

Mutual Fund Tournaments and Structural Changes in an Emerging Fund Market: The Case of Korea^{*}

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Abstract

The objective of this study is to evaluate the mutual fund tournament, i.e., an agency issue between fund managers and investors, in the presence of structural changes in an emerging fund market. This study extends BHS (1996), Busse (2001), and Kempf and Ruenzi (2008b). A switching regression model is employed to investigate the effects of structural changes on the mutual fund tournament. We find that structural changes in the Korean fund market alter the tournament type from a segment to a family tournament. We believe that the family tournament comes from more competition since 2005 within large families. Our evidence of tournaments is robust to return frequency. Our results indicate that regulators and fund families should exercise greater caution than is currently the case to prevent conflicts of interests between fund investors and managers.

Keywords: Segment Tournaments, Family Tournaments, Korean Fund Market, Structural Changes, Conflicts of Interests

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INTRODUCTION

A number of recent studies have focused on agency problems arising between investors and management companies (i.e., such investment advisors as Vanguard Group, Pimco, and Fidelity). In accordance with the rubric established by Jensen and Meckling (1976), investors are considered a principal, and management companies an agency. On behalf of the investors, the management company must do its best to further the interests of the investors. Conflicts of interests between investors and a management company, however, may derive from the compensation for the management company, which is typically determined as a percentage of fund's assets under management (henceforth AUMs). If the performance of a mutual fund is enhanced to a greater degree than expected, more money will pour into the fund than anticipated, and thus, its AUMs will increase. Needless to say, the compensation to the management company will increase with increased AUMs.¹⁾ In the case of worse-than-expected performance, the opposite will be the case. Hence, management companies may attempt to enhance fund performance unduly, in an effort to increase their compensation.

At the level of fund managers belonging to a management company, the mutual fund tournament can also pose an agency problem. In this case, investors are considered a principal, and fund managers an agency. The mutual fund tournament involves the attempts of rational fund managers to maximize their individual expected compensations by increasing unduly the risk of fund portfolios according to the relative mid-year performance of funds. From the perspective of tournaments, Brown, Harlow, and Starks (1996, henceforth BHS) are the first to analyze the risk adjustment behavior of fund managers using monthly returns of U.S. equity mutual funds. They find that, in a fund segment, mid-year losers

1) Chevalier and Ellison (1997) and Sirri and Tufano (1998) report a convex fund flow-performance relation. This implies that high performance induces higher cash inflows than cash outflows that could result from low performance. Hence, management companies might be quite tempted to increase investment risks unduly to achieve better performance and ultimately obtain higher compensation, even if such a strategy might be against the interests of investors. Many studies have investigated agency issues such as portfolio pumping at the end of December or cross-fund subsidization. [See Carhart, Kaniel, Musto, and Reed (2002) and Gasper, Massa, and Matos (2006), respectively.]

tend to increase fund volatility in the second part of an annual assessment to a greater extent than do mid-year winners. BHS (1996) find a mutual fund segment tournament that could be considered at the level of either a management company or fund managers. Koski and Pontiff (1999) and Elton, Gruber, and Blake (2003) support the results of BHS (1996). Busse (2001) re-tests the segment tournament addressed by BHS (1996) using daily returns of U.S. equity mutual funds, and concludes that the results of BHS (1996) are more likely an artifact of inefficient monthly volatility estimates. However, Goriaev, Nijman, and Werker (2005) demonstrate that tests of the tournament hypothesis based on monthly data are more robust in terms of autocorrelation effects than tests based on daily data. The study of BHS (1996) is followed by many other studies.²⁾

Beyond the gravity of segment competition, recently, Kempf and Ruenzi (2008a) have emphasized the importance of fund family in the relationship between fund performance and cash inflows. It is valuable to study fund managers' behavior from a fund family perspective, because the resources of a fund family may be somewhat limited and fund managers' explicit and implicit benefits depend on the relative performance in the family to which they belong. If a fund manager gets relatively higher performance than that of others in the same family, he/she will tend to be more compensated, and also more likely to be promoted. On the other hand, the fund family will market and advertise selected funds that experienced returns that are relatively higher than those of other

2) Qiu (2003) and Bar, Ciccotello, and Ruenzi (2008) take a look at the impact of managerial structures on risk-taking tournaments. Qiu (2003) shows that managers of funds whose performance is closer to that of the top performing fund have greater incentives to increase their portfolios' risk than managers at the top who exhibit a tendency to lock in their positions. Bar, Ciccotello, and Ruenzi (2008) find that teams behave more in line with investors' interests than solo managers along several dimensions. On the other hand, Oliver and Tay (2008) and Kempf, Ruenzi, and Thiele (2009) take into account time variation in market based incentives. Oliver and Tay (2008) provide evidence that poor mid-year performers increase the risk of the portfolio only when economic activity is strong. Kempf, Ruenzi, and Thiele (2009) also examine the influence on managerial risk taking of incentives due to either employment risk or compensation. They show that when employment risk is low, compensation incentives become more relevant and poor mid-year performers increase risk to catch up with the mid-year winners. Huang, Sialm, and Zheng (2009) view the risk-taking behavior of fund managers as an agency problem in mutual fund industry, which has a very important practical implication. They find that funds that increase risk perform worse than funds that keep stable risk levels over time.

funds in the same family. The selected fund's performance might also be improved at the expense of other funds, as is shown by Gasper, Massa, and Matos (2006). The concentrated advertisement and enhanced performance from such fund subsidization will tend to induce higher cash inflows, consequently leading to continued higher compensation. Naturally, then, fund managers within the same family may compete with each other for possibly limited resources. This phenomenon is referred to as a 'family tournament.'

Kempf and Ruenzi (2008b) are the first to attempt to empirically test family tournaments via an extension of BHS (1996) using the monthly returns of U.S. equity mutual funds. Their empirical analysis is predicated on the game-theoretic approach adopted by Taylor (2003), Makarov (2005), and Acker and Duck (2006). Kempf and Ruenzi (2008b) find that U.S. equity mutual fund managers adjust the risk they take depending on their relative position within their fund family, and conclude that the direction of risk adjustment depends on the competitive situation pertaining within that family. They demonstrate that the family tournament is caused by fund managers' investment strategies for salary increases, an advertising purpose of their own funds in their fund family, and a cross-fund subsidization purpose to their own funds. [See Khorana (1996), Jain and Wu (2000), and Gasper, Massa, and Matos (2006), respectively.]

