When *CPR* = 1, it reflects an equal number of observations in each cell of the contingency table, supporting the null hypothesis that the two classifications are independent. Alternatively, when *CPR* < 1 (*CPR* > 1), interim losing managers have increased (decreased) second period risk and interim winners have decreased (increased) risk. The test statistic for the *CPR* is referred to as the z statistic. It is the standard deviation of the log of *CPR*, calculated as the square root of the sum of the

reciprocals of the cell counts, which is normally distributed with mean log *CPR* for large samples. It can be used as an alternative to the chi-square statistic to test for independence.

4. THE HYPOTHESES

In this paper we extend the managed fund literature by investigating a Malaysian data set for evidence of tournament behaviour. Our contribution is related to two specific hypotheses concerning the strategic interaction between active fund managers when alternate benchmarks are specified.

Stated formally, our null hypothesis is that subsequent period fund risk is independent of ranking period performance. Given our research design, we would fail to reject the null hypothesis when the *CPR* is equal to unity: a *CPR* of one represents equal counts in each of the cells of the contingency table, indicating the absence of association between fund performance over the assessment period and changes in fund risk over the remaining part of the tournament. Hence

$$H_0: CPR = 1 \tag{5}$$

If the null hypothesis of independence between fund performance and subsequent changes in fund risk can be rejected, our alternative hypotheses focus on examining the strategic response of fund managers to performance rankings under different benchmark regimes.[5] Following Taylor's (2003) game-theoretic analysis, we investigate whether, under an

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[5] Consistent with earlier literature, Taylor (2003) analyses the strategic response of fund managers in terms of two-person non-cooperative games where one player is the fund manager and the other player represents the benchmark.

exogenous benchmark (index) regime, losing managers at the end of the assessment period increase the risk of the fund in the subsequent period while winning managers reduce their risk. Evidence supporting this alternative hypothesis would be provided by a *CPR* less than unity:

$$H_1: CPR < 1 \tag{6}$$

Our second alternative hypothesis concerns the strategic response of fund managers when their within-tournament performance is assessed against an endogenous benchmark. Under this benchmark regime, Taylor's (2003) analysis predicts that when performance is measured against the median manager, winning managers at the end of the ranking period increase their portfolio risk, while losing managers reduce their risk, over the remaining period. Stated formally:

$$H_2: CPR > 1 \tag{7}$$

Support for this hypothesis would contradict the findings of BHS but it would be consistent with the results reported by Chevalier and Ellison (1997).

5. RESULTS

5.1 Analysis Relative to an Exogenous Benchmark

The first hypothesis (H1) is that assessment against an exogenous benchmark (such as the Malaysian KLCI stock market index) induces losing managers to gamble and take on more risk in the subsequent period, while winning managers index to lock in their lead, and in doing so reduce their portfolio risk. This hypothesis is supported when the *CPR* is less than unity.

5.1.1 Malaysian Islamic Funds – Exogenous Benchmark

Table 4 presents an indication of tournament behaviour being almost absent in the Malaysian Islamic managed fund industry when measured against the index benchmark. Only on one single occasion (1.1% of the assessable period) is there evidence of tournament behaviour and this occurs in the (5,7) assessment period in 2005. This further confirms that the players in the Islamic funds management industry do not compete to obtain higher returns, whether it is against a benchmark nor against a particular index. The Islamic Shariah beliefs have core principles stating that they cannot invest in certain companies. This paper, therefore, provides evidence indicating that no tournament behaviour appears in the Islamic funds management industry in Malaysia.

5.1.2 Malaysian Conventional Funds – Exogenous Benchmark

The results of the conventional funds returns when compared to the exogenous index benchmark demonstrate strong evidence for tournament behaviour (as shown in Table 5). Managers from 19 of the 91 assessment periods reveal signs of tournament behaviour. Of the 19 significant results, 13 (68%) support H1, indicating that winning (losing) managers decrease (increase) risk in the subsequent assessment period.

An interesting trend to emerge is that the 6 significant results produced in 2002 endorse H2. The first period (3,9) of 2002 shows a *CPR* of zero, indicating no association between fund performance over the assessment period and changes in fund risk over the remaining part of the tournament. Furthermore, during the six significant periods of 2002 the winning (losing) managers increased (decreased) their risk.

