Tournaments, Career Concerns and Risk Taking: Evidence from ECB Reserve Currency Portfolios*

Benjamin Sahel† Antonio Scalia‡ Luana Zaccaria§

Abstract

Using data on ECB's reserve currency portfolios, we show that money managers react to relative rankings, i.e. own versus peers' performance, by adjusting portfolio risk levels as measured *ex-ante* by actual deviations from their benchmark. This happens in the absence of explicit incentives, as no monetary reward is promised for winning this "tournament" among portfolio managers. We collect information on managers' characteristics, such as age, education, tenure, salary and career path and investigate the role played by implicit incentives. We provide evidence that career concerns contribute to the documented relationship between relative ranking and risk taking.

*We are grateful to Conception Alonso, Paolo Del Giovane, Luca Filidi, Cinzia Gigante, Anja Kreutzenbeck, Alessio Nulli Gennari, Andrea Pozzi and Giuseppe Reale for their useful comments. We gratefully acknowledge the participation in the survey of portfolio managers of the Deutsche Bundesbank, Central Bank of Ireland, Bank of Greece, Banco de España, Banque de France, Banca d'Italia, Banque centrale du Luxembourg, Suomen Pankki. The views expressed in the paper are those of the authors and do not involve the responsibility of the European Central Bank or the Banca d'Italia.

†ECB, benjamin.sahel@ecb.europa.eu

‡Banca d'Italia, antonio.scalia@bancaditalia.it

§EIEF, luana.zaccaria@eief.it (corresponding author), Via Sallustiana 62, 00186 Rome, Italy.

1 Introduction

This study performs an empirical analysis of the relationship between ranking, i.e. workers' own performance relative to peers', and risk taking. We exploit a novel setting, that of the European Central Bank (ECB)'s foreign reserves funds, where return objectives and risk guidelines are centrally defined at the ECB headquarters in Frankfurt, while actual, day-to-day management is delegated to the Eurosystem's National Central Banks (NCBs).[1]

While closely related to previous studies on tournaments in the mutual fund industry (pioneered by Brown, Harlow, and Starks [1996]), our analysis departs from existing literature in that, as compared to the private sector, a different set of managerial incentives applies. National reserve managers, who are practically civil servants, do not compete for investment flows (as in Chevalier and Ellison [1997] or Sirri and Tufano [1998]), nor is their compensation directly linked to performance. Therefore, this setting optimally lends itself to the exploration of the interactions between attitude towards risk and indirect incentives, such as reputation, peer pressure and career concerns as opposed to compensation incentives. A major advantage of our empirical strategy is that our data include daily securities holdings, allowing us to observe managers' actual strategies and construct precise measures for ex-ante risk taking, instead of inferring them from fund returns like in most previous studies.[2] Furthermore, we can provide novel and clean evidence on the mechanisms behind the ranking-risk relationship thanks to our data on managers' characteristics (such as education, tenure and salary) and career events (e.g. promotions and separations).

The investment process of ECB's foreign reserves is based on a central risk management function, which produces strategic and tactical benchmark portfolios and sets risk limits, and a decentralized approach for investment operations involving the NCBs. The NCBs are assigned sub-portfolios with assets size proportional to the country's contribution to the ECB's capital. This arrangement can be framed as one where a principal (the ECB) splits a task to be performed on his behalf among several agents-managers (the NCBs). Each agent is given the same investment objective, namely to generate

[1] Because of the novelty of this dataset, this paper represents a step towards a better understanding of the under-researched topic of the management of official foreign exchange reserve funds which, as of December 2016, were globally worth over USD 10 trillion (Source: IMF COFER statistics).

[2] Notable exceptions are Kempf et al. [2009] and Schwarz [2011] who also use ex-ante holdings data.

positive excess returns while preserving liquidity on short-term fixed income portfolios denominated in USD or JPY. Performances on each portfolio are immediately observable to the principal; on a monthly basis, the principal provides the agents with information on returns on all portfolios and hence with their relative, year-to-date performance rankings. Once a year a general report is produced and submitted to the Governing Council of the ECB, which includes the aggregate performance of the reserve funds as well as returns on all of the single NCB portfolios for each currency. We want to test the hypothesis that this system generates a tournament among the NCBs, a sort of financial *Jeux Sans Frontières,* where managers care not just about the official goal of beating a given benchmark but also about their performance relative to the other national teams. To this end, we analyze the relationship between ranking and risk-taking. It is important to emphasize that we refer to risk in terms of portfolios deviation from the benchmark rather than volatility of returns. Therefore, in the context of this study, risk is coterminous with activism in portfolio management (as opposed to benchmark-replicating strategies), but it can translate into either higher or lower expected variance of absolute returns. Our analysis has interesting implications: if competition among peers efficiently motivates agents, it might be optimal for a principal to incur higher fixed costs associated to a multiple agents structure, even in presence of significant economies of scale.[3] This consideration supports the case of multiple manager organizations, even when the motives of specialization, diversification or risk sharing do not hold (Sharpe [1981], Barry and Starks [1984]).

Our data include holdings and performances of reserve portfolios managed by 12 NCBs from January 2002 to December 2009. We construct a cardinal measure of relative ranking by computing the difference in terms of monthly cumulative returns between each portfolio and the month's best performer. We regress three measures of risk (duration, curve and spread risk) and portfolio turnover on the relative ranking variable measured in the previous period. Our results show that relative rankings affect risk taking. In particular, managers who are lagging behind in the tournament tend to increase their duration and curve *active* positions, i.e. absolute deviations from the tactical benchmark. Such effects are stronger if the portfolio has ranking below the median and is underperforming the benchmark and during the second half of the year.

Our results appear in line with related studies on fund managers' tournaments. Specifically,

[3]See Lazear and Rosen [1981] and Nalebuff and Stiglitz [1983] for related theories

it emerges from previous literature that past performance is the main determinant of mutual fund selection, through a convex flow-performance relationship; hence fund managers actively pursue growth of the assets under management, which brings about a rise in the fees. This observation underpins the tournament hypothesis, according to which fund managers adjust portfolio composition depending on year-to-date performance. The empirical evidence supports this hypothesis in its narrow-sense version, according to which interim winners lock-in their outperformance and reduce risk, while interim losers increase volatility in the attempt to catch up (Chevalier and Ellison [1997]).

In spite of the similarities in the empirical evidence, a mechanism based on fund selection does not apply to the ECB's context, since assets under management for each NCB are not subject to inflows or outflows and no fees are charged. One possible explanation for our findings is drawn from previous studies which show that past performance can drive investment behaviours in presence of career concerns (Chevalier and Ellison [1999]). Similarly to Qiu [2003] and Kempf et al. [2009], in this paper we explore the theme of career concerns by focussing on managers' performance *relative* to their peers, rather than on absolute excess returns. NCBs portfolio managers operate in highly correlated environments, as they share the same benchmark, investable assets universe and risk limits. In this setting, rankings can be informative of managers' specific ability as they isolate idiosyncratic versus systematic performance components and can be used as a signal on manager's skills or effort for current and potential employers (Holmstrom [1982], Gibbons and Murphy [1990]). In other words, a manager's positive excess return can be a stronger signal of his skill if most of his peers investing in the same asset class performed poorly over the same time period. For this reason career outcomes may depend on relative excess returns.

Additionally, public disclosure of personal achievements or simple exposure to others' success can generate pure peer pressure (Bandiera et al. [2010], Mas and Moretti [2009], Falk and Ichino [2006]). Having their performance revealed to peers and upper management on a regular basis, managers can be motivated by the desire to gain reputation, e.g. being recognized as smart individuals, and to avoid social sanctions, e.g. being labeled as lazy or incompetent.