Despite the fairly significant amount of research thus far conducted into this issue, many issues remain unresolved. Considering the effects of return frequency, this study extends BHS (1996), Busse (2001), and Kempf and Ruenzi (2008b) from the viewpoint of both segment and family tournaments in an emerging mutual fund market. Unlike developed fund markets such as the U.S., nobody knows whether fund managers show tournament behavior to enhance their individual benefits in emerging fund markets. Thus, the benefit-oriented behavior of fund managers in an emerging market constitutes an important empirical issue, we believe, as different phenomena might occur as the consequence of different financial ecologies (i.e., investment mind and practice, culture, and regulation structure). In this regard, Korea constitutes an exemplary test bed for the study of both segment and family tournaments, largely because it has experienced, as recently as 2004, marked changes in fund market structure and investors'

propensities.³⁾ Following these changes, the Korean fund market has taken on the characteristics of developed fund markets in terms of investors' mentality, investment methods, and regulation. Hence, beyond previous studies, we are now able to evaluate the effects of structural changes on mutual fund tournaments.

This study makes several important contributions to the existing empirical literature regarding mutual fund tournaments. The most salient of these is that in this study, mutual fund tournaments are evaluated in an emerging market, rather than in the U.S. Also, this study assesses the effects of structural changes in a fund market on segment and/or family tournaments. Furthermore, the robustness of mutual fund tournaments is confirmed in regard to return frequency.

This paper is organized as follows: The following section briefly reviews the Korean fund market. The recent structural changes noted in the Korean mutual fund market provide clues as to the construction of our empirical model, which is a variant of switching regression model. Next section details the data and empirical models employed herein. Then, the empirical results are described. Final section contains our conclusions.

KOREAN FUND MARKET AND ITS STRUCTURAL CHANGES

With the marked changes in government regulations ensuing from the 1997 financial crisis, the Korean mutual fund industry has been re-structured into a sound and credible financial sector, and thus has continued to attract a great deal of money from investors. All of these restructuring efforts built the mutual fund industry into a strong competitor to the banking and insurance industries in the 21st century. Since the year 2000, investors have been aware of the risk and reward structure of equity mutual funds, and have been able to distinguish them from bond funds and bank savings. To attract new investor money, newly established investment management companies have made efforts to aggressively promote

3) Korea is regarded as advanced country by the OECD, IMF, and FTSE, but not by MSCI. If Korean fund market is now developing, tournament behavior is not likely to be observed because of the absence of competitive behavior of fund managers. For the purpose of reviewing various empirical results of Korean capital markets, see Cho (2007, 2009) and Shin (2009).

their funds via public advertising. Owing to the Korean government's efforts to develop the mutual fund industry, the aforementioned aggressive advertisements, and the favorable performance of equity mutual funds at that time, the AUMs of equity mutual funds began to grow. Meanwhile, new regulations on banks' trust accounts kicked a great deal of the money therein out, often to mutual funds.⁴⁾ The changing climate of financial markets allowed commercial banks to conduct fund sales business with their abundant retail networks, thus preventing them from losing their profits. Fund sales businesses conducted by commercial banks accelerated the equity fund growth.

With the changing structure of financial sectors, public investors began to demand fresh investment tools with which to replace regular bank savings. To meet the investors' demands, a few aggressive new investment management companies attempted to promote their equity funds, and strongly advertised dollar cost averaging techniques for equity mutual fund investments.⁵⁾ They succeeded in launching a host of new equity funds that were designed specifically for dollar cost averaging investments. The other investment management companies soon adopted similar behavior in an effort to attract the huge amounts of investment money seeking novel financial instruments. At the end of 2004, consequently, the demand base of equity mutual funds was strong and widespread, and the AUMs of equity mutual funds following the preponderant dollar cost averaging investments began to grow rapidly, which provoked structural changes in the Korean mutual fund market.

The structural changes in the mutual fund market reflect a change in financial mentalities, from risk-free or low-risk investments (bank savings or bond funds) towards more risky investments (equity funds). Fund investors began to be more conscious of risk-return tradeoffs, and to evaluate both the advantages and disadvantages

4) The Financial Supervisory Commission ordered that the trust division should be independent of the main business of commercial banks (i.e., a "fire-wall" between them), and trust accounts should follow the regulations of mutual funds at the same level. This caused commercial banks to gradually abandon their trust account businesses. These regulations essentially followed the model of the U.S. Gramm-Leach-Bliley Act of 1999.

5) According to the U.S. Investment Company Institute, dollar cost averaging investment is the practice of investing a fixed amount of money at regular intervals, regardless of whether the securities markets are declining or rising.

of equity fund investments. That is to say, fund investors familiarized themselves with equity fund investments. We believe that the following three factors drove the structural changes in the Korean mutual fund market: First, there existed an abundance of floating capital, which was generated from Korean economic growth beginning in 1999. The interest rate, however, declined dramatically from the beginning of the 21st century. This floating capital was, therefore, assiduously seeking appropriate investment opportunities, such as equity funds. Investors were attempting to grasp the ramifications of new and risky investments. Second, the above-mentioned regulatory changes in bank trusts kicked a great deal of money out of bank trust accounts into capital markets. Fund markets absorbed a significant proportion of that money through equity funds. Third, the advertisement of dollar cost averaging investments into equity funds was an important factor for investors' understanding of both risk-return trade-offs and equity funds. Such structural changes made strong impacts on both the rapid growth of market size and the quality of fund markets. The rapid growth of market size could be confirmed in table 1.⁶⁾

As shown in table 1, the total AUMs steadily increased, except in 2003. The structural changes in the mutual fund market since 2005, however, significantly altered the investment propensities of fund investors. Investors began to prefer equity funds to bond funds more than they had previously, and began to better understand the risk-and-reward concept inherent to equity fund investments. The third column demonstrates that the AUMs of equity funds increased significantly in 2005, which resulted from the proliferation of dollar cost averaging investments. Although dollar cost averaging investments had not become popular until 2004, the promotions and advertisements associated with these investments helped them become prevalent among individual investors by the end of 2005.⁷⁾ The fourth column corroborates the above reasoning. The

6) We ran the Chow test to confirm the structural changes in an econometric sense. In the case of 3 (5) large families, the F-statistic is 8.31 (8.56) with p-value of 0.00 and degree of freedom of (7,932). Hence the Chow test confirms the structural changes,

7) Prior to 2005 in Korean mutual fund industry, the majority of advertisements were generic, i.e., not specific to the promotion of targeted funds. Since 2004, fund sales companies began to help investors to understand dollar cost averaging investment techniques and promote some targeted fund products by advertising via mass media and signboards.

Table 1. Trend of Korean Mutual Fund Market^a

Year	Total AUMs ^b	AUMs of equity funds	AUMs of dollar cost averaging investments in equity funds	Stock market capitalization	AUMs of sample equity funds	Market return (%)
2001	155,737	6,919	NA	255,850	4,112	28.64
2002	174,874	10,483	NA	258,681	3,641	-14.43
2003	145,037	9,401	NA ^c	355,363	3,934	24.40
2004	186,992	8,580	6,447 ^d	412,588	2,803	8.70
2005	204,346	26,185	14,030	655,075	13,615	43.40
2006	234,610	46,491	28,089	704,588	25,574	3.20
2007	296,460	116,353	58,400	951,900	47,366	31.16

a. Expressed in billions of Korean won at the end of each year

b. AUMs: Assets Under Managements

c. NA: Not available but negligible or none

d. At the end of March 2005

noteworthy increase in stock market capitalization observed in 2005 is also attributable to the stock market investments of equity funds using cash inflows from the prevailing dollar cost averaging investments. Lump-sum investments also increased together with the dollar cost averaging investments. The difference in the AUMs of our sample equity funds between 2004 and 2005 can also be understood via the same rationale.