5.1.3 All Malaysian Funds – Exogenous Benchmark

Table 6 reports the outcome of the contingency table/*CPR* analysis applied to calendar year tournaments assessed against the index benchmark. This table reveals our strongest results in support of H_1. The primary focus in this table should be on the bottom row of figures, which represent the aggregate *CPR* results for the complete set of thirteen years of calendar tournaments. Here we see that the overall *CPR* ratio is less than one for all assessment periods except for the (3,9) period. This evidence is strongly in favour of H_1: losing (winning) managers appear to gamble (play it safe) and take on more (less) risk in the subsequent period.

The all funds results for the exogenous benchmark produce extremely similar results to that of those of the conventional funds. The analysis of all Malaysian managed funds shows significant results in 22 percent of the assessment period. Of the 20 significant results, 14 support H_1, indicating that winning managers reduce risk in the subsequent assessment period, with 43 percent of the assessment periods from 2000 to 2005 producing significant results. This may be attributed to the rapid growth in the Malaysian managed fund industry, which may be leading to more competitive behaviour. Another trend to emerge is that of the 3 significant results produced in 2005, all of which endorse H_2. This may be an indication that while H_1 is by far the most prevalent during the sample period, there may be a change in the behaviour of Malaysian fund managers towards H_2. However, this conjecture is only based on our limited sample and evidence. To be confirmed, it would require extended examination in future research.

Taken together, all of the analysis involving exogenous benchmarks does provide a degree of support for H1. The results found under the conventional and all fund analysis produce almost identical results, suggesting that while Islamic funds are rapidly increasing in prominence and appeal, they still represent a relatively small section of the Malaysian managed fund industry and have little influence on strategic behaviour of the industry as a whole.

5.2 Analysis Relative to an Endogenous Benchmark

The second hypothesis (H2) is that assessment against an endogenous benchmark, such as a median performance, induces winning (losing) managers to take on more (less) risk in the subsequent period. This hypothesis is supported when the *CPR* exceeds unity.

5.2.1 Malaysian Islamic Funds - Endogenous Benchmark

The Islamic fund analysis for the endogenous benchmark is shown in Table 7. Again, initial attention should be directed to the bottom row of figures, which represent the aggregate *CPR* results for the complete set of twelve years. The results produce little evidence for tournament behaviour, with only 5 of the 91 individual tournaments producing significant *CPR* results. This outcome can be attributed to the Islamic beliefs and hence investment styles made in accordance to the Shariah laws. However, there have been some significant results periods between 2000 and 2005, which may or may not be due to the industry growth over this period. From the five significant results, three support Taylor's (2003) analysis that winning managers increase risk in the next period, therefore supporting H2. The most noteworthy pattern that emerges from the significant results is that two of the results supporting H2 occur in the (3,9) periods, whilst the two results that support H1 are in (9,3) and (7,5). This reinforces the findings pertaining to conventional funds, indicating

that interim winning (losing) managers decrease (increase) in the latter stages of the tournament. Overall, however, the evidence suggests that tournament behaviour is not present in Islamic funds.

5.2.2 Malaysian Conventional Funds – Endogenous Benchmark

At a general level, the results for the endogenous (median manager) benchmark produce a greater number of significant results compared to the exogenous benchmark. From the conventional fund analysis, 30 percent of the individual tournaments recorded (using an endogenous benchmark) produce significant results while the exogenous benchmark produce 21 percent. The all fund analysis produce significant results for 36 percent compared to 22 percent under the exogenous benchmark. More specific details are discussed below.

Table 8 reports the conventional fund results for the endogenous benchmark. This analysis shows 27 significant *CPR* results from the 91 individual tournaments. Of these cases, 23 indicate that interim period losers increased risk in the second period, thereby providing support for H1. The concentration of significant below unity *CPR* results in the individual annual tournaments is highest at four (out of 13 years) in the (4,8), (6,6) and (7,5) period. The year 2002 is notable in as much as all seven assessment periods record significant *CPR* results.

