FUNDS TOURNAMENT AND EQUITY PORTFOLIO MANAGERS RISK-TAKING

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Abstract

This paper investigates the impact of prior performance of mutual funds on the risk-taking behavior of funds' managers. On a large database of French equity mutual funds running from 1993 to 2004 we show that portfolios' managers compete in an important tournament that characterizes the French and European industry. The extent of this risk-adjustment behavior clearly depends on the size of the peer group. In the French and European environments a particular peer group is considered: the funds' family or management company because it usually belongs to the bank sector. Funds likely to end up as "losers" in their management company increase risk more than midyear "winners" that performed well in order to achieve a better rank at the end of the year.

Keywords: funds, open-ended mutual funds, risk-taking behavior, ranking, tournament theory, dynamic panel data, Arellano-Bond GMM.

I – INTRODUCTION

Studies addressing theoretically or empirically the issue of portfolio managers' risk-taking behavior in the mutual fund industry have shown that they tend to adapt their investment behavior to the economic incentives they are granted. Moreover, investment strategies are also adjusted to mid-year performance. Managers of portfolios likely to end up as «losers» will manage fund risk differently than those managing portfolios likely to be «winners». Brown, Harlow and Starks [1996] showed on a yearly basis that, over the period 1976-1991, growth-oriented mutual funds exhibit this kind of tournament behavior: mid-year «losers» tend to increase fund volatility in the latter part of the year to a greater extent than mid-year «winners». On one hand, managers who performed poorly, have incentives to increase their relative risk level given that they are trying to impose their ranking by year-end. On the other hand, managers having high interim returns may want to, at least, maintain those high returns. The only way to achieve these objectives is to increase risk and losing managers increase the total risk of their assets under management in a greater extent than winning managers. This behavior is usually referred as «tournament behavior».

Other empirical studies pointed a positive correlation between past performance in excess of a benchmark during the first three quarters of the year and increases in tracking error in the subsequent quarter (Chevalier and Ellison [1997]). Using daily, rather than monthly, data on mutual funds' returns to calculate a fund's variance of returns, Busse [2001] finds no evidence that mid-year poor performing funds increase their return variances more than mid-year better performing funds, but observes that funds ranked above the median of their category increase total risk.

Funds ranking has a great impact on managers' behavior. As this ranking is mostly made public at the end of each year, Carhart *et al.* [1999] document that a subset of winning fund managers «mark the close» on the last day of a calendar year. There is also evidence on the existence of a convex positive relationship between the net inflows into a fund and its relative performance (Sirri and Tufano [1998]; Bergstresser and Poterba [2002]; Goriaev, Nijman and Werker [2002]). As a matter of fact, investors choose to put their money in mutual funds that performed quite well in the past. This relative past performance may be observed in different public rankings. Therefore, funds managers are specifically interested in the rank they achieve because an important part of their income arises from the increase in net inflows (Brown, Harlow and Starks [1996], Khorana [1996], Chevalier and Ellison [1999]) and management companies advertise their star funds (Jain and Wu [2000], Nanda, Wang and Zheng [2004]).

The theoretical work of Taylor [2003] is the only attempt to formalize these empirical findings. According to his model, *tournament* behavior is optimal if portfolio managers consider the actions of others managers in the same fund category as given. In other words, when there is no scope for strategic interactions between managers, winners decrease their risk to lock in their top rank whereas losers increase their risk to achieve a better rank in the second part of the year. In the theoretical model, if interactions are allowed, i.e., if winners (respectively losers) anticipate the behavior of losers (respectively winners), Taylor demonstrates this results in symmetric risk-taking behaviors (also referred as *strategic* behavior). Winners react to an increase in risk in losing funds by also increasing the risk of their fund, whereas losers cannot achieve a top rank by increasing risk. As this phenomenon is usually interpreted as evidence against the tournament hypothesis (Busse [2001]; Goriaev, Nijman and Werker [2000, 2001]), Taylor argues this is simply another effect of its tournament model.

Our paper is the first attempt to test Taylor's model on the French equity mutual fund industry. Our methodology relies on the empirical work of Kempf and Ruenzi [2004b], but we use a different econometric methodology relying on dynamic panel data analysis and test different segmentation levels to investigate where the crucial tournament takes place. At the tightest level we use, like them, the fund's management company. Rankings achieved by funds' managers in the company that hires them may have an impact on their risk-taking behavior. Kempf and Ruenzi [2004a] show that there also exists a positive convex relationship between the net inflows into a fund and its relative performance in its management company. This explanation is particularly appealing in the European and French environments where funds' management companies (funds' families) have some common special features. On one hand, the European Union has created a single market in financial products through a series of directives making it easier to sell mutual funds across national borders with a single currency. A fund registered in one EU country member may be sold in any other country which gives rise to an increasing market. On the other hand, distribution of funds is firmly in the hand of banks in most European countries. As they sell only or in priority their own funds, it is therefore hard for outsiders to break in.