In order to explore these mechanisms we collect information on individual portfolio managers regarding their age, tenure, education, work experience, gender, nationality and career events such as promotions, separations and lateral moves, i.e. changes of job duties within the same central

bank. [4] While we cannot directly test the pure peer pressure hypothesis, we show evidence that career concerns play a role in managers' active risk decisions. In our sample promotions are significantly correlated with higher rankings, while separations are more frequent among underperforming managers with low rankings. Importantly, the effect of ranking decreases in the late years of managers' tenure, when career motivations are less intense (Gibbons and Murphy [1992]). This result is in contrast with previous studies, notably Kempf et al. [2009] who find that "employment incentives lead managers of funds with a poor interim performance to decrease their fund's risk relative to managers of funds with a good interim performance". Finally we show that larger deviations from the benchmark are normally associated with higher performance, supporting the idea that the tournament setting, by stimulating competition, can improve the efficiency of delegated portfolio management.

The rest of the paper proceeds as follows. Section 2 describes the institutional framework. Section 3 illustrates the data and descriptive statistics. The empirical strategy and results of the estimations are presented in Section 4. Section 5 investigates potential mechanisms. Section 6 concludes.

2 Institutional Framework

For this particular study, and more generally for any study related to the ECB's foreign reserves, three aspects of the portfolio management framework are relevant: (i) the foreign reserves' origin and purpose; (ii) their size; and (iii) their composition. Each aspect will be considered in turn.[5]

The Statute of the ECB and of the ESCB stipulates that the ECB may hold foreign reserves and may intervene in various markets including the foreign exchange market in order to pursue its objectives. It further stipulates that the ECB's foreign reserves would initially be constituted through the transfer, from the NCBs of the countries joining the euro area to the ECB, of amounts determined in accordance with the ECB's capital key and equivalent to EUR 50 billion.[6] The

[4] This is made possible by the kind cooperation of a subgroup of NCBs, which have taken part in a survey on confidential grounds.The involved NCBs are the Deutsche Bundesbank, Central Bank of Ireland, Bank of Greece, Banco de España, Banque de France, Banca d'Italia, Banque centrale du Luxembourg, Suomen Pankki.

[5] For a broader discussion on ECB portfolio management see ECB [2006]

[6] See https://www.ecb.europa.eu/ecb/legal/pdf/en_statute_2.pdf

composition of the amounts transferred by the NCBs was determined by the ECB. This included cash and fixed income securities denominated in US dollar and Japanese yen as well as gold. The transfers took place when the euro area was created in January 1999 and subsequently each time a new country joined the euro area. Given that new countries joined the EU after the creation of the euro area, the total amount that is to be transferred was proportionally increased from EUR 50 billion upwards, to around EUR 56 billion. The Statute of the ECB and of the ESCB also stipulates that the ECB may call on the NCBs of the euro area to transfer more foreign reserves to it in case its foreign reserves are depleted. The option of such additional calls for foreign reserve transfers has not been used by the ECB so far.

Over the years, the amount and the composition of the ECB's foreign reserves has evolved, reflecting several factors which include: (i) changes in US dollar and Japanese yen exchange rates and gold prices; (ii) returns on the US dollar and Japanese yen foreign reserve portfolios in local currency terms; (iii) interventions on the foreign exchange markets which took place in September and November 2000 and in March 2011 and subsequent portfolio rebalancing transactions aimed at restoring the desired portfolio composition; (iv) sales of gold which took place from 2005 to 2009; and (v) the acquisition of a portfolio denominated in Chinese renminbi in 2017, which reflected the increasing role played by this currency in international financial markets.

As of December 2009, the end of our sample period, the size of the ECB's foreign reserves was EUR 51 billion, of which EUR 38.3 billion was in foreign currencies - the Japanese yen and the US dollar - and EUR 12.7 billion was in gold and Special Drawing Rights of the International Monetary Fund. Applying the exchange rates of end-2009, US dollar-denominated assets represented 78.5% of the foreign currency reserves, while those denominated in Japanese yen accounted for 21.5%. The ECB's foreign reserves are thus relatively small compared with the amounts which may be required for large-scale interventions in the foreign exchange market.[7] However, the size of the ECB's foreign reserves is a limiting factor only in cases when the ECB sells foreign currency: when it buys foreign currency, the size of its pre-existing foreign reserves obviously does not matter. Moreover, the size of the ECB's foreign reserves has proven to be sufficient in the (rare) occasions when the ECB

[7]The daily turnover for exchange rates transactions involving the euro was EUR 1 trillion in the first quarter of 2017 according to data collected by the Bank for International Settlements.

intervened in the foreign exchange markets.[8]

The composition of the ECB's foreign reserves reflects the liquidity constraints imposed by the possibility of unanticipated interventions in the foreign exchange market and, within the boundaries set by these needs, it must satisfy risk and return optimization criteria. Being the currencies of the main trading partners of the euro area outside of the EU, the US dollar and the Japanese yen are are included in the ECB's foreign reserves as it may be relevant and necessary for the ECB to carry out interventions in these markets .[9] The portfolio management framework of the ECB's foreign reserves intends to achieve an optimal risk and return profile with respect to local currency asset prices. The following constraints are imposed on this optimization process: no active changes in the currency composition are allowed (e.g. foreign exchange transactions which would decrease or increase the size of the US dollar portfolio and increase or decrease the size of the Japanese yen portfolio); portfolios investments should be liquid enough so that they can be sold efficiently and without significant losses in case the money is needed, at short notice, for financing interventions in the foreign exchange market. These constraints are implemented by limits on the transaction types and investment instruments which can be used, as well as requirements on minimum amounts for the safest securities that must be held in each portfolio. There is a list of eligible investment instruments for each currency, which includes government securities, securities issued by supranational institutions and agencies and BIS instruments. Cash management operations include bank deposits, repos and reverse repos. Derivative contracts are allowed in the form of interest rates and bond futures, interest rate swaps and fully-hedged foreign interest swaps. With the exception of government securities, each investment class is subject to maximum risk limits of two types: individual issuer limits, in absolute values, and sector limits, as a percentage of portfolio size. These limits are designed to contain credit and liquidity risks.

Within these limits, the optimization procedure includes three processes, which have different

[8]In addition, the ECB has currency swap line agreements with the major central banks, which allow a central bank to obtain foreign currency liquidity from the central bank that issues it.

[9]Gold is also held within the ECB's foreign reserves because, thanks to the negative correlation between its returns and market risks it is considered to improve the portfolio risk and return profile in the medium term. The ECB completed an investment equivalent to EUR 500 million of its foreign reserves in Chinese renminbi (CNY) during the first half of 2017, implementing a decision taken by the ECB Governing Council on 20 January 2017.

time horizons. The first process is the one which sets a strategic benchmark portfolio for each currency.[10] It has an investment time horizon of several years and it is updated once per year. This process uses publicly available economic projections for variables such as growth and inflation and econometric models that determine probability distributions for the outcomes of these variables and that map changes in the economic variables into changes in yield curves. Given the estimated future interest rates levels, a set of efficient strategic benchmark portfolios is defined as the one that includes, for any given risk level (defined as conditional Value at Risk), the portfolio with the highest expected return. Within this efficient set of portfolios, two more constraints apply: first, in order to reduce dependency on model risk and stabilize portfolio selection over time, minimum shares of the portfolio must be present in broad bond maturity buckets; second, in order to reduce the likelihood of losses, portfolio risk is set equal to a specific desired level or brought as close as possible to it.[11]

The second process is the one which sets a tactical benchmark portfolio. It has a horizon of one year and is subject to a monthly revision. This process is placed under the responsibility of the ECB's Investment Committee, based on a proposal made by a small team of portfolio managers employed directly by the ECB. The team periodically fine-tunes the benchmark with the aim of achieving higher returns over a period of one year. It also sets stop-loss or take-profit levels: if one of these levels is reached, the Investment Committee reassesses the position and may decide to close it immediately, before the next monthly review. The tactical benchmark portfolios are subject to the same kind of limits as the strategic benchmark portfolios on transaction types, investment instruments and portfolio liquidity. In addition, they are subject to relative risk limits, which constrain the total market risk exposure of the positions taken by the team. There is evidence that the tactical benchmark process has achieved an improvement in portfolio returns and developed portfolio management skills within the ECB (ECB [2006]). Such skills have been beneficial for the strategic benchmark process, the management of other ECB investment portfolios (including the ECB's own funds and staff pension funds), the purchase of securities for monetary policy purposes (including the Asset Purchase Programme) and the monitoring and analysis of financial market

[10]The strategic benchmark is decided upon by the ECB's Governing Council on the basis of a proposal put forward by the risk management function of the ECB.