The conventional fund median benchmark results provide reasonably strong support for H1, contrary to the prediction (based on Taylor, 2003) of H2, that interim winners (losers) increase (decrease) risk. However, some of the results indicate a growing trend towards the

latter hypothesis being relevant. Three of the four results obtained in support of H_1 occur in 2005. Also, two of the four results that exceeded unity occur in the (3,9) period, possibly suggesting that winning (losing) managers are more likely to act earlier to increase (decrease) risk.

5.2.3 All Malaysian Funds – Endogenous Benchmark

The analysis of all funds is revealed in Table 9. In broad terms, the results are quite similar to the conventional funds results. Of the 91 assessment periods, 33 produce significant results, or 36.3%. Of the significant results, 23 support H_1, indicating that interim winning (losing) managers are more likely to decrease (increase) risk in the following period in the overall Malaysian managed funds industry. Of the assessment periods, the highest number of significant results are recorded during the (7,5) and (8,4) periods. An interesting statistic to emerge from the analysis of all funds is that when calculated in percentage terms, the endogenous and exogenous variable produce identical break-ups between H_1 (70%) and H_2 (30%). Whilst the majority of results support H_1, there does seem to be a trend towards H_2 in latter years. Of the 7 significant results of 2004 and 2005, 6 support H_2. Once again, 2002 has the most significant results, with all 7 assessment periods producing significant results. However, as already noted, this may have been as a result of the post September 11 rebound, which may have diluted return figures.

Viewed as a whole, the results involving all Malaysian managed funds are quite supportive of H_1. Significant results are obtained for 36% of the assessment periods analysed for all funds against an endogenous benchmark. There is solid evidence to suggest that there is a strong degree of tournament behaviour in the Malaysian managed funds industry.

6. SUMMARY AND CONCLUSIONS

The funds management industry has proven to be a fertile ground for theoretical and empirical research over the past forty years. Since the performance and risk-shifting behaviour of fund managers was initially put under the spotlight by Treynor and Mazuy (1966) and Jensen (1968), it is possible to identify an evolving strand of research where performance assessment is examined within the framework of the principal-agent literature. One focus that has emerged in this literature is the tournament model developed by Brown, Harlow and Starks (1996). Specifically, they argue that fund managers who are interim losers are likely to increase fund volatility in the latter part of the assessment period to a greater extent than interim winners. While the empirical results are mixed, recent theoretical developments by Taylor (2003) point to the proposition that using an exogenous (endogenous) benchmark induces losing (winning) managers to gamble. This proposition presents two competing testable hypotheses.

Using a sample covering the period 1982 to 2005, we investigated the tournament induced risk-shifting behaviour of Malaysian managed funds. Following Taylor (2003), we tested the ability of the two competing hypotheses to predict risk-shifting behaviour in our sample. To this end, we applied the non-parametric cross-product ratio methodology to examine tournaments based on conventional funds, Islamic funds and all funds, using a range of within-year assessment periods, against both an exogenous and an endogenous benchmark.

Our findings can be summarized as follows. Generally, the evidence suggested that winning managers are likely to decrease risk and losing managers are likely to increase risk regardless of the benchmark used. Therefore, our findings indicate that Taylor's (2003)

model does not hold, as the empirical evidence found when using an endogenous benchmark contradicts Taylor's (2003) claim that when compared to an endogenous benchmark, winning managers are inclined to gamble whilst losing managers decrease risk. Our results produced no strong evidence of tournament behaviour within Malaysian Islamic funds, indicating Islamic behaviour, which can be attributed to the Islamic attitude to investment resulting from the Shariah law. Therefore, when we looked at Malaysian funds as a whole, we found evidence supporting Brown et al.'s (1996) theory of tournament behaviour (that is, fund managers who are more likely to end up as "losers" in the first period tend to increase risk exposure towards the end of the period).