DATA AND METHODOLOGY

Data

This study analyzes daily, weekly, and monthly returns of growth-oriented equity funds from January 2001 through December 2007, all of which were generously provided by the ZeroIn and FnGuide.⁸⁾ We use monthly fund returns to test tournament behavior. Only when testing the effects of return frequency do we employ daily and weekly fund returns. A growth-oriented equity fund is defined

8) ZeroIn and FnGuide are the largest fund rating company and the largest financial data provider in Korea, respectively. See www.zeroIn.co.kr and www.fnGuide.com for details.

as one that invests more than 60% of its assets in equities. This definition of a growth-oriented equity fund is identical to the Financial Supervisory Commission's definition of an equity fund. During the sample period, there are 570 growth-oriented equity funds, the average total net asset (henceforth TNA) value of which is in excess of 5 billion Korean won. Among them, we omit all classes of multiple-class funds except for the first class of these funds, as well as the funds with abnormal returns when they are redeemed.⁹⁾ The screening process leaves 372 equity funds. Among them, 88 funds with duration of less than one year are deleted. Finally, we have a total of 284 of the funds and all 984 of the fund-years. Our contingency table analysis utilizes all 284 of the funds and all 984 of the fund-years. Our switching regression analysis, however, employs only 271 of the funds and 946 of the fund-years, because a few families with just one fund each are omitted from that sample.¹⁰⁾

Descriptive statistics for our sample equity funds over the seven-year sample period are provided in Table 2. The numbers of funds and families and the average fund size grew rapidly over time. Surprisingly, the average fund size of the largest family in the sample increased from 37 billion Korean won in 2001 to 1,389 billion Korean won in 2007, which is reflective of an incredible expansion of the equity fund market.¹¹⁾ A striking difference is also observed in the average fund sizes of the largest family between 2004 and 2005. The 2005 figure is more than seven times larger than that of 2004. This might be explained by the structural changes occurring in the fund market and the investment propensity of investors, as previously mentioned. By way of contrast with the largest family, the smallest family evidences no significant differences in average fund size over the sample period, as new fund families were entering the market each year, and their funds began as small ones. The

9) The number of funds that evidence abnormal returns during their redemption period is less than 15. Most of the omitted ones are multiple class funds.

10) We followed the procedures of Kempf and Ruenzi (2008b) which used at least 2-fund families. From the perspective of the family tournament, we believe that their method is correct. However, from the perspective of the segment tournament, 1-fund families should also be included in the analysis. To assess the effects of 1-fund families on the results, we conducted the same analysis, but included 1-fund families. The results do not differ profoundly from ours, and are available upon request.

11) The largest (smallest) family is the investment management company with the largest (smallest) AUMs.

Table 2. Descriptive Statistics for Sample Equity Funds

Year	Number of funds	Number of families	Average fund size ^a	Average fund size of the largest family ^a	Average fund size of the smallest family ^a	Median of yearly returns (%)	Median of standard deviations (%)
2001	127	12	32	37	9	35.87	33.27
2002	122	12	30	29	5	-0.16	28.14
2003	122	12	32	29	15	37.25	21.17
2004	125	13	22	98	8	3.12	15.04
2005	131	15	104	689	14	60.84	24.92
2006	177	24	144	566	16	1.68	11.59
2007	188	27	252	1,389	28	39.16	23.77

a. Expressed in billions of Korean won at the end of year

median of yearly fund returns does, however, fluctuate significantly in accordance with the volatile stock market pertaining during the sample period. The median of standard deviations ranges between 11.59% and 33.27%, which is generally smaller than that of the market index returns.¹²⁾

Methodology

This study employs two methodologies that are also used in BHS (1996) and Kempf and Ruenzi (2008b): contingency table analysis and regression models, respectively. Contingency table analysis of BHS (1996) is used to test for the hypothesis that segment tournaments exist and persist over a specific time period in the presence of structural changes in the Korean fund market. Meanwhile, general regression models are not appropriate for the adjustment of structural changes to the tests of mutual fund tournaments. We modify Kempf and Ruenzi's regression into a switching regression, in order to reflect structural changes in the Korean fund market.

To construct the contingency table for the segment tournament test, the interim or mid-year return (henceforth RTN) is computed from the beginning of January to the end of month M for a given

12) Each fund's standard deviation is calculated from 12 monthly returns and annualized. Yearly standard deviation of market index returns was generally 30~40% at that time.

year. Using the RTN at month M , the mid-year winners and losers are determined. Based on the interim month M , a fund's risk adjustment ratio (henceforth RAR) is calculated by dividing the standard deviation of the second part by that of the first part, as is in BHS (1996). The first part of a year covers the period from January through month M , and the second part is the remaining period of the year. Winner (loser) is a fund whose RTN is above (below) the median value of RTN. In the same way, high (low) RAR fund is a fund whose RAR is above (below) the median value of RAR. If losers increase their fund risks, their RARs will be greater than those of the interim winners.

Finally, a (RTN, RAR) pair is created for a fund within a year. The test procedure involves, first, the formation of a 2×2 contingency table in which each pair is located into one of four cells: (low RTN, low RAR), (low RTN, high RAR), (high RTN, low RAR), (high RTN, high RAR). According to BHS (1996), if there is no segment tournament, the percentage of the sample population that falls into each of these four cells is equal, as the two classifications (i.e., RTN and RAR) are independent. That is, the same number of observations should be allocated to each cell in the absence of segment tournament (null hypothesis). Contingency table analysis is, therefore, capable of testing the segment tournament, when there is a fund manager's risk adjustment based on the first part's performance in a specific investment segment. As mentioned previously, we use only one segment (growth-oriented equity funds) because the classification of equity funds in Korea is somewhat unclear.