[11]The strategic benchmark process, including the projections, the models and the constraints, is further described in ECB [2006].

developments as an input for ECB monetary policy preparation and implementation.

Finally, the third process is the one which sets and implements the portfolios as they are actually invested in the financial markets. It also has a horizon of one year and it has no constraints on its frequency. This process is placed under the responsibility of each Eurosystem National Central Bank, or joint group of Eurosystem National Central Banks, which wishes to be involved. In each involved NCB or group of NCBs, a portfolio manager or team of portfolio managers is given responsibility for a part of the US dollar portfolio or the Japanese yen portfolio. The aim of these portfolio managers is to invest the funds in the market in line with the set rules and limits, prudently and efficiently, and to achieve higher returns than the respective tactical benchmark. Each such sub-portfolio is subject to broadly the same limits as the strategic and tactical benchmarks, proportionally, on transaction types, investment instruments and portfolio liquidity, and to a relative risk limit. The involved NCBs are not exposed to financial risks, which are all borne by the ECB (except in case of gross negligence), they must ensure a strict separation of duties between this activity and their other activities (including the management of their own portfolios), and they are not compensated for the service they provide to the ECB. There is evidence that this third layer of portfolio optimization process has achieved a further improvement in returns as compared with the tactical benchmark level and contributed to develop cooperation and information exchange within the Eurosystem (Scalia and Sahel [2011]). NCBs' involvement has been beneficial for maintaining and further developing portfolio management skills and market presence.

Until the end of 2005 each NCB was involved in managing both a US dollar and a yen denominated portfolio. Since 2006, with a view to achieving efficiency gains, portions of the portfolios are allocated to each NCB or pool of NCBs that express interest in being involved in foreign reserve management. The NCBs comprising this analysis, singularly or in pools, are those of Belgium, Germany, Ireland-Malta, Greece-Cyprus, Spain, France, Italy, Luxembourg-Slovenia, the Netherlands, Austria, Portugal and Finland.

3 Data and Descriptive Statistics

We start the description of our sample by providing general information on the aggregate reserve portfolios in USD and JPY for the period January 2002 to December 2009. Table 1) shows that, though being exposed to very limited risk in terms of duration and volatility of returns, the two portfolios achieved average returns of 3.96% for the USD portfolio and 0.42% for the JPY portfolio. These performances are above not only those of money market securities but also those of government bond benchmarks that are commonly used in the private sector.

Market conditions varied significantly over the sample period, as our time series includes the burst of the dot-com bubble, the boom market of the mid years 2000s and the financial crisis which started in August 2007. We consider the following market risk measures as relevant for the investment style of the portfolios in our analysis:

Term Spread: the slope of the yield curve, defined as the difference between 10-year and 2-year government bond yields.

Ted Spread: the difference between the 3-month Libor rate and the 3-month T-bill rate. This variable is used as a proxy for credit risk for dollar denominated portfolios.

OIS Spread: the difference between the 3-month Libor rate and the 3-month overnight indexed swap rate. It is used as a credit risk proxy for yen denominated portfolios.

Bond Volatility: the annualized historical volatility of the price of 10-year government futures contracts, for current delivery, taken over the last 60 working days. This variable is a proxy for market volatility at the long end of the curve.

Figure 1) shows the dynamics of these risk factors, measured monthly, together with the time series for the short term interest rates in both currencies.

Aggregate portfolios are composed of 6 to 12 sub-portfolios that are managed at the local NCB level. In particular, all of the 12 NCBs were involved in the management of both USD and JPY denominated portfolios before 2006, while thereafter 6 NCBs managed only dollar denominated portfolios, 4 NCBs managed only yen denominated portfolios and 2 NCBs managed portfolios in both currencies. Portfolios are homogeneous in terms of return objectives and risk limits, as these are defined at the ECB level, but have different sizes. The average dollar portfolio asset value is

USD 3,489 million, with a minimum size of USD 56 million and a maximum size of USD 12,831 million. The average yen portfolio asset value is JPY 83,169 million, with a minimum size of JPY 846 million and a maximum size of JPY 358,274 million.

To capture different dimensions of active risk we construct three variables:

Duration Risk: Duration exposure of the portfolio relative to the benchmark. It is defined as the absolute difference in years between the modified duration of the portfolio and that of the tactical benchmark, both observed on the last day of the month.

Spread Risk: Spread exposure of the portfolio relative to the benchmark. It is defined as the absolute difference between the duration contribution of the spread instruments (deposits, BIS, supranationals, agencies) in the portfolio and that of the tactical benchmark, in years, at month end.

Curve Risk: Curve exposure of the portfolio relative to the benchmark, net of duration risk. It is defined as the sum of the absolute differences between the duration contributions of each time bucket in the portfolio and the corresponding value for the benchmark, minus duration risk, in years, at month end.[12]

Moreover we define *Turnover* as the ratio between total value of monthly transactions over portfolio size.

Figure 2) and 3) show that national managers implement different risk strategies. In particular, they differ in terms of active duration, curve and spread positions, and this heterogeneity varies over time reflecting changes in uncertainty over monetary policies and market returns. For example, the maximum dispersion in active duration risk among dollar denominated portfolios is reached at the peak of the monetary policy cycle in 2007.

None of the NCBs appear to consistently achieve higher monthly returns, but they seem to have

[12]A numerical example may help. Suppose that at a certain date the duration of the portfolio held by Manager 1 (M1) is 2.06 years, against 2.03 years for the corresponding tactical benchmark. Hence, the duration risk of M1 is 0.03 years. On the same date, the spread instruments in M1's portfolio have a duration contribution of 0.80 years, against a value of 0.45 for the tactical benchmark. M1's spread risk is thus equal to 0.35 years. Suppose now that the total duration position of the tactical benchmark can be split in 4 time buckets, each corresponding to a certain maturity, namely 1,2,3 and 4 years and that each time bucket contributes to the total duration by 0.50, 0.50, 0.50 and 0.53 years respectively. The duration contributions for each time bucket are 0.80, 0, 0, 1.26 for M1's portfolio, that is M1 holds a barbell portfolio overweighted on the short and long part of the curve. M1's curve risk is (0.30+0.50+0.50+0.73)-0.03=2 years.

specific styles in terms of active risk and turnover strategies. In order to investigate conditional correlations, we estimate the two linear models

$$W_{j,Y,t} = \delta X_{Y,t} + \alpha_Y + \mu_t + \epsilon_{j,Y,t+1}$$

$$W_{j,Y,t} = \delta X_{Y,t} + \alpha_Y + \mu_t + \eta_j + \epsilon_{j,Y,t+1}$$

where $X_{Y,t}$ is the full set of risk factors in year Y month t. We alternate *Monthly Returns, Duration*, *Curve* and *Spread Risk* and *Turnover,* in absolute values, as dependent variables $W_{j,Y,t}$ for each portfolio j. The difference between the two equations resides in the term η_j, the portfolio fixed effect. Table 2) shows the $R^2$for the estimates of the two models in the sub-periods 2002-2005 and 2006-2009. While portfolio fixed effects do not add explanatory power to the model when we consider monthly returns as the dependent variable, they noticeably improve the goodness of the fit when we analyze risk and turnover measures.