Our research, therefore, extends the empirical literature on fund manager behaviour by seeking empirical evidence of tournament effects in a dataset. Moreover, we employed three different representations of the annual tournament period to examine behaviour against two ranking benchmarks, one endogenous and one exogenous. While our study is concerned primarily with evidence on risk-taking behaviour on the part of fund managers, it can also be viewed as providing, albeit indirectly, empirical evidence on the question of whether benchmark choice may affect such behaviour. In an era when fund manager performance and behaviour is under unprecedented scrutiny (both by regulators and by increasingly knowledgeable and financially literate investors), this study provides an empirical contribution to an issue of current relevance, which is likely to endure interest for some time to come.

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Table 1: Malaysian Unit Trusts Sector Performance Table 2006

Sector Name	No of Funds	Assets (AUD $b)	YTD returns
Asset Allocation	72	6.44	6.06
Equity	169	22.84	9.23
Fixed Income	61	10.29	1.46
Money Market	22	6.13	2.01
Total	324	45.7	

Source: S&P September 2006 "Unit Trusts".

Table 2: Break up of Malaysian Funds

Calendar Year	No of Islamic Funds	No of Conventional Funds	Total Funds
1982	0	1	1
1983	0	1	1
1984	0	1	1
1985	1	5	6
1986	1	6	7
1987	1	7	8
1988	1	7	8
1989	1	7	8
1990	1	10	11
1991	2	16	18
1992	2	17	19
1993	3	22	25
1994	3	25	28
1995	5	31	36
1996	7	44	51
1997	8	51	59
1998	9	57	66
1999	12	63	75
2000	12	75	87
2001	14	90	104
2002	21	104	125
2003	33	122	155
2004	45	148	193
2005	60	195	255

Table 3: Descriptive Statistics for Malaysian Funds

	31 December 2005	31 December 2004
No. of funds approved	340	291
• Conventional • Islamic-based	257 83	220 71
Total approved fund size (billion units)	267.33	218.05
Units in circulation (billion units)	139.39	118.63
No. of accounts (million)	10.86	10.43
Total NAV (RM billion)	98.49	87.39
• Conventional (RM billion) • Islamic-based (RM billion)	90.00 8.49	80.63 6.76
% of NAV to KLSE market capitalisation	14.17	12.10

Table 4: Cross-Product Ratios for Calendar-year Tournaments: Islamic Funds Index Benchmark

						Assessment Period								
	(3,9)		(4,8)		(5,7)		(6,6)		(7,5)		(8,4)		(9,3)	
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1996	0.00	0.00	2.00	0.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1997	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1998	0.00	0.00	0.00	0.00	2.00	0.47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1999	0.56	-0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2000	1.60	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	2.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2003	0.47	-0.90	0.83	-0.22	3.29	1.04	1.20	0.25	0.56	-0.72	0.69	-0.40	0.06	0.08
2004	0.00	0.00	0.78	-0.28	0.65	-0.63	0.60	-0.52	0.55	-0.47	0.00	0.00	0.00	0.00
2005	1.12	0.21	1.64	0.92	3.63	2.04	2.55	1.42	1.84	0.90	1.00	0.00	-0.59	-1.02
Total	**1.03**	**0.10**	**0.76**	**-1.07**	**0.97**	**-0.12**	**0.77**	**-0.97**	**0.46**	**-2.78**	**0.57**	**-2.04**	**-0.54**	**-1.94**

* Darker shading indicates periods supporting H1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. *CPR* < 1). Lighter shading indicates periods supporting H2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. *CPR* > 1).

Table 5: Cross-Product Ratios for Calendar-year Tournaments: Conventional Funds Index Benchmark