Beyond the contingency table analysis of BHS (1996), we use the following regression model to detect both segment and family tournaments, which Kempf and Ruenzi (2008b) employ:

$$\Delta\sigma_{it} = \alpha + \beta_L^f DL_{it} R_{it}^f + \beta_S^f DS_{it} R_{it}^f + \beta_L^s DL_{it} R_{it}^s + \beta_S^s DS_{it} R_{it}^s + \gamma_1 \Delta\sigma_t^m + \gamma_2 \sigma_{it}^{(1)} + \varepsilon_{it}, \quad (1)$$

where $\Delta\sigma_{it} = \sigma_{it}^{(2)} - \sigma_{it}^{(1)}$: the change in standard deviations of i^{th} fund returns from the first to the second part of year t ,

R_{it}^f : family rank (between 0 and 1) of fund i in year t ,

R_{it}^s : segment rank (between 0 and 1) of fund i in year t ,

DL_{it} (DS_{it}) = $\begin{cases} 1, & \text{if fund } i \text{ belongs to a large (small) family in year } t \\ 0, & \text{otherwise,} \end{cases}$

$\Delta\sigma_t^m = \Delta\sigma_t^{m(2)} - \Delta\sigma_t^{m(1)}$: the difference of median annualized

standard deviation between the second and first parts of year t ,

$\sigma_{it}^{(1)}$: annualized standard deviation of i^{th} fund returns in the first part of year t .¹³⁾

Segment and family ranks are determined as in Kempf and Ruenzi (2008b). The segment rank of the i^{th} fund at the end of the first part of year t (i.e., R_{it}^s) is determined by its total return relative to the total returns of the competing funds within the same segment. Segment ranks are distributed evenly between 0 and 1, and a higher R_{it}^s indicates a better performance within a segment. As a next step to assign the family rank of a fund, all equity funds within a fund family are ranked on the basis of their segment ranks in a descending order, regardless of segment type. According to the ordering of the segment ranks, the family rank, R_{it}^f , is re-assigned to each fund between 0 and 1. Like R_{it}^s , a higher R_{it}^f denotes a better performance within a family. By construction, the ordinal ranks within segment and family should be identical. The only difference between segment rank and family rank can derive from the cardinal rankings, as family ranks are assigned on the basis of segment ranks.¹⁴⁾ This study utilizes just one segment of growth-oriented equity funds.

β_L^f and β_S^f represent the effects of family tournaments of large and small families, respectively. The definitions of large and small families will be provided later. If mutual fund tournament behavior exists in the absence of strategic behavior, mid-year losers increase risk more than do mid-year winners in their segment. Such behavior causes the coefficients of β_L^f and β_S^f to be negative. On the other

13) The first control variable, $\Delta\sigma_t^m$, measures the effect of overall investment risk change in the equity fund market from the first part to the second part of year t . Our notation differs slightly from that used by Kempf and Ruenzi (2008b) because we think they misused subscript i in Equation (1) on page 1021. The second control variable, $\sigma_{it}^{(1)}$, controls for the mean reversion effect of each fund's investment risk.

14) For example, consider a hypothetical family with only three funds, $i = 1, 2, 3$. They have segment ranks of $R_{1t}^s = 0.9$, $R_{2t}^s = 0.4$, and $R_{3t}^s = 0.1$, respectively. Their family ranks are determined based on their segment ranks as follows: $R_{1t}^f = 1.0$, $R_{2t}^f = 0.5$, and $R_{3t}^f = 0.0$. Hence, segment and family ranks have the same ordinal ranks, but different cardinal ranks. As noted in footnote 15 of Kempf and Ruenzi (2008b), their robustness tests show that the number of segments does not affect the results. Furthermore, our study has a lower correlation coefficient (0.60) between these two variables than is reported (0.78) by Kempf and Ruenzi (2008b).

hand, the strategic behavior of fund managers tells a different story with regard to the direction of coefficients. As winners expect losers to buy more risky assets in efforts to catch up, the winners will tend to buy riskier assets. This is a strategic behavior. When the number of funds in a family is small, strategic interactions become increasingly important. In the case of the strategic behavior of fund managers in small families, winners increase risk more than mid-year losers, and thus β_S^f should be positive. Non-strategic behavior could be observed in a large family with relatively abundant funds. In this case, strategic interactions become less important. A negative coefficient is consistent with this non-strategic behavior.

In the manner described above, β_L^s and β_S^s represent the effects of the segment tournaments of large and small families, respectively. Regardless of whether they belong to large or small families, the nonstrategic behavior of fund managers is expected in the segment tournament, and hence the coefficients of β_L^s and β_S^s should be negative. We expect that the coefficient will either be greater (in the case of strategic behavior) than zero or smaller (in the case of nonstrategic behavior) than zero rather than just different from zero. Hence, we use one-sided t-tests to determine the statistical significance of the coefficients.

While the regression model shown above is capable of capturing the family and/or segment tournaments simultaneously by controlling for each other, the effects of structural changes cannot be detected in this model. To incorporate the effects of structural changes in the Korean fund market, we employ the following switching regression model based on equation (1):

$$\begin{aligned} \Delta\sigma_{it} = & a + (\beta_L^f D1_{it} + \beta_L^f D2_{it}) DL_{it} R_{it}^f + (\beta_S^f D1_{it} + \beta_S^f D2_{it}) DS_{it} R_{it}^f \\ & + (\beta_L^s D1_{it} + \beta_L^s D2_{it}) D_{it} R_{it}^s + (\beta_S^s D1_{it} + \beta_S^s D2_{it}) D_{it} R_{it}^s \quad (2) \\ & + \gamma_1 \Delta\sigma_t^m + \gamma_2 \sigma_{it}^{(1)} + \varepsilon_{it}, \end{aligned}$$

where $D1_{it} = \begin{cases} 1, & \text{if year } t \text{ belongs to } \{2001, 2002, 2003, \text{ or } 2004\}, \\ 0, & \text{otherwise} \end{cases}$,
 $D2_{it} = \begin{cases} 1, & \text{if year } t \text{ belongs to } \{2005, 2006, \text{ or } 2007\}. \\ 0, & \text{otherwise} \end{cases}$.

The other notations are the same as in equation (1). The numbers of 1 and 2 in the superscripts of β coefficients represent the former and latter periods, respectively. The switching regression model (2)

can capture the family and/or segment tournaments depending on the time period. If the effects are time-dependent, we assert that the structural changes in the Korean fund market have an effect on mutual fund tournaments. The statistically significant negative β coefficients imply family and/or segment tournaments in the absence of strategic behavior.

EMPIRICAL EVIDENCE

Analysis of Contingency Table

Without considering family tournament, the segment tournament is tested via a contingency table approach here. Panel A of table 3 shows the test results of the mutual fund segment tournament for various pairs of assessment period. Each pair is represented as (M, 12-M), where M indicates the month of the interim assessment and 12-M is the remainder of the year. As is the case in the U.S., segment tournaments are detected in all assessment period pairs. The frequencies of (Low RTN, High RAR) cells are even slightly higher than those computed by BHS (1996) in the U.S., and the χ^2 test statistics are all statistically significant at the 1% level. Despite the preponderance of evidence, our results do not reconcile the structural changes in the Korean fund market.