Active management can also be affected by non-market factors, such as managers' strategic considerations. Table 3) shows that, for USD denominated portfolios, the intensity of active bets for managers with cumulative performances below or above the tactical benchmark changes between the first and the second half of the year, with losers increasing risk and winners shunning risk to lock-in returns towards the end of the year. Such patterns seem less pronounced for JPY portfolios.

Since monetary incentives, career concerns and peer pressure can motivate effort and risk taking, managers' specific factors, such as age or compensation schemes, may drive the relationship between relative performance (*ranking*) and active management. We conduct a survey among 8 of the 12 NCBs and collected information at yearly frequency on 26 different heads of management teams, including their age, gender, education, previous experience in the financial sector, tenure at the NCB, salary and nationality. We also include information on each manager's career path, namely if he received a promotion, left the NCB or moved into a different job within the NCB. The survey's questions are listed in Figure 4). Summary statistics are presented in Table 4). On average, USD (JPY) portfolio managers are 41 (40) years old, with 15 (14) years of tenure in their NCB; they are mostly male and with no previous experience in the financial private sector. Promotions are a

relatively rare event, observed only for 12.5% (11%) of the USD (JPY) manager-year sample. It is worth noting that none of the portfolio manager ever received a performance-related bonus. Thus we can exclude direct monetary incentives as the explanation for effort/risk taking.

4 Relative Performance and Risk Taking

We construct our measure of relative performance starting from portfolios cumulative returns. Each month we order portfolios (i.e. NCBs sub-portfolios) according to their absolute year-to-date performance and define the variable $Distance_{j,Y,t}$ as the difference (in percentage points) between the cumulative return of the best performing portfolio at the end of month $t = 1, .., 12$ of year $Y = 2002, .., 2009$ and portfolio j 's cumulative return in that same month. Thus, *Distance* is a cardinal ranking measure.

We estimate

$$W_{j,Y,t+1} = \beta Distance_{j,Y,t} + \gamma AboveBmk_{j,Y,t} + \theta FirstHalf_{Y,t} + \delta X_{Y,t} + \alpha_Y + \mu_t + \eta_j + \epsilon_{j,Y,t+1} \quad (1)$$

where $AboveBmk_{j,Y,t}$ is a dummy variable that takes value 1 if portfolio j 's return at time t is greater than the return on the tactical benchmark, $FirstHalf_{Y,t} = 1$ if $t \leq 6$ and 0 otherwise and $X_{Y,t}$ is the full set of risk factors described in the previous section. We control for year, month and portfolio fixed effects and cluster errors at the portfolio level to account for the possibility that multiple observations for the same NCB are correlated over time. We alternate *Duration*, *Curve* and *Spread Risk* and *Turnover,* in absolute values, as dependent variables $W_{j,Y,t+1}$. Although a higher turnover ratio does not necessarily represent active risk, we include it in the analysis because low relative performance may affect it, for example by inducing managers to look more actively for investment opportunities or to try their luck by increasing their bets (Dow and Gorton [1997], Allen and Gorton [1993]). We estimate equation 1 separately for dollar and yen portfolios, since the two markets are subject to different risk factors. In particular the yen fixed income market is characterized by significantly smaller yields and volatility. Furthermore, the size of yen denominated

portfolios is considerably smaller.

The results of the estimation for our main specification (equation 1) are presented in Table 5), columns 1,3,5,7. Higher distance at the end of month t, i.e. low relative performance, significantly increases active risk in terms of duration, curve and spread positions in month $t+1$ for portfolios denominated in US dollars., while no evidence of this sort emerges for JPY portfolios.

Since teams (and strategies) can vary over time within each NCB it would be optimal to include fixed effect at the portfolio-team level. Unfortunately we do not possess this information for all of the NCBs in the sample. As mentioned earlier, we partially solve this problem by using portfolio fixed effects and clustering errors at portfolio level. To further alleviate the concern that results may be driven by team specific management styles, we add Year-Portfolio fixed effects to our main specification, since teams are usually not reshuffled during the calendar year. We show coefficient estimates from a standard OLS estimation in Table 5), columns 2,4,6,8. The results presented above are robust to this specification when risk is expressed in terms of duration and curve; coefficients however decrease significantly.[13]

Most of the documented effects of ranking on risk taking come from the bottom of the relative performance distribution. Table 6) shows coefficient estimates for our main specification augmented with two alternative explanatory variables, namely either the square of *Distance* ($Distance^2$) or an interaction term between *Distance* and a dummy variable -*Low Rank*- that takes value 1 if the portfolio j's return in month t is below the month's median (*Dist.*$\times$*Low Rank*). Managers with poor relative performance and with performance below the median (*Low Rank=1*) react more intensely by taking more risk. Furthermore, the effects of relative ranking are more pronounced in the second half of the year and for portfolios that are underperforming the benchmark, as showed by the coefficients for the interaction terms *Distance*$\times$*July-Dec* and *Distance*$\times <$*Bmk* in Table 7).[14]

To investigate whether trends in performance affect our results we construct the dummy variable *Worse=1* if the portfolio experienced a widening of the performance differential with the top ranked

[13] For JPY denominated portfolios the specification with Year-Portfolio fixed effects yields a positive coefficient when risk is expressed in terms of curve positions.

[14] Once again results are mixed and hard to interpret for JPY denominated portfolios. The specification with $Distance^2$ yields a negative coefficient for the model with curve risk. The interaction term *Distance*$\times$*July-Dec* has a positive coefficient for the model with curve risk. The interaction term *Distance*$\times <$*Bmk* has a positive coefficient for the model with spread risk.

portfolio over the current month and we interact it with *Distance*. The coefficients for this interaction term are presented in Table 8), columns 1,3,5,7. Results are ambiguous. Trends seem to either reinforce the ranking-risk relationships (for duration risk) or to weaken it (for spread risk in JPY portfolios). In order to verify that results are driven by relative rather than absolute performance, we replace the dummy *AboveBmk* from equation 1) with a continuous variable for cumulative performance. Results on duration and curve risk are robust to this specification (Table 8), columns 2,4,6,8).

Finally we examine separately the two sub-periods 2002-2005 and 2006-2009. Recall that until the end of 2005 all 12 NCBs were managing both USD and JPY portfolios, while starting from January 2006 and until the end of the sample only 8 NCBs managed USD portfolios and 6 NCBs managed JPY portfolios, with 2 NCBs managing portfolios in both currencies. Thus, the two periods differ both in the number of tournament participants and in the NCBs' degree of currency specialization. Additionally, we estimate equation 1) by using an alternative ordinal measure of ranking instead of the cardinal measure. This measure takes value 1 for the best performer of the month, 2 for the second best and so on and so forth. For this measure to be meaningful we need a constant number of competitors over the observation period and this is why we employed it only for the analysis of the two sub-periods.