On a database of 4362 funds running from January 1993 to December 2004, we find that ranking has a significant impact on managers risk adjustment and document that this behavior is in accordance with the tournament theory when we consider the peer group as being the fund family. We also find, as suggested in Taylor's model, an important impact of the peer group size.

The rest of the paper is organized as follows. Section 2 presents the empirical model and the methodology used. Section 3 describes data. Our results are developed in Section 4 and Section 5 concludes.

II –EMPIRICAL MODEL

Tournament theory points out that fund's performance indirectly affects managers' behavior. A simple way to test this hypothesis is to analyse the impact of prior performance on fund managers risk adjustment of their portfolio. We have to ask four distinct questions. (1), in which peer groups should we rank funds prior performance? (2), on which timing horizon should we control for risk adjustment, or what is the evaluation period? (3), how should we measure prior performance and, (4), what is fund managers risk-taking behavior?

II.1 – Definition of segments

Fund managers are more sensitive to the relative performance of their fund according to some benchmarks. Then, in the European context, the location of the fund's assets may influence its risk, so we use a first level to group funds according to their geographic area (fund's type). A second level is used to group funds according to, either management styles (fund's category), or management companies (fund's family). Segments are thereby defined according to two available features of our database:

- the fund's Europerformance[1] category (thereafter denoted 1). According to the Europerformance classification, it is a good measure of the management style risk exposure of the fund, so we suspect this segmentation to have a direct impact on the change in risk.

- The fund's management company (thereafter denoted 2). According to Kempf and Ruenzi [2004a], a tournament is expected to take place between managers of the same company because of firm's specific incentives. Since fees earned by the management company are calculated over the fund's total assets, their amount depends on both the net fund's inflows and the fund's return. The compensation received by the portfolio manager hired by the company depends only on his ability to generate extra net fund's inflows. These are assumed in the tournament theory to proceed from his fund's performance relative to other funds. The management company does not reward its portfolio managers for common or systematic shocks that affect the returns of all mutual funds. This incentive effect reinforces the tournament hypothesis in a fund family.

[1] The Europerformance classification is presented in details in table 2.

II.2 – Definition of the evaluation period and absolute performance

Because fund managers are usually evaluated at the end of a calendar year, we therefore expect them to adjust the risk of their portfolio in the second part of each year relative to an observed performance on a first part of the year. According to Brown, Harlow and Starks [1996], we define the first period as the first 7 months of a year and the remaining 5 months compose the second period[2]. As mentioned by Kempf and Ruenzi [2004b], this 7/5 segmentation appears as reasonable because funds ranks are usually published in the financial press around midyear, that is, within the month following the release of the second quarter performance. We denote the time index of our database with *t=0,…,23* so that the first period of each year is always an odd number (for example *t=0* corresponds to the period running from January 1993 to July 1993). Over the first period of each year, performance of each fund *i* is simply computed as the total return over the period covering, respectively for odd and even numbers *t,* the first 7 months or the 5 latter months:

The returns we use are net of management fees. They are calculated under the assumption that all dividends

$$r_{it} = \left(\prod_{t=1}^{7} (1 + r_{it}) - 1 \right) \quad for \quad t = 1,3,...,23$$

$$r_{it} = \left(\prod_{t=8}^{12} (1 + r_{it}) - 1 \right) \quad for \quad t = 0,2,...,22$$

are reinvested on the ex-dividend date at the ex-dividend net asset value. As our methodology relies on investors perceived prior performance, we consider raw returns rather than risk-adjusted measures because all equity funds in our sample should be exposed to the same market risk. Moreover, according to Patel, Zeckhauser and Hendricks [1994], rankings allow taking into account the impact of relative rather than absolute performance on this perception.

II.3 – Definition of rankings

Our relative performance measure refers to what Kempf and Ruenzi call rank-of-ranks tournament. We introduce the two following notations: R_{it-1}, the rank of fund *i* within its type at the end of period *t-1* of each year and, $R_j R_{it-1}$, a rank-of-ranks measure corresponding to the rank of fund *i* within its segment *j* at

[2] We allow for different segmentations of the year (7-5, 5-7, 6-6, 8-4, 4-8) and run bilateral Wicoxon sign test on our database. July marking date generates the highest significant test statistics of funds risk increase at conventional levels.

the end of period *t-1* (for example, $R_1 R_{it-1}$ is the rank of the fund within its category). The rank is calculated in the following way:

- we rank all funds belonging to a same type according to the total returns achieved in the period *t-1*, r_{it-1}, and assign numbers to them in descending order (i.e. in a group of 5 funds the best fund gets the rank number 5 and the worst fund the rank number 1),

- the number of funds in the type normalizes these rank numbers in order to make segments of different size comparable. The type ranks R_{it-1} are then distributed evenly between 0 and 1, a higher rank denoting a better performance within a type. For example, an American fund having a type rank of .8 did better relative to another American fund with a type rank of .6, but did as well as a fund competing in another type and having the same type rank of .8,

- to measure $R_j R_{it-1}$ the rank within segment j, we first order all funds in segment j according to their type rank, R_{it-1}. Then, we assign segment j rank number to them (based on this ordering), and make the same normalization as in step 2. According to Kempf and Ruenzi, we argue that the rank of the fund within its type is the relevant variable because funds belonging to a particular segment, also belong to a type which rank is regularly advertised. Moreover, the size of the different segments has no impact on our ranks because they consist in relative and not absolute performance measures. In this sense, they have the same variance (1/12 by construction) whatever the number of funds.

II.4 – Definition of risk

To answer the last question, we use fund returns' standard deviations in each period to measure risk adjustment of fund managers to prior performance, like Koski and Pontiff [1999] do. In their study, they also use monthly data on returns to compute various measures of a fund's risk, including the standard deviation, beta and idiosyncratic risk of a fund's returns. Their results are similar to those of Brown, Harlow and Starks [1996] whatever the risk measure used. We define s_{it} the estimated standard deviation of monthly returns of fund *i* in period *t*.

II.5 – Theoretical predictions

The impact of the type rank of a fund on its manager's risk taking behavior could not be measured without taking into account other effects that might affect s_{it}. Following Kempf and Ruenzi, we add two explanatory variables, s_{it-l} and s^{m}_{it-l} in the model, with lags *l=1,…,22*. The variable s_{it-l} allows us to control for the change in funds volatility between periods. The variable s^{m}_{it-l} is used to take into account the fact that the change in risk of a fund during a specific period could be influenced by the market volatility in its type during the preceding periods. A simple measure is offered by the median volatility in the type.

Finally, we consider a dynamic panel model with yearly dummies and unobserved fixed individual effect for funds[3]:

$$s_{it} = \sum_{l=1}^{L} b_{0l} s_{it-l} + \sum_{l=1}^{L} b_{1l} R_{it-l} + \sum_{l=1}^{L} b_{2jl} R_j R_{it-l} + + \sum_{l=1}^{L} b_{3l} s^{m}_{it-l} + \sum_{k=1993}^{2004} a_k D_k + f_i + e_{it}$$
$$i = 1,...,4362 \qquad t = L-1,...,23$$

In a first step, we need to determine the optimal lag level in the model. A Wilcoxon sign rank test allows us to conclude that the series of $s_{it} - s_{it-1}$ clearly differ (the bilateral test is significant at the 1% level) whether *t* is or not an odd number. The high difference allows us to conclude that the higher risk change is observed in intrayear periods than between two consecutive parts of different years. Then, we choose to use only one lag[4], which relies at least on two financial arguments. First, prior performance necessarily influences future portfolio's managers strategies. Second, exclusion of lags greater than 1 is due to managers' readjustments of their funds' composition that make these differing too much on a larger time-span.

Therefore, the dynamic model could be rewritten in a simpler way:

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1} + b_{2j} R_j R_{it-1} + b_3 s^{m}_{it-1} + \sum_{k=1993}^{2004} a_k D_k + f_i + e_{it}$$

Arellano-Bond[5] [1991] proposed the first known estimation of this dynamic model with an extension of the Generalized Method of Moments (Hansen [1982]) in the case of panel data. They remove the unobserved individual effect by taking first differences of variables, and since thereby, a lagged dependent variable

[3] Dummies play simply the role of the constant term. The variable f_i accounts for others unobserved funds' characteristics that do not vary with time.
[4] Our parameter estimates would include the variations between first and second parts of each year as well as the ones between second part of one year and first of the preceding one.
[5] The Arellano-Bond methodology is available in Stata.

appears on the right-hand side of the equation. By assumption[6] the differenced residuals satisfy the orthogonality conditions and all lagged variables (for L≥2) are used as valid instrument. The model is over-identified which makes necessary the use of a GMM estimator. The model is over-identified gives rise to a joint test of the model specification and the validity of the instruments (Sargan test of over-identifying restrictions).

In our model, we expect for b_0>0, indicating risk increase, and $b_3 < 0$, because this increase should be partly market driven. If we observe b_1<0, it means higher the rank in a type, lower the risk and, lower the rank, higher the risk, so winners managers and losers managers adjust differently their portfolios, leading us to conclude on the evidence of tournament behavior. On the contrary, b_1 ≥0 demonstrates that losers do not increase risk more than winners, indicating a strategic behavior in the type. Similarly, the observation of the same signs in the b_{2j}'s indicates the extent of tournament behavior in segment j.