In an effort to examine the effect of structural changes, this study tests segment tournament only for the assessment period pair of (7,5) each year from 2001 through 2007. Panel B provides the yearly results. Surprisingly, segment tournaments are not observed since 2005, when the structural changes of the fund market became substantial. Prior to 2005, with the exception of 2003, segment tournaments are strikingly apparent.¹⁵⁾ The unreported results for

15) The result for the year 2003 could be due to the economic disorder in Korean credit card companies. At that time, many credit card companies faced possible bankruptcies because their overdue rate hit the historical record high. As a consequence, they were short of working capital, which drove them to financial distress. The crisis spread over all economies including financial sector. Despite good market performance of the year 2003 (24.40 percent as in table 1), fund managers might be afraid of losing their jobs in case of intolerably low performance from tournaments. Even in the presence of good market performance, Kempf, Ruenzi, Thiele(2009)'s employment risk could be applied to this situation, we guess.

Table 3. Evidence of Mutual Fund Tournaments

Interim return (i.e., RTN) is computed from the beginning of January to the end of month M for a particular year. By RTN at month M, mid-year winners and losers are determined. Based on the interim month M, a fund's risk adjustment ratio (i.e., RAR) is calculated by dividing the second part's standard deviation by that of the first part as in BHS (1996). A (RTN, RAR) pair is created for a fund within a year. The test procedure is, first, to form a 2×2 contingency table in which each pair is located into one of four cells: (low RTN, low RAR), (low RTN, high RAR), (high RTN, low RAR), (high RTN, high RAR). Finally, the null hypothesis (i.e., no mutual fund tournament) that two classifications (i.e., RTN and RAR) are independent is tested by χ^2 -statistics.

Pair of assessment period	The number of observations	Low RTN (Losers)		High RTN (Winners)		χ^2 (p-value)
		Low RAR	High RAR	Low RAR	High RAR	
Panel A: Evidence for the entire period from 2001 through 2007						
(4,8) ^a	984	22.46	27.54	27.44	22.56	9.76 (0.002)
(5,7)	984	21.34	28.66	28.76	21.24	21.66 (0.000)
(6,6)	984	22.15	27.95	27.85	22.05	13.21 (0.000)
(7,5)	984	21.65	28.25	28.35	21.75	17.17 (0.000)
(8,4)	984	22.46	27.44	27.74	22.36	10.57 (0.001)
Panel B: Evidence of each year for the assessment period pair of (7,5)						
2001	125	14.40	35.20	35.20	15.20	20.82 (0.000)
2002	122	14.75	35.25	35.25	14.75	20.49 (0.000)
2003	122	27.05	22.95	22.95	27.05	0.82 (0.365)
2004	123	11.38	38.21	38.21	12.20	34.36 (0.000)
2005	129	24.81	24.81	25.58	24.81	0.01 (0.930)
2006	175	26.86	23.43	23.43	26.29	0.69 (0.406)
2007	188	27.13	22.87	22.87	27.13	1.36 (0.243)

a. (the number of the first part of year, the number of the second part of year)

the other assessment period pairs do not differ significantly from those of the pair (7,5). Thus, the evidence of table 3 concludes that segment tournaments are detected prior to 2005 in the sense of BHS (1996), but not thereafter.

To re-confirm the evidence above, segment tournaments are tested during both the former (2001-2004) and the latter (2005-2007) periods. The break-even time point is 2005. This is the year during which we presume the structural changes occurred. Panel A of table 4 shows the results for the former period, which also constitute

Table 4. Evidence of Mutual Fund Tournaments based on Structural Changes

Interim return (i.e., RTN) is computed from the beginning of January to the end of month M for a particular year. By RTN at month M, mid-year winners and losers are determined. Based on the interim month M, a fund's risk adjustment ratio (i.e., RAR) is calculated by dividing the second part's standard deviation by that of the first part as in BHS (1996). A (RTN, RAR) pair is created for a fund within a year. The test procedure is, first, to form a 2×2 contingency table in which each pair is located into one of four cells: (low RTN, low RAR), (low RTN, high RAR), (high RTN, low RAR), (high RTN, high RAR). Finally, the null hypothesis (i.e., no mutual fund tournament) that two classifications (i.e., RTN and RAR) are independent is tested by χ^2 -statistics.

Pair of assessment period	The number of observations	Low RTN (Losers)		High RTN (Winners)		χ^2 (p-value)
		Low RAR	High RAR	Low RAR	High RAR	
Panel A: Evidence for the former period (2001-2004)						
(4,8) ^a	492	18.09	31.91	31.91	18.09	37.59 (0.000)
(5,7)	492	16.46	33.54	33.54	16.46	57.37 (0.000)
(6,6)	492	19.92	30.08	30.08	19.92	20.33 (0.000)
(7,5)	492	16.87	32.93	32.93	17.28	49.47 (0.000)
(8,4)	492	17.28	32.72	32.93	17.07	48.20 (0.000)
Panel B: Evidence for the latter period (2005-2007)						
(4,8)	492	26.83	23.17	22.97	27.03	2.94 (0.087)
(5,7)	492	26.22	23.78	23.98	26.02	0.98 (0.321)
(6,6)	492	24.39	25.81	25.61	24.19	0.40 (0.528)
(7,5)	492	26.42	23.58	23.78	26.22	1.37 (0.241)
(8,4)	492	27.64	22.15	22.56	27.64	(0.019)

a. (the number of the first part of year, the number of the second part of year)

striking evidence of segment tournament for every assessment period pair as compared to the entire period shown in Panel A of table 3. The frequencies of (Low RTN, High RAR) cells are significantly increased, and the p-values of χ^2 statistics are less than 0.1%; thus, this finding could be considered strong evidence for the segment tournament. On the other hand, the results of Panel B for the latter period differ completely from those of Panel A. This provides no statistically significant evidence of segment tournament. It can be readily understood that the evidence of segment tournament shown in Panel A of table 3 is attributable to the strong effect from

the former period. According to the evidence shown in table 4, we can confirm that the structural changes must have an effect on the segment tournament. As a consequence, in the latter period, we find no segment tournament. This leaves open the possibility of a tournament type change. We surmise that both the strong demand base of equity funds and the new investment propensity of investors have altered the type of mutual fund tournament from a segment to a family tournament.

Regression Analysis

The above analysis shows the existence of mutual fund segment tournaments in Korea; however, since 2005, the type of tournament has changed. In this section, we are going to study this phenomenon in more details. To test both segment and family tournaments, this study estimates the regression model of Kempf and Ruenzi (2008b) as expressed in equation (1). Unfortunately, as a multiple regression model is incapable of capturing the effects of structural changes, this study also employs the switching regression model shown in equation (2).