Tables 9) and 10) show the results of this estimation. The structure of the tournament seems to affect risk taking. For dollar denominated portfolios, the ranking-risk relationship intensifies in the second period when we consider duration risk but ceases to be significant when risk is expressed in terms of curve positions. Yen denominated portfolios display a positive and significant effect of relative ranking on curve and spread risk during years 2002 to 2005, but no significant effects for the subperiod 2006-2009. These changes may be due to the reduction in the number of competitors, to the effects of currency specialization or to the peculiar management style of the NCBs left in each tournament.

To summarize, we find empirical evidence for the ranking-risk relationship for portfolios denominated in US dollars. We interpret this outcome in light of the fact that JPY portfolios are on average substantially smaller than USD portfolios and for this reason they may grant less visibility to managers. Moreover, Japanese fixed income markets offer fewer opportunities for value or directional

trades because of illiquidity and lower volatility.

We obtain the strongest results when risk is expressed in terms of duration and curve positions; this is not surprising since these are the most important risk factors for government and supranational bond markets. The effects of ranking on turnover are weak and unstable, with coefficients that are not significant (in most cases), negative or positive, depending on the specification. This is not entirely surprising. While high turnover may derive from an active quest for investment opportunities, it may also signal unwillingness to hold on to specific bets for a prolonged period of time or frequent readjustments in order to track the benchmark more closely (like in the case of ETFs). Therefore the ranking-turnover relationship has no clear ex-ante implications.

The analysis reveals the presence of non-linearities in the intensity of the ranking-risk relationship: portfolios that are more distant from the best performers and that are underperforming the benchmark are the ones for which the relationship is stronger. This is in contrast with results emerging from studies on private asset management industry, where "top funds tend to "lock in" their position while funds whose performance is closer to top funds have greater incentives to alter their portfolio risk. In the extreme, the poorest performing funds also exhibit a strong tendency to lock in their position." (Qiu [2003]). Our results, instead, are stronger in the extreme of the ranking distribution. This may be due to the fact that our tournament lacks the "winner takes it all" component of the private sector, which is related to the non-linear relationship between ranking and flows of investment funds.

5 Tournaments, Risk Taking and Indirect Incentives

We established a link between relative performance and relevant risk taking measures. In the absence of monetary incentives provided by the fund selection/management fees mechanisms, we look at indirect incentives in order to explain such findings. Chevalier and Ellison [1999] show that managerial turnover depends on managers' past performance, and this in turn affects investment decisions. This is consistent with theoretical models where principals learn managers' skills from the time series of past outputs. We consider an additional, cross-sectional dimension of this problem and ask wether,

once we account for absolute performance, there is still scope for relative performance, i.e. own versus peers' outputs, to trigger career concerns.[15] This can occur because the tournament structure may provide additional information on managers' skills, especially in a framework, like the one analyzed here, in which managers are homogeneous in terms of output objectives, risk constraints and information. "In such a setting, the *relative performance* of the agents can provide a good indicator of their individual efforts, while controlling for the effects of the common environmental shock" (Sappington [1991]).

As noted by Gibbons and Murphy [1990], basing career rewards on relative performance may impose costs to the employer, insofar as it "generates incentives to sabotage the measured performance of co-workers, to collude with co-workers and shirk, and to apply for jobs with inept co-workers". None of these considerations apply to our setting. Portfolio performances are based on market prices and are very hard, if not impossible, to manipulate; there is no evidence of collusion among portfolio managers as strategies and performances differ substantially among managers and over time; it is not possible for portfolio managers to pick and choose the other NCBs they want to compete with. The only potential drawback of the tournament structure resides in its impact on production externalities. It is possible that competition inhibits collaboration and information exchange, hurting aggregate performance. This concern may play a role in the costs and benefits analysis of the reserve management framework at the Eurosystem level, but it is unlikely to be meaningful for the individual NCBs.

Another explanation for our findings is based on peer pressure. Managers whose performance falls behind that of their peers may experience distress due to feelings of inadequacy and failure, and may react to this discomfort by increasing their effort level.[16] Previous empirical literature has shown the relevance of peer effects in low-skill jobs (Bandiera et al. [2010], Falk and Ichino [2006], Mas and Moretti [2009]). The advantage of the empirical settings in these studies is that, just like in our context, a worker' s performance is immediately observable by his peers.

It has been argued that, in workplaces with highly skilled employees (e.g. medical science research) an increase in productivity of a worker following a better performance of his peers may be

[15]For a theory on relative performance and compensation see Nalebuff and Stiglitz [1983]

[16]Large skill differentials among workers, however, may create adverse incentives and reduce effort levels (Brown [2011]).

due to knowledge spillovers rather than peer pressure (Jackson and Bruegmann [2009]). Although all portfolio managers operate in the same large institution, namely the Eurosystem, and some limited knowledge spillover may occur, our data do not allow us to document this mechanism. Moreover, NCBs managers are not exactly co-workers as they have different employers, they sit in offices in different European cities and they do not directly observe each other's investment strategies.

5.1 Relative Performance and Careers

We examine actual career progressions of 26 individual national managers employed in 8 of the 12 NCBs involved in foreign reserve management. As shown in Figure 4), information on promotions and separations is explicitly requested in the questionnaire. We interpret separations as voluntary terminations, as positions at the NCBs are mostly tenured. We infer lateral moves whenever an individual indicated as the senior manager in year t is no longer in charge at t+1 and has not left the NCB.

Table 11 Panel A shows managers' characteristics in the year of, or the year before, a career event and compares them with the rest of the sample. Managers who receive a promotion or move laterally do not significantly differ from those who do not experience such events in terms of average tenure (16 years for promotions and 13 years for lateral moves), age (40) and salary (approximately between EUR 76k and 100k). Separations, instead, seem to happen at an earlier career stage. Managers who leave have shorter tenure (4 year versus 14 years), lower salary (EUR 51k to 75k versus 76k to 100k) and are younger (30 versus 40) than their colleagues who stay.

Table 11 Panel B shows time-invariant characteristics of managers who received a promotion, left or moved laterally. It appears that managers who received promotions are more likely to be female and, contrary to what one might expect, less likely to have previous working experience in the financial industry and marginally less educated. Instead, as one might expect, these individuals display superior skills in money management. In particular, managers who received a promotion have higher absolute performance when compared with managers who left or managers who moved laterally (Table 12). More importantly in the context of this study, promotions seem to be associated with higher *relative* performance, while separations correlate with both low absolute and relative

performances. This evidence suggests that career advancements are granted not only on the basis of the fulfillment of the stated management objective, i.e. outperforming the tactical benchmark, but also on the basis of managers' ability to achieve better returns than their peers'. For this reason, managers who fail to achieve both goals may perceive their career as capped and decide to leave the NCB.

5.2 Interactions with Career Related Variables

If the mechanism behind the link between relative rankings and risk strategies rests on managers' career concerns, the intensity of the reactions to rankings should vary with the relative importance of individual managers' career motives. It is arguably difficult to identify personal inclinations, such as ambition in the workplace, using impersonal or general categories. However, one can conjecture that motivations may change over workers' career path (Chevalier and Ellison [1999]). Moreover these developments are likely to be shaped by the specific context in which workers make their decisions. Kempf et al. [2009] argue that, compared with compensation incentives, which typically induce risky strategies, employment concerns may present offsetting, negative effects on risk taking, which can dominate during bear markets. As opposed to the private sector, jobs in central banks are typically tenured. This implies little employment risk, which can be counterbalanced, as seen in the previous section, by a more arduous upward mobility. In the context of this study, career concerns may then be stronger in early career stages, when managers can start building a reputation for themselves without the risk of being fired. Conversely, career concerns should be weaker in late work-life years, when managers have already shown their abilities and are approaching retirement.