III –DATA

The database contains half-yearly observations on 4362 equity mutual funds (open-end funds) over the period January 1993 to December 2004, provided by Finopc module of the Fininfo database. As we consider cylindric panel data with possible attrition, disappearing funds are included until their disappearance dates and new funds are included since their inception date. The database combines information on each fund type and category, indicates if the fund is sold in France and by which company (if different from the management company), the inception date, the different informations necessary to easily calculate amounts of fees (type, entry, exit, minimum, maximum, management fees), the dividend operations and the liquidative value of the last trading day of each month (or the last liquidative value in the case of funds having total net asset values less than 80 million euros).

All examinations are done for funds being at least one year old and for which at least 25 consecutive months of liquidative value are reported. This elimination is done to exclude extremely young funds that might have other life-cycle incentives (Chevalier and Ellison [1997]) and to keep only funds for which we are able to compute monthly returns over at least two years. Less than 7% of the funds are deleted from our sample. Our final sample includes 4362 funds.

[6] The latter step in the estimation is to verify this assumption by checking if the average covariance in residuals of order 1 and 2 are zero.

In table 1, some general characteristics of French equity mutual funds are documented. The number of mutual funds in our dataset grows from 668 funds in 1993 to 4001 funds in 2003, which denotes a sharp increase in activity[8] during years 1998 to 2002, and highlights the emergence of a large number of new funds. It's causes the average fund age[9] decrease during these particular years before the burst of the internet bubble. After the year 2000's euphoria, new funds are still created but in a less important proportion.

[Table 1 around here]

Europerformance divides the funds into five asset categories according to their risk level: liquidity, bonds, equities, diversified, guaranteed. Each class is then divided into more precise classes. Funds holding equities are generally categorized according to their economic sector, their management style or their market value. The Europerformance classification relies on official information on funds (notices) sold in France and has the double ambition to reflect the needs to compare performances by constructing peer groups and to document the portfolio composition chosen by the manager of the fund by constructing different levels (type for geographic and sector allocation, category for management styles). Table 2 presents the number of funds in the different categories of these types in our pooled database of yearly fund observations. This classification leaves us with 28 management categories (segments of level 1). Definition of these categories has been done in order to take into account the management styles affecting risk exposure (for example, the use of derivatives) but it excludes allocative considerations as other classification agencies do (tax laws, funds of funds…).

[Table 2 around here]

Table 3 shows the increasing number of funds in all types across all years in the sample. The number of new funds is equally spread over all types in the market. We also identify two sub-periods in this figure: one before 1998 or 1999 with a maximum number of funds in any type of about 400 and the other, "the new economy" with increasing numbers (at least twice as many as the preceding ones).

[Table 3 around here]

Tables 4 and 5 give some statistics on level 1 and 2 segments. The increasing number of funds belonging to the same category (from a maximum of 118 in 1993 to 722 in 2003) or family (from a maximum of 39 in

[8] The database provides us with a seemingly few number of funds in 2004, and we do not understand why at that time.
[9] The fund's average age is equal to the average number of years from all funds' inception date to the end of each calendar year.

1993 to 238 in 2003) definitely mirrors the response of the market to the constant demand increase for the industry. This is especially striking when we look at families' number: new management companies are created each year in a quite constant proportion of about 10% whereas we observe a rise during the internet bubble.

[Table 4 around here]

The supply side seems to be close to atomistic as denoted by the increasing numbers of competitors. The average number of competitors in a particular management category has been multiplied by more than 5 over 10 years, while the number of funds managed by the same company is at least twofold.

[Table 5 around here]

IV - RESULTS

In this section, we investigate in which segmentation level the tournament takes place. To do that, we follow a step by step procedure by first looking at type ranks.

IV.1 – Type ranks

At this first level, funds are grouped according to their geographic area in the Europerformance classification. In this case, we do not expect to observe strategic behavior because the number of funds in a type is too large to allow managers to observe the behavior of others. We first present our results for the following regression on the entire sample (we do not take into account ranks of segment *j*).

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1} + b_3 s^{m}_{it-1} + \sum_{k=1993}^{2004} a_k D_k + e_{it}$$

The results of the estimation appear in table 6 (dummies' coefficients are not reported).