Before estimating models (1) and (2), large and small families must be defined. Kempf and Ruenzi (2008b) use the number of funds as a cutoff point (i.e., 26) for the inclusion of a family in the large family group. Differing slightly from their methods, we elect to use the number of fund-year observations, because the number of funds may not be reflective of the size of families in Korea.¹⁶⁾ Table 5 shows the number of funds and fund-year observations in descending order. The rapidly decreasing numbers show that the majority of families are relatively small in size. In this study, the big 3s (or big 5s) are classified as the large ones, and the others are considered the

16) In the Korean fund industry, it is very easy to establish a fund. A fund can be made at negligible cost within 2 days-- in the U.S., by way of contrast, setting up a fund normally takes 90 days and an average cost of \$100,000. Most Korean investment management companies set up unnecessarily many funds which have very small TNAs. Generally, the life duration of a small-sized fund is relatively short. Hence the number of fund-years may be a better criterion than the number of funds for determining large or small investment management companies. As can be seen from table 5, however, using the number of funds does not change the category of 3 large families, which implies that the empirical results are the same as in table 6. We also obtain the very similar results when we adopt the category of 5 large families based on the number of funds. These findings are available upon request.

Table 5. The Numbers of Funds and Fund-Year Observations for Each Fund Family

Rank	The number of fund-years (observations)	The number of funds	Rank	The number of fund-years (observations)	The number of funds
1	286	47	17	9	5
2	155	42	18	9	4
3	134	31	19	8	4
4	58	20	20	7	3
5	49	11	21	5	3
6	33	12	22	5	3
7	23	11	23	5	3
8	23	5	24	5	3
9	22	7	25	4	2
10	16	6	26	4	2
11	15	5	27	2	2
12	14	5	28	2	2
13	13	8	29	2	2
14	12	7	30	2	2
15	10	6	31	2	2
16	10	4	32	2	2

small ones. With regard to the partition of a year, this study follows the protocol of BHS (1996) and Kempf and Ruenzi (2008b), in that the first seven months of the year are considered the first part of the year, and the remaining five months comprise the second part. That is, the assessment period pair selected is (7,5). As mentioned in footnote 20 of Kempf and Ruenzi (2008b), the empirical results would not be affected by the selection of (6,6).

Panel A of table 6 shows the regression results of equation (1). When we classify the big 3 companies as large families, only the coefficients of segment ranks are statistically significantly negative for both large and small families. These results are consistent with a mutual fund segment tournament condition over the entire period as is shown in Panel A of table 3. Unfortunately, the coefficients of family ranks are statistically significantly positive for large families at the 10% level, which is a questionable finding. A possible explanation will be provided later, in the case of structural changes. We believe that family tournament was not detected because the regression equation (1) does not reflect structural changes occurring since 2005. Even when we classify the 5 largest companies as

Table 6. Regression Analysis of Mutual Fund Tournaments

The dependent variable of $\Delta\sigma_{it}$ is the change in standard deviations of t^{th} fund returns from the first to the second part of year t . R_{it}^f is family rank (between 0 and 1) of fund i in year t , and R_{it}^s , segment rank (between 0 and 1) of fund i in year t . DL_{it} (DS_{it}) is a dummy variable for large (small) families in year t , and $D1_{it}$ ($D2_{it}$) is a dummy variable for the former (latter) period in year t . $\Delta\sigma_{it}^m$ is the difference of median standard deviations between the second and first parts of year t , and $\sigma_{it}^{(1)}$ is the annualized standard deviation of t^{th} fund returns in the first part of year t .

Panel A: Regression in the absence of structural changes

$$\Delta\sigma_{it} = \alpha + \beta_L^f DL_{it} R_{it}^f + \beta_S^f DS_{it} R_{it}^f + \beta_L^s DL_{it} R_{it}^s + \beta_S^s DS_{it} R_{it}^s + \gamma_1 \Delta\sigma_{it}^m + \gamma_2 \sigma_{it}^{(1)} + \varepsilon_{it}$$

		Big 3 as large families		Big 5 as large families	
β_L^f	Family rank in large families	.0108	(1.45) ^a	.0123	(1.87) ^{**}
β_S^f	Family rank in small families	.0003	(.04)	-.0019	(-.29)
β_L^s	Segment rank in large families	-.0200	(-2.49) ^{***}	-.0200	(-2.89) ^{***}
β_S^s	Segment rank in small families	-.0190	(-2.78) ^{***}	-.0260	(-3.24) ^{***}
γ_1	Change in segment volatility	1.0302	(36.00) ^{***}	1.0317	(36.47) ^{***}
γ_2	Fund's risk in the first part of year	-.1967	(-7.74) ^{***}	-.1995	(-7.92) ^{***}
Adjusted R^2		65.34%		65.78%	
The number of observations (large, small) ^b		946 (575, 371)		946 (682, 264)	

large families, very similar results are observed. As in Kempf and Ruenzi (2008b), the γ_1 and γ_2 coefficients of the control variables possess the expected signs. The statistically significant positive coefficient of γ_1 implies that the risk change of an individual fund is related positively to the risk change of overall funds in the segment. Additionally, the mean reversion in the standard deviation is represented by the statistically significant negative coefficient of γ_2 .

The above regression results do not accurately capture the mutual fund tournaments because the model does not consider structural changes in the fund market occurring since 2005. To account for the effect of structural changes, the switching regression model in equation (2) is estimated. The estimation results are shown in Panel B of table 6. In the former period of 2001-2004, only the coefficients of segment ranks in both large and small families are statistically significantly negative. No family tournament whatsoever is found in the former period. Unlike Kempf and Ruenzi (2008b), the results are

Table 6. (Continued)

Panel B: Switching regression conditioned on structural changes

$$\Delta\sigma_{it} = \alpha + (\beta_L^{f1} D1_{it} + \beta_L^{f2} D2_{it}) DL_{it} R_{it}^f + (\beta_S^{f1} D1_{it} + \beta_S^{f2} D2_{it}) DS_{it} R_{it}^f + (\beta_L^{s1} D1_{it} + \beta_L^{s2} D2_{it}) DL_{it} R_{it}^s + (\beta_S^{s1} D1_{it} + \beta_S^{s2} D2_{-it}) DS_{it} R_{it}^s + \gamma_1 \Delta\sigma_t^m + \gamma_2 \sigma_{it}^{(1)} + \varepsilon_{it}$$