We estimate

$$\begin{aligned} W_{j,Y,t+1} = {} & \beta M_{i,j,Y,t} + \vartheta TeamSize_{j,Y,t} + + \gamma_1 Dist \times EarlyCareer_{i,j,Y,t} + \gamma_2 Dist \times LateCareer_{i,j,Y,t} + \\ & + \gamma_3 Dist \times Salary_{i,j,Y,t} + \gamma_4 Dist \times Age_{i,j,Y,t} + \\ & + \delta P_{j,Y,t} + \alpha_Y + \mu_t + \eta_j + \epsilon_{i,j,Y,t+1} \end{aligned} \tag{2}$$

where $M_{i,j,Y,t}$ is a vector of manager i specific characteristics including age, salary, tenure and gender; $TeamSize_{j,Y,t}$ is the number of components of the management team of portfolio j; $P_{j,Y,t}$ includes all controls from our main specification (Equation 1). We control for year, month and portfolio fixed effects. We note that in this equation portfolio fixed effects may also control for relevant country-specific variables like the salary, tax and price levels, that are relatively stable over time. We alternate *Duration*, *Curve* and *Spread Risk* and *Turnover,* in absolute values, as dependent variables $W_{j,Y,t+1}$.

The coefficients of interest are γ_1, γ_2, γ_3 and γ_4, which measure the intensity of the reaction to our measure of relative ranking, *Distance*, at different career stages, proxied by manager's tenure, salary range and age. Variables $EarlyCareer$ and $LateCareer$ take value 1 if the manager's tenure is below 5 years or above 23 years, respectively. These two thresholds represent the 25th and 75th percentile of the tenure distribution in our sample.

The results of this estimation are presented in Tables 13) and 14). Consistent with our conjectures, when we estimate Equation 3 using duration and curve as risk indicators, the variable $LateCareer = 1$ significantly reduces the impact of relative rankings on risk taking, while the opposite is true for the variable $EarlyCareer$. No additional effects however can be discerned for the interactions between relative rankings and age and salary.

Interestingly, riskier strategies, independently from relative performance, are more common among more experienced and better paid managers and when the management team is larger.

5.3 Performance Analysis: Efficient Effort or Risk Taking?

We provide evidence that managers react to low performances relative to their peers by increasing risk. Such behaviour is only rational insofar as higher risk improves the chances of good performance relative to the benchmark or at least it does not decrease them.[17] More risk can in fact be counterproductive and further harm fund's performance and manager's career as a consequence. If risky strategies do not systematically generate better relative returns, managers will still find it worth to

[17] Another possible explanation is related to managerial overconfidence (Eshraghi and Taffler [2012])

try, provided that such effort does not involve excessive personal costs. We estimate

$$R_{i,j,Y,t+1} = \alpha Turnover_{j,Y,t} + \lambda Risk_{j,Y,t} + \theta M_{Y,t} + \alpha_Y + \mu_t + \eta_i + \epsilon_{i,j,Y,t+1} \quad (3)$$

where $R_{j,Y,t+1}$ is the excess return (positive or negative) over the benchmark achieved by manager i on fund j in year Y and month $t+1$; $Risk_{j,Y,t}$ is a vector of duration, curve and spread risk positions on fund j in year Y and month t; $X_{Y,t}$ is the full set of market risk variables as in Equation 1. Table 15) shows that, for dollar denominated portfolios, duration risk is positively associated with higher excess returns in the next period while curve and spread risk and turnover have no significant effect. Managers' reaction to rankings seems therefore to be rationally justified.

6 Conclusions

This paper provides evidence that money managers react to relative performance by adjusting their investment strategies. In particular, managers who underperform their peers increase portfolio risk vis-à-vis the common benchmark.

We use data from ECB foreign reserve management funds. Although foreign reserves belong to the ECB for all intents and purposes, day-to-day transactions and management are delegated, within a common framework, to multiple national central banks. We argue that this setting generates a tournament among managers and such competition is reflected in risk-taking behaviours for managers who lag behind. One advantage of our data set is that strategies and risk can be directly measured. We show that managers whose distance from the top performers is larger tend to increase their duration and curve *active* positions, i.e. absolute deviations from the tactical benchmark. Such effects are stronger for US dollar portfolios, if the portfolio is underperforming the benchmark and during the second half of the year.

We investigate the mechanisms behind our findings. ECB reserve management does not offer direct monetary incentives through flow of funds, fees or performance-related compensation, which have been indicated as the explanation for the ranking-risk relationship by previous literature. Therefore we focus on career concerns. Using survey data, we provide evidence suggesting that a) career

advancements are positively correlated with high relative returns; b) reaction to rankings are less pronounced for managers in their late career stage; c) risk-taking is effective in improving returns for US dollar portfolios.

References

Franklin Allen and Gary Gorton. Churning bubbles. *The Review of Economic Studies*, 60 (4):813–836, 1993.

Oriana Bandiera, Iwan Barankay, and Imran Rasul. Social incentives in the workplace. *The Review of Economic Studies*, 77(2):417–458, 2010.

Christopher B Barry and Laura T Starks. Investment management and risk sharing with multiple managers. *The Journal of Finance*, 1984.

Jennifer Brown. Quitters never win: The (adverse) incentive effects of competing with superstars. *Journal of Political Economy*, 2011.

Keith C Brown, W Van Harlow, and Laura T Starks. Of tournaments and temptations: An analysis of managerial incentives in the mutual fund industry. *The Journal of Finance*, 51 (1):85–110, 1996.

Judith Chevalier and Glenn Ellison. Risk taking by mutual funds as a response to incentives. *Journal of Political Economy*, 105(6):1167–1200, 1997.

Judith Chevalier and Glenn Ellison. Career concerns of mutual fund managers. *The Quarterly Journal of Economics*, 114(2):389–432, 1999.

James Dow and Gary Gorton. Noise trading, delegated portfolio management, and economic welfare. *Journal of Political Economy*, 105(5):1024–1050, 1997.

ECB. Portfolio management at the ecb. *Monthly Bulletin, April*, 2006.

Arman Eshraghi and Richard Taffler. Fund manager overconfidence and investment performance: Evidence from mutual funds. 2012.

Armin Falk and Andrea Ichino. Clean evidence on peer effects. *Journal of labor economics*, 24(1):39–57, 2006.

Robert Gibbons and Kevin J Murphy. Relative performance evaluation for chief executive officers. *ILR Review*, 1990.

Robert Gibbons and Kevin J Murphy. Optimal incentive contracts in the presence of career concerns: Theory and evidence. *Journal of political Economy*, 100(3):468–505, 1992.

Bengt Holmstrom. Moral hazard in teams. *The Bell Journal of Economics*, pages 324–340, 1982.

C Kirabo Jackson and Elias Bruegmann. Teaching students and teaching each other: The importance of peer learning for teachers. *American Economic Journal: Applied Economics*, 1(4):85–108, 2009.

Alexander Kempf, Stefan Ruenzi, and Tanja Thiele. Employment risk, compensation incentives, and managerial risk taking: Evidence from the mutual fund industry. *Journal of Financial Economics*, 92(1):92–108, 2009.

Edward P Lazear and Sherwin Rosen. Rank-order tournaments as optimum labor contracts. *Journal of political Economy*, 89(5):841–864, 1981.

Alexandre Mas and Enrico Moretti. Peers at work. *The American economic review*, 99(1): 112–145, 2009.

Barry J Nalebuff and Joseph E Stiglitz. Information, competition, and markets. *The American Economic Review*, 73(2):278–283, 1983.

Jiaping Qiu. Termination risk, multiple managers and mutual fund tournaments. *Review of Finance*, 7(2):161–190, 2003.