[Table 6 around here]

Results confirm the influence of the relative ranking in the preceding period, R_{it-1} on the risk-taking behavior of funds' managers. The coefficient b_1 is significantly negative, indicating strong tournament behavior and this result is in accordance with Brown, Harlow and Starks [1996], Koski and Pontiff [1999] and Elton, Gruber and Blake [2003]. In other words, as funds globally increase risk (b_0 is positive), the worst funds in a type increase risk by 0,5% (in terms of monthly return standard deviations) more than the best funds. The coefficient b_3 is also significant at the highest level. Its negative sign reflects a positive

influence of the change in the type volatility on the change of risk of its manager which confirms the result obtained by Kempf and Ruenzi on US mutual funds. As our types refer to geographic areas in a broader category of funds on equity, the change in risk taken by a manager is not surprisingly in the same direction than that taken by managers having the same general investment objectives. Moreover, Table 7 document funds globally increase their risk over the sample as positive skewness reflects the asymmetry of the two distributions towards the right side. This risk increase appears to be not type specific and this allows us to reject some exogenous explanations of this phenomenon (like the Asian crisis).

[Table 7 around here]

As pointed out by Taylor, in a more realistic setting in which funds include idiosyncratic as well as market risk, the relationship between the difference in the proportion of winning funds relative to the proportion of losing funds that increase the risk of their portfolio and the market standard deviation should be positive in the absence of any impact of rankings. Actually, it is often documented that funds have a higher risk in the second half of a year than in the first half. As we identify significant tournament behavior, Taylor's argument strengthens our result on the sensitivity of funds' managers to rankings. We conclude that funds' risk increase is not only market driven, but results from risk adjustment strategies of fund managers. Dummies parameters denote an unstable inter-year market effect. In particular, the dummies reflect some yearly market trend with increasing risk observed during the period 1998-2002, which is linked to the internet bubble. Table 8 highlights the tournament effect was less important during this bullish period, probably because all funds managers may have taken more risk to share in the speculative bubble whatever their prior performance.

[Table 8 around here]

To characterize managers behavior in a same type, we may also directly study it depending on the relative rank. Funds having the worst ranks are expected to show more pronounced tournament behavior than best funds. To test this we create three dummies of the rank levels (High, Medium, Low), interact them with ranks and estimate the following equation:

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1}.D^H + b_1 R_{it-1}.D^M + b_1 R_{it-1}.D^L + b_3 s^m_{it-1} + \sum_{k=1993}^{2004} a_k D_k + e_{it}$$

All three coefficients in Table 9 are significant and show higher the rank, lower the risk taken, which supports the tournament behaviour hypothesis.

[Table 9 around here]

Finally, we test the idea of Kempf and Ruenzi, according to which the tournament should be driven by the relative number of funds in a type. Our methodology rests on interacting ranks with dummies indicating 3 different types size according to centiles (Big or more than 522 funds, Medium, and Small with less than 304 funds). Results of the estimation of the following model appear in Table 10.

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1}.D^B + b_1 R_{it-1}.D^M + b_1 R_{it-1}.D^S + b_3 s^m_{it-1} + \sum_{k=1993}^{2004} a_k D_k + e_{it}$$

Results confirm the large number of funds in a type strengthens the tournament. This effect arises from the fact that managers that compete in the same type could not directly observe each others risk-taking behavior.

[Table 10 around here]

IV.2 – Ranks within the fund category (segment 1)

The previous section shows that the risk-taking behavior of fund managers is influenced by their fund type rank. We now turn to test if the rank-of-ranks in segment 1, the rank within the fund category, has an impact on this behavior. Table 11 presents our results for the following equation:

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1} + b_{21} R_1 R_{it-1} + b_3 s^m_{it-1} + \sum_{k=1993}^{2004} a_k D_k + e_{it}$$

[Table 11 around here]

The rank within the fund category has a significant impact on managers risk-taking behavior which allows us to get an accurate glimpse at managers' sensitivity to the relative ranking of their fund in all sub-segments they can identify. The positive sign of the coefficient b_{21} indicates a possible rejection of the tournament hypothesis in segment 1 because it indicates symmetric risk reactions to rankings between losers and winners in the management categories of funds. Nevertheless b_1 is still negative and significant. As before, we interact dummies of the relative level of ranks in segment 1 with the rank-of-ranks and obtain results of Table 12.

[Table 12 around here]

As b_{21} increases with the relative level of the rank-of-ranks, the higher the rank, the higher the risk taken in the segment of level 1, leading us to conclude to a strategic behavior in the level 1 segment.

The opposed effects in the type and in the segment of level 1 arise from the importance of the number of funds used to compute rankings. We argue that the average number of funds in segment 1 (less than 212 over the entire sample) gives to managers the opportunity to observe each other. As they usually try to replicate

the performance of the geographic area index that constitutes their fund's benchmark, they are able to more easily identify a common benchmark in a segment of level 1 than in a type.