					Assessment Period								
	(3,9)		(4,8)		(5,7)		(6,6)		(7,5)		(8,4)		(9,3)	
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.00	0.00	0.38	-1.04	0.33	-1.10	0.38	-0.85	0.14	-1.62	0.47	-0.73	0.45	-0.61
1994	0.00	0.00	1.50	0.44	6.00	1.48	2.75	1.03	2.75	1.03	4.00	1.15	0.00	0.00
1995	0.59	-0.49	1.80	0.77	0.26	-0.90	0.19	-1.69	1.25	0.24	0.92	-0.10	1.63	0.63
1996	0.00	0.00	0.18	-2.32	0.51	-0.89	1.40	0.53	0.32	-1.79	0.37	-1.43	0.18	-2.02
1997	0.33	-0.98	0.83	-0.14	0.41	-1.04	0.46	-1.05	0.42	-1.01	0.78	-0.35	1.75	0.48
1998	0.00	0.00	0.00	0.00	0.71	-0.53	2.57	0.84	0.00	0.00	0.00	0.00	0.58	-0.47
1999	1.30	0.39	1.15	0.12	0.09	-1.90	0.67	-0.46	1.58	0.54	1.30	0.35	0.00	0.00
2000	0.47	-1.25	0.08	-2.36	0.00	0.00	0.56	-0.73	1.85	0.55	0.89	-0.13	0.00	0.00
2001	3.11	2.16	4.69	1.82	6.00	1.57	6.52	2.15	0.00	0.00	1.59	0.72	3.96	1.69
2002	0.00	0.00	0.06	-2.53	0.06	-2.53	0.06	-4.51	0.08	-3.77	0.03	-4.58	0.13	-2.11
2003	0.67	-1.10	0.52	-1.64	2.27	1.85	0.52	-1.74	0.69	-0.93	0.35	-2.58	0.21	-3.28
2004	0.00	0.00	0.42	-2.16	0.51	-1.83	0.10	-2.17	0.13	-1.91	0.28	-1.64	1.30	0.32
2005	3.77	4.24	1.37	0.97	5.12	3.07	3.10	2.46	1.56	1.25	1.50	1.37	2.40	2.59
Total	1.06	0.48	0.59	-4.33	0.70	-2.87	0.68	-3.14	0.54	-4.95	0.69	-2.99	0.84	-1.43

* Darker shading indicates periods supporting H_1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. $CPR < 1$). Lighter shading indicates periods supporting H_2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. $CPR > 1$).

Table 6: Cross-Product Ratios for Calendar-year Tournaments: All Funds Index Benchmark

					Assessment Period									
	(3,9)		(4,8)		(5,7)		(6,6)		(7,5)		(8,4)		(9,3)	
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.00	0.00	0.36	-1.18	0.31	-1.30	0.29	-1.21	0.12	-1.80	0.36	-1.03	0.50	-0.53
1994	0.00	0.00	1.22	0.22	5.20	1.38	2.40	0.91	1.47	0.44	4.17	1.21	0.00	0.00
1995	0.60	-0.48	2.08	1.01	0.26	-0.91	0.15	-1.92	1.13	0.13	0.98	-0.02	1.17	0.21
1996	0.00	0.00	0.28	-2.03	0.39	-1.28	1.23	0.35	0.35	-1.80	0.27	-1.91	0.14	-2.27
1997	0.22	-1.36	0.58	-0.45	0.43	-1.02	0.40	-1.29	0.34	-1.29	0.60	-0.81	1.97	0.60
1998	0.00	0.00	0.00	0.00	0.82	-0.33	3.15	1.04	0.00	0.00	0.00	0.00	0.55	-0.53
1999	1.00	0.00	1.16	0.13	0.09	-1.90	0.59	-0.60	1.20	0.22	0.96	-0.05	0.00	0.00
2000	2.03	1.34	0.13	-2.49	0.00	0.00	0.47	-0.93	1.62	0.43	0.74	-0.32	0.00	0.00
2001	3.07	2.32	4.58	1.81	5.90	1.56	6.83	2.21	0.00	0.00	1.59	0.72	4.22	1.78
2002	0.00	0.00	0.05	-2.71	0.09	-2.17	0.11	-3.97	0.10	-3.46	0.04	-4.41	0.22	-1.67
2003	0.63	-1.38	0.55	-1.66	2.33	2.08	0.68	-1.21	0.71	-0.97	0.42	-2.37	0.30	-2.94
2004	0.22	-1.46	0.45	-2.24	0.53	-2.01	0.23	-2.31	0.21	-2.05	0.26	-1.80	1.28	0.30
2005	2.64	3.70	1.44	1.32	4.22	3.64	2.84	2.80	1.61	1.52	1.35	1.15	1.72	1.94
Total	1.09	0.76	0.61	-4.48	0.74	-2.71	0.69	-3.25	0.52	-5.73	0.67	-3.56	0.79	-2.06

* Darker shading indicates periods supporting H_1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. *CPR* < 1). Lighter shading indicates periods supporting H_2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. *CPR* > 1).