David EM Sappington. Incentives in principal-agent relationships. *The Journal of Economic Perspectives*, pages 45–66, 1991.

Antonio Scalia and Benjamin Sahel. Ranking, risk-taking and effort: an analysis of the ecb's foreign reserves management. *ECB Working Paper Series*, (1377), September 2011.

Christopher G Schwarz. Mutual fund tournaments: The sorting bias and new evidence. *The Review of Financial Studies*, 25(3):913–936, 2011.

William F Sharpe. Decentralized investment management. *The Journal of Finance*, 1981.

Erik R Sirri and Peter Tufano. Costly search and mutual fund flows. *The journal of finance*, 53(5):1589–1622, 1998.

Table 1: Aggregate Portfolios Descriptive Statistics

Portfolio: USD

Size (average, in USD milions) 34,965.13	Annual Return (Mean 2002-2009) 3.96%	TBill 1 Month Annual Return (Mean 2002-2009) 2.16%	BofA US Treasuries 1-3yr (Mean 2002-2009) 3.61%
Excess Returns Volatility (monthly) 0.0046	Sharpe Ratio (rel. Risk Free) 0.318	Sharpe Ratio (rel. TB) 0.434	
Duration 1.35	Curve (rel. SB) 0.297	Spread 0.636	Turnover 3.56

Portfolio: JPY

Size (average, in JPY milions) 748,533.4	Annual Return (Mean 2002-2009) 0.416%	Tbill 3 Months Annual Return (Mean 2002-2009) 0.191%	BofA JP Gov 0-1Y 0.23%
Excess Returns Volatility (monthly) 0.0008	Sharpe Ratio (rel. Risk Free) 0.227	Sharpe Ratio (rel. TB) 0.351	
Duration 0.864	Curve (rel. SB) 0.288	Spread 0.0018	Turnover 0.734

Figure 1: Market Risk Factors

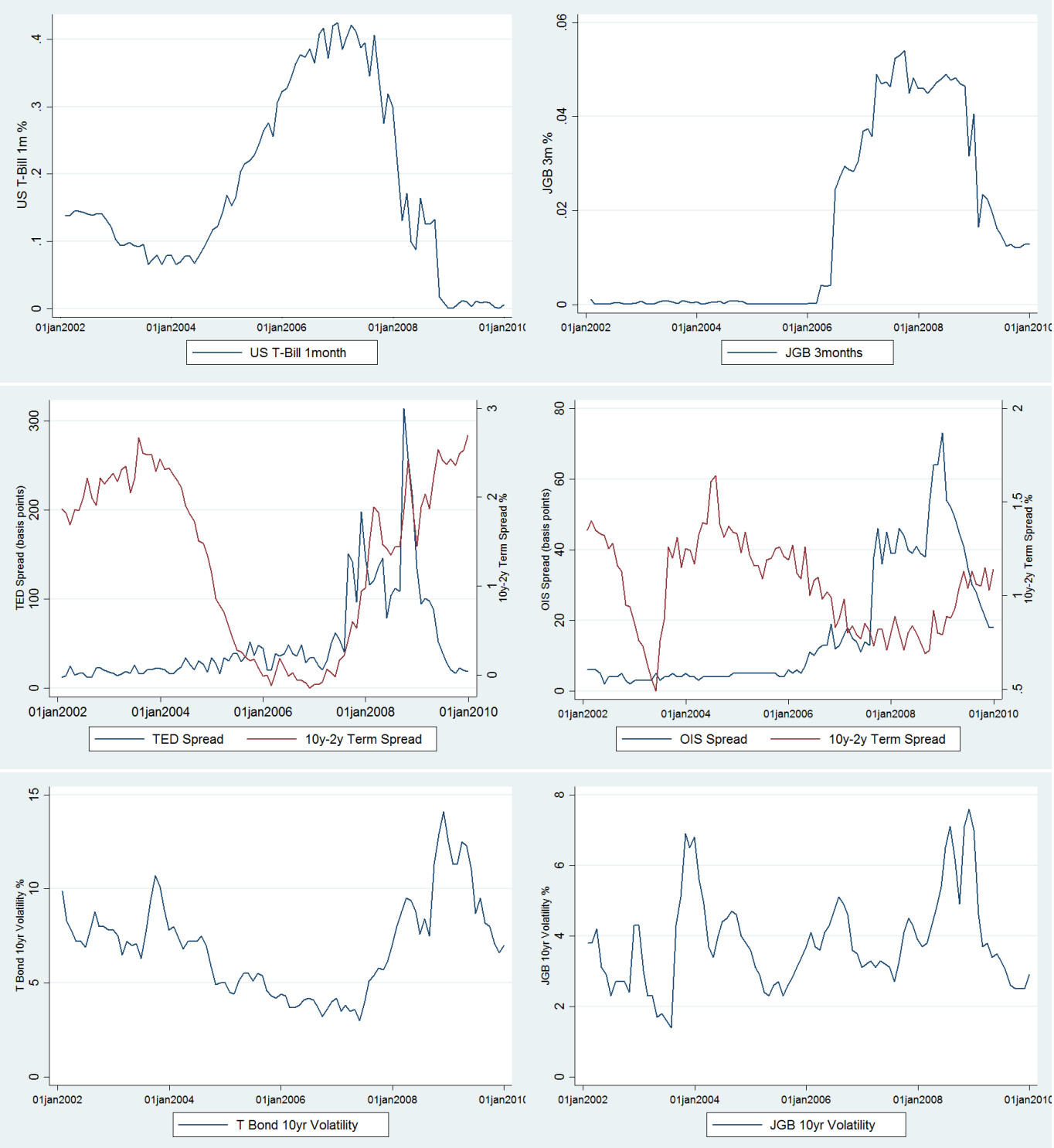

Figure 2: Active Management: USD Portfolios

Dots represent monthly portfolios active positions against the tactical benchmark, in duration, spread and curve and turnover ratios. The solid line represents the dispersion of active positions and turnover ratios among portfolios throughout the time series.

Figure 3: Active Management: JPY Portfolios

Dots represent monthly portfolios active positions against the tactical benchmark, in duration, spread and curve and turnover ratios. The solid line represents the dispersion of active positions and turnover ratios among portfolios throughout the time series.