We finally interact size dummies for segment of level 1 and for the type. We define respectively small, medium and big categories as segments of level 1 having less than 93 funds, 93 to 234 funds and more than 234 funds. In the first part of Table 13, parameter estimates of b_1 don't differ with the size of the type and the only effect is a decreasing strategic behavior with the relative size of the segment of level 1. The number of funds competing the ones against the others only matters in the segment of level 1.

To get a more precise interpretation of this result, part 2 of Table 13 gives our estimates when we only interact size dummies for segment of level 1. Tournament (resp. strategic) behavior in the type and strategic (resp. tournament) behavior in the segment of level 1 is imparted to segment of level 1 having large (resp. small) numbers of funds.

[Table 13 around here]

So, if we consider the peer group as the segment of level 1, then the number of funds in this group strengthens the respective impact of the ranks on managers' risk-taking behavior. Size appears to play a different role in the geographic area of the fund (tournament in the type) and in its management category (strategic behaviour in the segment of level 1). Nevertheless, big size segments of level 1 also belong to big size types. As a matter of fact, given this we cannot discriminate between two competing explanations: is it the number of funds in a segment or the ability of their managers to observe others' behavior in the same segment that drives our results? To test this we turn to analyse the impact of funds' management companies.

IV.3 – Ranks within the fund management company (segment 2)

Given the respective impact of the type and the category to which a fund belongs, we now investigate the impact of the fund family, which is the company that hires the fund manager because it constitutes a natural peer group. Actually, part of managers total income depends on bonuses they may earn if they achieve a top rank in the family. In this case, managers also get satisfaction to be known as the best manager of the company over a period, simply like a bettor who is the only one to find the winner of a race. Moreover, poor performance by a portfolio manager may be personally more damaging than what would be predicted by funds flows if such performance results in the manager's termination. In this framework, we

suspect them to compete within the same company. We estimate the following equation and present our results in Table 14.

$$s_{it} = b_0 s_{it-1} + b_1 R_{it-1} + b_{22} R_2 R_{it-1} + b_3 s^{m}_{it-1} + \sum_{k=1993}^{2004} a_k D_k + e_{it}$$

[Table 14 around here]

Over the entire sample, b_{22} is significantly negative indicating tournament behavior. Here, funds managers working in the same company know each other, whatever the number of funds the company has under management and the management objective of the fund. Thereby, a high rank in the family constitutes a natural way to catch the attention of the top executives of the company or simply to keep his job. Table 15 provides results on the importance of the relative level of ranks. The tournament behavior increases with the rank-of-ranks inside the management company. Once again, this result sheds lights on the asymmetric impact of a low rank relative to a high rank.

[Table 15 around here]

Since in a particular family of funds everyone may observe the behavior of others, the size of the management company, that is the number of funds or equivalently, the number of managers in a family, may also be a relevant variable that makes managers more prone to take risk to achieve a top rank. Kempf and Ruenzi provide evidence that size affects tournament behavior but their test does not allow to discriminate between size and observation ability. A specific behavior (tournament or strategic) whatever the family size only depends on the ability of funds' managers to observe each other. On the contrary, any impact of the family size would indicate that the relevant variable to characterize competition among funds' managers is the size of the peer group.

Part 1 of Table 16 presents our results when we include dummies of the type and the family sizes. We define respectively small, medium and big families as segments of level 2 having less than 10 funds, 10 to 33 funds and more than 33 funds. Our estimates indicate that higher the number of funds in a peer group (type or family), greater the impact of prior performance on risk-taking behavior. The tournament behavior appears to be crucially depending on the numbers of funds in competition and not on the ability of funds' managers to observe each others in the same management company. This result is confirmed by an analysis of managers' behavior in a same family (part 2 of table 16). The coefficient for the family rank is still negative and it is not really affected by the family size but the respective coefficients for the type rank are –0,0045 for large

families against –0,0017 for small ones, indicating stronger tournament behavior within the type for the largest management companies.

[Table 16 around here]

These results indicate that the relative family size increases the extend of the tournament in the type, not in the family. For example, funds belonging to large families play their crucial tournament in intra geographic area dimension of the fund. If we consider the management style as the relevant variable to construct the peer group, then ranking in this group has a symmetric impact on risk-taking behavior, probably due to the fact that managers try to replicate the same index. The relative importance of any peer group depends on the size of the group. The numbers of funds in the management company plays a crucial role in the determination of the risk strategies of fund managers: the more important is the number of funds under management in a company, the less important is the impact of the relative position of a fund within its company and the more is that of its relative position within a broader classification. According to James and Isaac [2000], as tournament behavior is strong whatever its location and the time period, efforts of funds' managers to construct efficient portfolios appear to be poor.

V - CONCLUSION

Some empirical studies have shown evidence of the Brown, Harlow and Starks's hypothesis that the mutual fund industry is a tournament. Using a database of French mutual funds on equity covering the years 1993 to 2004, we show that one particular tournament takes place in a fund family.