Table 7: Cross-Product Ratios for Calendar-year Tournaments: Islamic Funds Median Benchmark

| | Assessment Period | | | | | | | | | | | | | |
| | (3,9) | | (4,8) | | (5,7) | | (6,6) | | (7,5) | | (8,4) | | (9,3) | |
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1994	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1995	0.00	0.00	2.00	0.37	0.00	0.00	2.00	0.37	2.00	0.37	2.00	0.37	0.00	0.00
1996	0.00	0.00	6.00	1.06	0.50	-0.44	0.50	-0.44	0.50	-0.44	0.00	0.00	0.50	-0.44
1997	0.11	-1.35	9.00	1.35	1.00	0.00	9.00	1.35	1.00	0.00	1.00	0.00	0.00	0.00
1998	12.00	1.55	1.50	0.30	1.50	0.30	0.22	-1.02	0.22	-1.02	0.22	-1.02	0.22	-1.02
1999	0.25	-1.13	1.00	0.00	0.25	-1.13	0.25	-1.13	1.00	0.00	1.00	0.00	4.00	1.13
2000	1.00	0.00	0.25	-1.13	1.00	0.00	0.25	-1.13	0.04	-2.08	0.25	-1.13	0.04	-2.08
2001	36.00	2.35	1.78	0.53	1.78	0.53	0.56	-0.53	1.78	0.53	1.78	0.53	0.56	-0.53
2002	0.56	-0.66	0.56	-0.66	1.20	0.21	0.56	-0.66	1.20	0.21	2.63	1.07	0.56	-0.66
2003	0.42	-1.22	3.06	1.54	1.84	0.86	0.69	-0.53	0.69	-0.53	1.13	0.17	1.13	0.17
2004	1.09	0.15	0.37	-1.63	1.09	0.15	0.76	-0.45	0.76	-0.45	0.53	-1.04	0.53	-1.04
2005	2.98	2.04	1.71	1.03	2.25	1.54	1.71	1.03	4.00	2.53	1.31	0.52	1.00	0.00
Total	**1.52**	**1.62**	**1.25**	**0.85**	**1.52**	**1.62**	**0.89**	**-0.44**	**1.17**	**0.59**	**0.95**	**-0.18**	**1.09**	**0.33**

* Darker shading indicates periods supporting H_1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. *CPR* < 1). Lighter shading indicates periods supporting H_2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. *CPR* > 1).

Table 8: Cross-Product Ratios for Calendar-year Tournaments: Conventional Funds Median Benchmark

	Assessment Period												
	(3,9)		(4,8)		(5,7)		(6,6)		(7,5)		(8,4)		(9,3)	
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.14	-2.05	0.33	-1.26	0.69	-0.43	0.33	-1.26	0.14	-2.05	0.14	-2.05	0.14	-2.05
1994	4.50	1.75	2.24	0.99	4.50	1.75	4.50	1.75	2.24	0.99	4.50	1.75	1.17	0.19
1995	8.25	2.57	2.50	1.24	0.88	-0.19	0.52	-0.90	0.88	-0.19	0.52	-0.90	0.88	-0.19
1996	0.33	-1.79	1.44	0.60	1.00	0.00	1.00	0.00	0.48	-1.20	0.69	-0.60	0.14	-2.90
1997	0.92	-0.14	0.25	-2.34	0.49	-1.26	0.49	-1.26	0.25	-2.34	0.49	-1.26	1.74	0.97
1998	0.25	-2.47	0.61	-0.93	0.46	-1.45	0.34	-1.97	0.25	-2.47	0.81	-0.40	0.61	-0.93
1999	0.73	-0.63	0.10	-3.93	0.19	-3.06	0.33	-2.12	0.43	-1.63	0.43	-1.63	0.43	-1.63
2000	0.62	-1.04	0.40	-1.95	0.50	-1.50	0.25	-2.83	0.50	-1.50	0.50	-1.50	1.17	0.34
2001	2.25	1.88	1.87	1.47	1.56	1.05	1.09	0.21	0.77	-0.63	1.09	0.21	2.25	1.88
2002	0.33	-2.71	0.24	-3.45	0.07	-5.48	0.16	-4.17	0.20	-3.82	0.16	-4.17	0.28	-3.09
2003	0.72	-0.90	0.72	-0.90	1.59	1.26	0.42	-2.34	0.32	-3.04	0.63	-1.26	0.63	-1.26
2004	0.72	-0.99	0.23	-4.18	0.72	-0.99	0.72	-0.99	0.72	-0.99	1.72	1.64	1.11	0.33
2005	2.07	2.49	1.15	0.50	2.25	2.77	1.61	1.64	1.61	1.64	1.15	0.50	2.07	2.49
Total	0.84	-1.42	0.59	-4.30	0.82	-1.66	0.63	-3.82	0.59	-4.30	0.74	-2.50	0.88	-1.06