		Big 3 as large families		Big 5 as large families	
β_L^{f1}	Family rank in large families in 2001-2004	.0379	(4.20)***	.0364	(4.53)***
β_S^{f1}	Family rank in small families in 2001-2004	.0089	(.99)	.0032	(.31)
β_L^{s1}	Segment rank in large families in 2001-2004	-.0397	(-4.17)***	-.0388	(-4.62)***
β_S^{s1}	Segment rank in small families in 2001-2004	-.0220	(-2.18)**	-.0179	(-1.42)*
β_L^{f2}	Family rank in large families in 2005-2007	-.0387	(-3.15)***	-.0299	(-2.83)***
β_S^{f2}	Family rank in small families in 2005-2007	-.0058	(-.74)	-.0049	(-.59)
β_L^{s2}	Segment rank in large families in 2005-2007	.0219	(1.66)**	.0172	(1.60)*
β_S^{s2}	Segment rank in small families in 2005-2007	-.0145	(-1.70)**	-.0278	(-2.84)***
γ_1	Change in segment volatility	1.0369	(36.26)***	1.0392	(36.80)***
γ_2	Fund's risk in the first part of year	-.2113	(-7.96)***	-.2164	(-8.22)***
Adjusted R ²		66.33%		66.70%	
The number of observations (large, small) for 2001-2004		946 (353, 121)		946 (391, 83)	
The number of observations (large, small) for 2005-2007		222, 250		291, 181	

a. *, **, ***: statistically significant at 10%, 5%, and 1%, respectively
 b. (large, small): (the number of large families' observations, the number of small families' observations)

consistent only with the segment tournament. One thing that should be noted is that the coefficients of family ranks in large families are positive and statistically significant. This finding can be interpreted as follows: Even the (relatively) large families were small prior to 2005, whereas the large families are actually sufficiently large to

observe the nonstrategic behavior of fund managers thereafter. As a consequence, the strategic behavior of mutual fund tournaments might be observed even in large families prior to 2005.

Interestingly, the results in the latter period of 2005-2007 differ completely from those of the former period. Whereas the coefficients of family ranks are all negative, only the coefficient for large families is statistically significant, and not in that for small families. That is to say, the family tournament is evident only in large families. This is consistent with non-strategic behavior in large families as predicted by Kempf and Ruenzi (2008b). Small families, however, evidence no statistically significant positive coefficient, which is inconsistent with our understanding of strategic behavior in small families.¹⁷⁾

As anticipated, the coefficient of segment rank in large families is not negative, such that large families no longer evidence segment tournament. Meanwhile the coefficient of segment rank in small families is both negative and statistically significant, thereby implying segment tournament in the latter period. This could be explained by the small number of funds in small families and the new entry of management companies into the fund industry over the sample period. With the exception of three to five families, no clear leaders in the Korean fund market can be identified. While the large families possess a large market share of equity funds and can obtain highly stable compensation with relative economies of scale, the majority of small and new families do not enjoy such benefits. To overcome their difficulties, the majority of small families are constantly attempting to achieve relatively high performance in the equity fund market. The diversity of fund investment objectives is not a matter of great consequence for them; rather, performance is their principal concern. As a consequence, the number of their equity funds is small, and they do their best to achieve good performance. Such competitive environments force small families to devote themselves to segment tournament, even in the latter period.

17) Actually before 2005, we think that Korean fund market had not been recognized by investors. At that time, even large family was showing strategic behavior of fund managers within its own family because fund managers knew each other's behavior within their own family. As a consequence, only segment tournament could be observed. Structural changes fueled the growth of fund markets, hence even in large families, fund managers did not know each other's investment behavior in their own family. It might cause the family tournament behavior of fund managers.

When classifying the big 5 companies as large families, we obtain very similar results. Additionally, the figures and significance of the γ_1 and γ_2 coefficients are almost identical to those shown in Panel A.^{18),19)}

In sum, segment tournaments in both large and small families are apparent in the former period of 2001-2004. In the latter period of 2005-2007, however, owing to structural changes in the Korean fund market, we observe family tournament only in large families. This finding is consistent with the non-strategic behavior in large families, predicted by Kempf and Ruenzi (2008b). No strategic fund manager behavior is detected in small families. Rather, fund managers in small families continue to pursue segment tournament in the latter period.

Robustness Test: The Effect of Return Frequency

The existence of both segment and family tournaments was statistically evaluated in the presence of structural changes using a switching regression. However, if our findings are sensitive to return frequency, these might simply represent a statistical artifact. In order to confirm the robustness of our findings, we test mutual fund tournaments from the perspective of return frequency.²⁰⁾

18) We re-estimate equations (1) and (2) without dividing large and small families. In equation (1), only the coefficient of segment rank is negative and statistically significant. The estimation of equation (2) shows that the coefficient of family rank (segment rank) is statistically significantly positive (negative) at the 1% level in the former period of 2001-2004, but in the latter period of 2005-2007, the coefficient of family rank is statistically significantly negative at the 5% level.

19) In the above regressions, the explanatory power of changes in segment volatility is very big. If we omit the variable, adjusted R^2 decreases dramatically, but the same estimation results hold.

20) As additional tests, we assessed the effects of start-up funds and survivorship bias. While the tournament behavior evidenced in Panel B of table 6 is unaffected by the exclusion of start-up funds from the analysis, the sample of only start-up funds shows little evidence of tournaments. This might be due to the fact that a lot of fund advertisements and promotion poured huge amount of cash into start-up mutual funds. Fund investors misunderstood that the old funds were inferior to the start-up funds which were designed for dollar cost averaging investments. In this context, the fund managers of start-up funds may have little reason to compete severely with one another at that time. On the other hand, we know from Panel B of table 6 that tournament behavior is not affected by survivorship bias, as all the funds are included in the analysis. To further investigate the survivorship effect, we ran the regression using non-surviving funds only. The results are quite similar to those of the overall sample. Hence, it can be concluded that there

Busse (2001) finds that the segment tournament described by BHS (1996) is more likely an artifact of inefficient monthly volatility estimates. He concludes that it remains unclear as to when managers would take steps to strategically alter portfolio risk, and that future research is required to devise a methodology to effectively uncover a potentially more complex behavior pattern. His sample period of 1985-1995, however, is not the same as that (1980-1991) used by BHS (1996). Additionally, his analysis does not take into account the family tournament. Until now, there has not been sufficient evidence to draw any clear conclusions with regard to the effect of return frequency on mutual fund tournaments. This study attempts to address this issue in order to corroborate the robustness of our findings, even with daily and weekly returns during the same sample period.

We estimate the switching regression equation (2) using daily and weekly returns. All the standard deviations are calculated using the daily and weekly returns, and then annualized for use as dependent and independent variables. Family and segment ranks, however, remain identical to those used in the previous case. Table 7 shows reasonable estimates of coefficients that differ only minimally from those of Panel B in table 6. In the former period of 2001-2004, daily and weekly returns evidence a statistically significant negative β_L^{s1} coefficient, thus implying segment tournament conditions in large families. The coefficient of β_S^{s1} is negative but statistically insignificant. The coefficients of family ranks in large families, β_L^f , are also positive and statistically significant, which implies strategic behavior of the family tournament.

In the latter period of 2005-2007, the coefficients of family rank in large families, β_L^{f2} , are also both negative and statistically significant. It reveals the existence of the non-strategic family

is no survivorship bias whatsoever in mutual fund tournaments. Additionally we conducted another robustness test, the results of which are not reported in this paper. A salient difference between the Korean (or Japanese) fund industry and that of the U.S. is that privately-placed funds are subject to government regulation systems, such as publicly-offered mutual funds. In general, privately-placed funds are managed by mandated investment strategies. They need not compete with other funds for higher cash inflows or compensation. Owing to such non-tournament environments, privately-placed equity funds should not evidence any tournament behavior. As anticipated, the robustness tests using privately-placed equity funds reveal no tournament behavior. Thus, we confirm that our findings regarding segment and family tournaments are not simply a statistical artifact.