It appears that funds' managers participate in different competitions taking place at different levels: the geographic area, management style and management company of the fund. We identify two peer groups in which the relative performance in the competitive environment has an asymmetric effect on risk-taking behavior: the management company (family) and a broader category relative to the geographic area of the fund (type). This behavior results form the incentive schemes of the management company that hires the fund manager. The tournament effect is particularly pronounced in large families, allowing us to conclude that the competition among funds' managers depends on the size of the company that hires them. This result is particularly interesting in the French and European contexts, where banks usually manage funds.

Moreover, as tournament theory relies on the implicit hypothesis that managers are evaluated against some exogenous index return, risk adjustments may also be evaluated on a benchmark basis. Actually, managers may take bets against the market when their performance has worsened. Some theoretical work is

partially driven by this idea. Following the empirical finding of Khorana [1996] that managers receive asset based compensations, Carpenter's model [2000] assumes that a risk-averse manager is compensated in the form a fixed-fee plus a call option written on the value of the managed portfolio with an exercise price equal to the value of a benchmark asset. If this is the case, an adequate measure of the funds risk adjustment should be used instead of the total variance of the fund.

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Table 1: Funds' characteristics

Year	Number	Average age (years)
1993	668	6,85
1994	804	6,78
1995	997	6,76
1996	1137	6,92
1997	1333	7,06
1998	1565	6,81
1999	2114	6,51
2000	2780	6,41
2001	3349	6,42
2002	4092	6,54
2003	4001	6,97
2004	646	6,13

Table 2: Funds' types and categories

Types	Categories	Nber of funds	% of funds	Types	Categories	Nber of funds	% of funds
French		3627	15%	American		2609	11,11%
	General	2552	70,4%		North America general	1755	67,3%
	PMC[1]	525	14,5%		North America PMC	470	18%
	Nouveau Marché	114	3,1%		North America indicial	141	5,4%
	Indicial	436	12%		Latin America	243	9,3%
Euro zone		2471	10,52%	Asia/Pacific		2977	12,7%
	General	1351	54,7%		General	338	11,4%
	PMC	141	5,7%		Except Japan	848	28,5%
	Indicial	165	6,7%		Particular zone	340	11,4%
	Particular zone	824	32,9%		Japan	1451	48,7%
European		4750	20%	Sectorial		2823	12%
	General	2780	58,5%		Housing	506	17,9%
	PMC	603	12,7%		Gold and raw materials	394	14%
	Emerging	300	6,3%		Health and environment	461	16,3%
	Particular zone	1067	22,25%		Technology and multimedia	924	32,7%
International		4229	18%		Finance	208	7,4%
	General	3458	81,8%		Other sectors	330	11,7%

[1] Small and middle capitalisations (« Petites et Moyennes Capitalisations »).

	Emerging	771	18,2%		

Table 3: Statistics on types (level 1)

Year	Average nber of competitors	Min nber of funds	Max nber of funds
1993	95,43	61	166
1994	114,86	68	197
1995	142,43	88	226
1996	162,43	89	245
1997	190,43	106	277
1998	223,57	150	312
1999	302,00	215	457
2000	397,14	318	629
2001	478,43	383	755
2002	584,57	441	903
2003	571,57	496	958
2004	92,29	72	202
All	453,49	61	958

Table 4: Statistics on categories (segment of level 1)

Year	Average nber of competitors	Min nber of funds	Max nber of funds
1993	25,69	1	118
1994	30,93	1	141
1995	35,60	1	161
1996	40,60	1	178
1997	47,60	2	190
1998	55,89	2	233
1999	75,5	10	315
2000	99,28	16	415
2001	119,60	22	522
2002	146,14	22	635
2003	142,89	22	722
2004	23,07	1	158
All	211,83	1	722

Table 5: Statistics on families (segment of level 2)

Year	Families' number	Average nber of competitors	Max nber of funds
1993	164	4,07	39
1994	174	4,62	60
1995	194	5,13	64
1996	205	5,54	83
1997	228	5,84	92
1998	244	6,41	99
1999	288	7,34	116
2000	334	8,32	128
2001	367	9,12	187
2002	381	10,74	224
2003	382	10,47	238
2004	163	3,96	50
All	252	36,5	238

Table 6: Results within the funds' type[2]

Estimates	All sample
b_0	0,2058***
b_1	-0,0051***
b_3	-0,4953***
N	36842
Sargan test	11943,93***
Order 1 Autocorr.	-91,31***
Order 2 Autocorr.	20,25***