* Darker shading indicates periods supporting H_1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. $CPR < 1$). Lighter shading indicates periods supporting H_2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. $CPR > 1$).

Table 9: Cross-Product Ratios for Calendar-year Tournaments: All Funds Median Benchmark

| | (3,9) | | (4,8) | | (5,7) | | (6,6) | | (7,5) | | (8,4) | | (9,3) | |
| | | | | | | Assessment Period | | | | | | | | |
Year	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z	CPR	Z
1993	0.15	-2.13	0.31	-1.39	0.61	-0.61	0.31	-1.39	0.15	-2.13	0.15	-2.13	0.06	-2.77
1994	6.25	2.19	1.78	0.75	3.24	1.49	3.24	1.49	3.24	1.49	6.25	2.19	3.24	1.49
1995	6.76	2.57	1.56	0.67	1.00	0.00	1.00	0.00	0.64	-0.67	0.64	-0.67	1.56	0.67
1996	0.35	-1.80	1.26	0.42	0.49	-1.26	0.92	-0.14	0.49	-1.26	0.49	-1.26	0.25	-2.34
1997	0.71	-0.65	0.41	-1.68	0.41	-1.68	0.54	-1.17	0.23	-2.67	0.71	-0.65	2.83	1.93
1998	0.54	-1.23	0.89	-0.25	0.54	-1.23	0.42	-1.71	0.33	-2.19	0.69	-0.74	0.42	-1.71
1999	0.95	-0.12	0.20	-3.26	0.32	-2.39	0.32	-2.39	0.32	-2.39	0.40	-1.95	0.77	-0.58
2000	0.79	-0.54	0.37	-2.23	0.37	-2.23	0.20	-3.45	0.45	-1.81	0.37	-2.23	0.66	-0.96
2001	2.18	1.95	1.86	1.56	1.59	1.17	1.00	0.00	0.86	-0.39	1.17	0.39	1.86	1.56
2002	0.24	-3.77	0.24	-3.77	0.13	-5.05	0.21	-4.10	0.27	-3.43	0.24	-3.77	0.36	-2.74
2003	0.79	-0.72	0.88	-0.40	2.02	2.16	0.64	-1.36	0.58	-1.68	0.79	-0.72	0.79	-0.72
2004	0.57	-1.94	0.23	-4.72	0.57	-1.94	0.62	-1.65	0.62	-1.65	2.17	2.65	1.11	0.36
2005	1.98	2.68	1.27	0.94	2.25	3.17	1.74	2.18	1.98	2.68	1.27	0.94	1.85	2.43
Total	**0.87**	**-1.23**	**0.67**	**-3.68**	**0.86**	**-1.34**	**0.68**	**-3.51**	**0.67**	**-3.62**	**0.84**	**-1.56**	**0.96**	**-0.36**

* Darker shading indicates periods supporting H_1 (at the 5% level), indicating that interim winners (losers) decrease (increase) second period risk (i.e. *CPR* < 1). Lighter shading indicates periods supporting H_2 (at the 5% level), indicating that interim winners (losers) increase (decrease) second period risk (i.e. *CPR* > 1).