Table 7. The Effect of Return Frequency on Mutual Fund Tournaments

All the standard deviations are annualized by multiplying the square root of the number of days or weeks in a year. The dependent variable of $\Delta\sigma_{it}$ is the change in standard deviations of i^{th} fund returns from the first to the second part of year t . R_{it}^f is family rank (between 0 and 1) of fund i in year t , and R_{it}^s , segment rank (between 0 and 1) of fund i in year t . DL_{it} (DS_{it}) is a dummy variable for large (small) families in year t , and $D1_{it}$ ($D2_{it}$) is a dummy variable for the former (latter) period in year t . $\Delta\sigma_t^m$ is the difference of median standard deviations between the second and first parts of year t , and $\sigma_{it}^{(1)}$ is the annualized standard deviation of i^{th} fund returns in the first part of year t .

$$\Delta\sigma_{it} = a + (\beta_L^{f1} D1_{it} + \beta_L^{f2} D2_{it}) DL_{it} R_{it}^f + (\beta_S^{f1} D1_{-it} + \beta_S^{f2} D2_{it}) DS_{it} R_{it}^f + (\beta_L^{s1} D1_{it} + \beta_L^{s2} D2_{it}) DL_{it} R_{it}^s + (\beta_S^{s1} D1_{it} + \beta_S^{s2} D2_{it}) DS_{it} R_{it}^s + \gamma_1 \Delta\sigma_t^m + \gamma_2 \sigma_{it}^{(1)} + \varepsilon_{it}$$

		Daily returns		Weekly returns	
β_L^{f1}	Family rank in large families in 2001-2004	.0150	(3.35)*** ^a	.0260	(4.76)***
β_S^{f1}	Family rank in small families in 2001-2004	-.0010	(-.24)	-.0066	(-1.27)
β_L^{s1}	Segment rank in large families in 2001-2004	-.0194	(-4.15)***	-.0312	(-5.45)***
β_S^{s1}	Segment rank in small families in 2001-2004	-.0019	(-.37)	-.0023	(-.39)
β_L^{f2}	Family rank in large families in 2005-2007	-.0180	(-2.95)***	-.0216	(-2.94)***
β_S^{f2}	Family rank in small families in 2005-2007	.0068	(1.76)**	.0033	(.74)
β_L^{s2}	Segment rank in large families in 2005-2007	.0217	(3.31)***	.0178	(2.20)**
β_S^{s2}	Segment rank in small families in 2005-2007	-.0078	(-1.81)**	-.0046	(-.96)
γ_1	Change in segment volatility	.9414	(110.99)***	.9343	(87.63)***
γ_2	Fund's risk in the first part of year	-.0392	(-2.11)**	-.0531	(-3.04)***
Adjusted R^2		94.75%		89.81%	
The number of observations (large, small) ^b for 2001-2004 (large, small) for 2005-2007		946 (353, 121) (222, 250)			

a. *, **, ***: statistically significant at 10%, 5%, and 1%, respectively

b. (large, small): (the number of large families' observations, the number of small families' observations)

tournament behavior in the latter period, as well. When we use daily and weekly returns, unfortunately, the coefficients of family rank in small families are not consistent with those in the case of monthly returns. On the other hand, the coefficients of segment rank in small families, β_s^{s2} , are negative. Statistical significance is observed in the case of daily returns, but not in the case of weekly returns. The overall results confirm the existence of the segment tournament, which is the same as in the case of monthly returns. The daily and weekly returns confirm that the structural changes alter the type of tournament from a segment to a family tournament, even though some of the coefficients have different signs or statistical significance. The γ_1 and γ_2 coefficients have the same sign and statistical significance.

By way of contrast with Busse (2001), who report completely different evidence with the daily returns as compared to those with the monthly returns reported by BHS (1996), in this study, daily and weekly returns evidence no substantially different results from those using monthly returns.²¹⁾ Hence, we conclude that mutual fund tournaments in the presence of structural changes are robust to the return frequency.

CONCLUSIONS

In this study, we assess mutual fund tournaments in the presence of structural changes in an emerging fund market. This study also extends BHS (1996), Busse (2001), and Kempf and Ruenzi (2008b). Previous studies have left a variety of issues to be tested. To address some of the relevant questions, we follow the test methodologies of BHS (1996) and Kempf and Ruenzi (2008b), and employ a novel switching regression model to incorporate the effects of structural changes into tournament tests. Our findings can be summarized as follows: First, when we ignore structural changes, segment

21) To the question of the robust empirical results to return frequency, the following efficiency measure suggested by Busse (2001) might provide an answer: $\text{Efficiency} = \text{var}(S_{m2}/S_{m1})/\text{var}(S_{a2}/S_{a1})$. Its high value reflects inefficiency. When the assessment period pair of (6,6) is selected, its value of this study is 1.39, while it is 47.2 in Busse (2001). We understand that our robust results to the return frequency are consistent with the high efficiency evidenced by the above measure. The referee's comments on this issue are highly appreciated.

tournament is detected in the context of both BHS (1996) and Kempf and Ruenzi (2008b). Second, the structural changes in the Korean fund market are observed from temporal analyses of the contingency table, and such changes affect the type of mutual fund tournament. The structural changes alter the tournament type from a segment to a family tournament. Third, in contrast to Busse (2001), return frequency has minimal effect on mutual fund tournaments.

Most studies regarding mutual fund tournaments have focused on the U.S. market, and have analyzed why fund tournaments occur in many ways. This study is the first, to the best of our knowledge, to evaluate mutual fund tournaments in the presence of structural changes in an emerging market. We find that mutual fund tournaments are not unique to the highly-developed U.S. fund markets. Our results imply that there also exists an agency problem between fund investors and managers, even in emerging markets. The results of this study reveal important economic implications for emerging fund markets. As suggested in previous studies, tournament behavior is not good for the interests of both fund investors and families, as it prevents fund managers from forming optimal portfolios and also requires high rebalancing costs.

James and Isaac (2000) also contend that tournament behavior may even impair rational price formation in asset markets. In emerging fund markets as well as developed fund markets, all market participants and regulators should recognize the hazardous effects of mutual fund tournaments. As suggested by Bar, Ciccotello, and Ruenzi (2008), team management may be a possible measure to prevent mutual fund tournaments, and can also reduce operational risks. However, small families may not adopt team management systems due to limited numbers of fund managers. More caution and considerations should be exercised by regulators and fund families to prevent conflicts of interests between fund investors and managers.

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