Table 7: Statistics on variables

Variables	Mean	Std.Dev.	Skewness	Kurtosis	Min	Max
s_{it}	0,0595	0,0314	1,8942	10,5886	0	0,4228
s_{it}^{m}	0,0566	0,0189	0,6428	2,8283	0,0178	0,1055
s_{it}(AMER)	0,0645	0,0278				
s_{it}(ASIA)	0,0685	0,0301				
s_{it}(EURZ)	0,0581	0,0291				
s_{it}(EUR)	0,0546	0,0282				
s_{it}(FR)	0,0557	0,0307				
s_{it}(INT)	0,0541	0,0251				
s_{it}(SECT)	0,0676	0,0449				

Table 8: Statistics in the years

	s_{it}^{m}		s_{it}^{I}	
Years	Mean	Std.Dev.	Mean	Std.Dev.
1993	0,0345	0,0073	0,0433	0,0194
1994	0,0463	0,0075	0,0397	0,0144
1995	0,0346	0,0097	0,0354	0,0173
1996	0,0379	0,0101	0,0402	0,0201
1997	0,0381	0,0103	0,0550	0,0242
1998	0,0539	0,0112	0,0785	0,0401
1999	0,0694	0,0286	0,0583	0,0337
2000	0,0542	0,0083	0,0593	0,0330
2001	0,0554	0,0114	0,0760	0,0339
2002	0,0660	0,0141	0,0712	0,0296
2003	0,0674	0,0188	0,0515	0,0174
2004	0,0405	0,0133	0,0288	0,0171

Table 9: Relative ranks within the funds' type

[2] The model runs on 36842 observations because our sample is not cylindred and our structure excludes the first data for each fund and uses all lagged variables as instruments. *** indicates a 1% significance level, ** a 2% one and *, 5%. Next tables do not report results on the two orders autocorrelations because these are all significant at the highest level.

Estimates	All sample
b_0	0,2049***
b_1 high rank	-0,0057***
b_1 medium rank	-0,0085***
b_1 small rank	-0,0095***
b_3	-0,4947***
N	36842
Sargan test	11942,77***

Table 10: Relative size within the funds' type

Estimates	All sample
b_0	0,2055***
b_1 small type	-0,0037***
b_1 medium type	-0,0055***
b_1 big type	-0,0060***
b_3	-0,4958***
N	36842
Sargan test	11944,29***

Table 11: Results within the funds' segment 1

Estimates	All sample
b_0	0,2071***
b_1	-0,0084***
b_{21}	0,0041***
b_3	-0,4987***
N	36842
Sargan test	11920,74***

Table 12: Relative ranks within the funds' segment 1

Estimates	All sample
b_0	0,2070***
b_1	-0,0084***
b_{21} high rank	0,0039***
b_{21} medium rank	0,0037***
b_{21} small rank	0,0028
b_3	-0,4986***
N	36842
Sargan test	11920,46***

Table 13: Results for the entire sample

Estimates	All sample	Estimates	All sample
b_0	0,1989***	b_0	0,1948***
b_1 small type	-0,0079***	b_1 small category	-0,0007
b_1 medium type	-0,0079***	b_1 medium category	-0,0157***
b_1 big type	-0,0073***	b_1 big category	-0,0282***
b_{21}small category	0,0087***	b_{21}small category	0,0033***
b_{21}medium category	0,0028***	b_{21}medium category	0,0099***
b_{21}big category	-0,0005	b_{21}big category	0,0172***
b_3	-0,4909***	b_3	-0,4782***
N	36842	N	36842
Sargan test	11935,41***	Sargan test	11940,62***

Table 14: Results within the funds' families

Estimates	All sample
b_0	0,2066***
b_1	-0,0026***
b_{22}	-0,0035***
b_3	-0,4946***
N	36842
Sargan test	11927,82***

Table 15: Relative ranks within the funds' family

Estimates	All sample
b_0	0,2066***
b_1	-0,0025***
b_{22} high rank	-0,0062***
b_{22} medium rank	-0,0094***
b_{22} small rank	-0,0186***
b_3	-0,4935***
N	36842
Sargan test	11926,12***

Table 16: Relative size for type and family

Estimates	All sample	Estimates	All sample
b_0	0,2063***	b_0	0,2064***
b_1 small type	-0,0014	b_1 small family	-0,0017
b_1 medium type	-0,0029***	b_1 medium family	-0,0026*
b_1 big type	-0,0032***	b_1 big family	-0,0045*
b_{22} small family	-0,0029***	b_{22} small family	-0,0033***
b_{22} medium family	-0,0030***	b_{22} medium family	-0,0030***
b_{22} big family	-0,0046***	b_{22} big family	-0,0031***
b_3	-0,4948***	b_3	-0,4955***
N	36842	N	36842

Sargan test	11926,31***	Sargan test	11924,11***