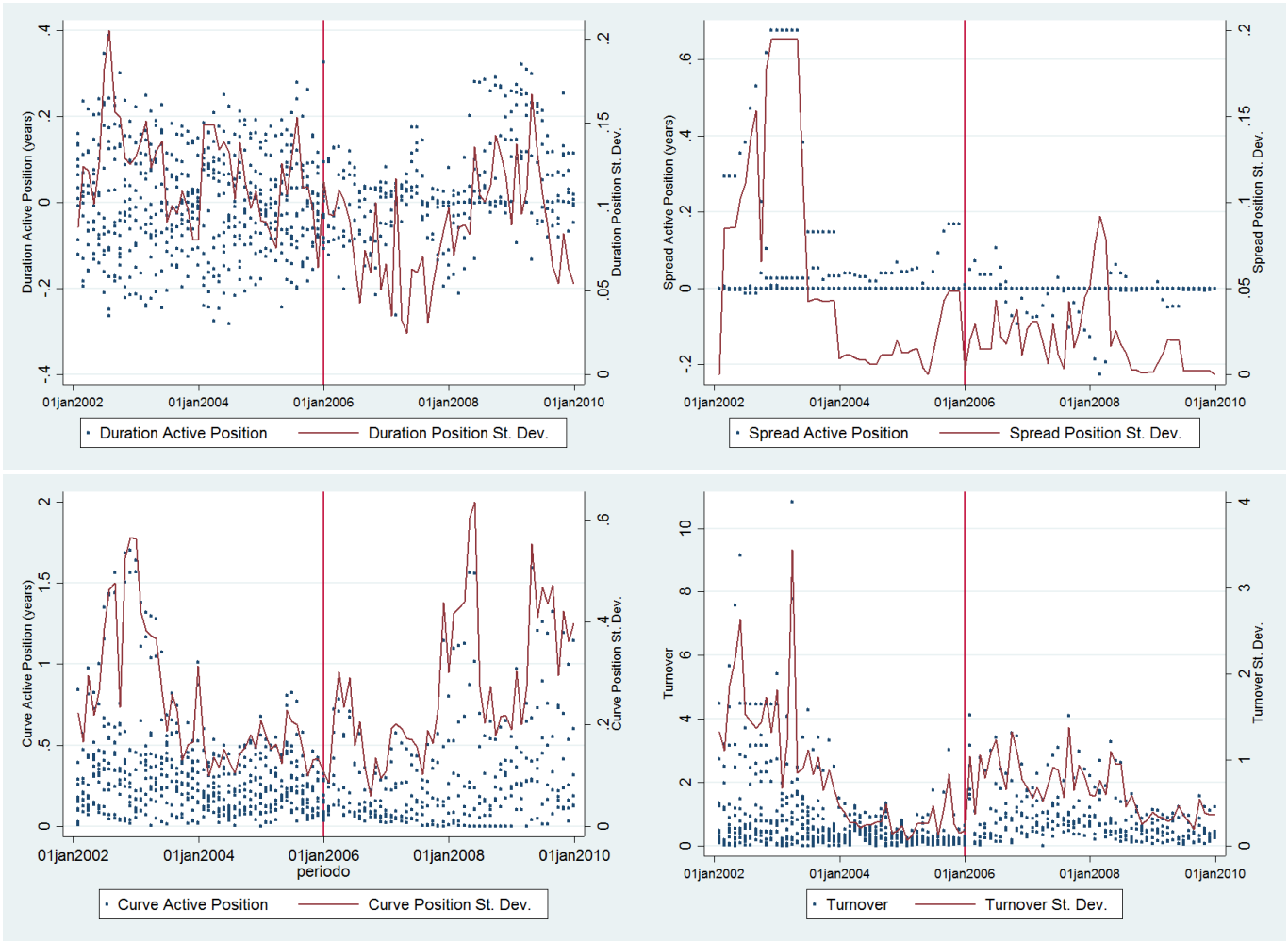

Table 2: Return, Risk, Turnover and Portfolio Fixed Effects

We report R^2 values for the linear regressions of monthly returns, risk and turnover on market risk factors. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. In columns (1) and (3) we report R^2 for linear regressions that include Year and Month fixed effects. In columns (2) and (4) we report R^2 for linear regressions that include Year, Month and Portfolio fixed effects. The sample is split in the two sub-periods 2002-2005 and 2006-2009.

USD Portfolios

	(1)	(2)	(3)	(4)
	2002-2005		2006-2009	
Portfolio FE:	No	Yes	No	Yes
Dependent Variable:				
Monthly Returns	0.499	0.500	0.627	0.627
Duration Risk	0.019	0.361	0.183	0.233
Curve Risk	0.067	0.467	0.037	0.460
Spread Risk	0.064	0.452	0.046	0.359
Turnover	0.026	0.584	0.139	0.494
Market Risk Controls	Y	Y	Y	Y
Year, Month FE	Y	Y	Y	Y
N	576	576	384	384

JPY Portfolios

	(1)	(2)	(3)	(4)
	2002-2005		2006-2009	
Portfolio FE:	No	Yes	No	Yes
Dependent Variable:				
Monthly Returns	0.356	0.361	0.484	0.487
Duration Risk	0.095	0.278	0.215	0.391
Curve Risk	0.121	0.514	0.127	0.709
Spread Risk	0.045	0.359	0.055	0.302
Turnover	0.180	0.335	0.158	0.577
Market Risk Controls	Y	Y	Y	Y
Year, Month FE	Y	Y	Y	Y
N	576	576	288	288

Table 3: Active Management, Performance and Calendar Effects

Panel A: Average change of risk levels and turnover ratios between the first and the second half of the calendar year

USD	All Portfolios		
	January-June	July-December	Δ
Duration	0.0453	0.0405	-11%
Curve	0.2088	0.2165	4%
Spread	0.0703	0.0721	3%
Turnover	3.4793	3.3891	-3%

JPY	All Portfolios		
	January-June	July-December	Δ
Duration	0.0979	0.0832	-15%
Curve	0.3231	0.2964	-8%
Spread	0.0163	0.0147	-10%

Panel B: Average change of risk levels and turnover ratios between the first and the second half of the calendar year, for portfolios over/under performing the tactical benchmark

USD	Above Bmk			Below Bmk		
	January-June	July-December	Δ	January-June	July-December	Δ
Duration	0.0433	0.0329	-24%	0.0534	0.0690	29%
Curve	0.2022	0.1668	-18%	0.2346	0.4030	72%
Spread	0.0689	0.0616	-11%	0.0758	0.1118	47%
Turnover	3.6457	3.4511	-5%	2.8306	3.1563	12%

JPY	Above Bmk			Below Bmk		
	January-June	July-December	Δ	January-June	July-December	Δ
Duration	0.0970	0.0849	-12%	0.0995	0.0787	-21%
Curve	0.3274	0.2759	-16%	0.3154	0.3479	10%
Spread	0.0077	0.0066	-14%	0.0318	0.0350	10%
Turnover	0.8455	0.7458	-12%	0.8051	0.6676	-17%

Figure 4: Managers Survey: Questionnaire

		2002	2003	2004	2005	2006	2007	2008	2009
	Team manager								
A.1	Year of birth								
A.2	Gender								
A.3	Nationality								
A.4	Year of inception at NCB								
A.5	Still at NCB (Y/N)								
A.6	If No: year of termination								
A.7	Past experience in financial sector (if YES, number of years)								
A.8	Education:								
	1 - undergraduate								
	2 - graduate/MBA								
	3 - PhD								
A.9	Gross yearly salary (EUR thousands):								
	1 - Up to 50								
	2 – 51 to 75								
	3 – 76 to 100								
	4 – 101 to 125								
	5 – above 125								
A.10	Performance-related bonus (Y/N)								
A.11	Obtained a promotion (Y/N)								
	Team level								
B.1	Number of components								
	Second person in charge								
C.1	Year of birth								
C.2	Gender								
C.3	Nationality								

Table 4: NCBs Managers Survey: Descriptive Statistics

USD Portfolios

Team Head - Year (60 Obs.)

Age					**Years in Service at NCB**					
Avg:	40,65	Min:	28	Max: 63	Avg:	14,87	Min:	1	Max:	34
Gender					**Previous Experience in Financial Industry**					
Male	72%	Female	28%		Yes	37%	No	63%		
Received Promotion (38 Obs.)					**Salary**					
Yes	12,5%	No	87,5%		51k to 75k	38%	76k to 100k	32%	101k to 125k	30%

Team - Year (60 Obs.)

Number of Team Members					**Age of Second Person in Charge**					
Avg:	2,78	Min:	1	Max: 5	Avg:	37,64	Min:	28	Max:	55

JPY Portfolios

Team Head - Year (60 Obs.)

Age					**Years in Service at NCB**					
Avg:	39,88	Min:	24	Max: 63	Avg:	13,90	Min:	1	Max:	34
Gender					**Previous Experience in Financial Industry**					
Male	72%	Female	28%		Yes	38%	No	62%		
Received Promotion (34 Obs.)					**Salary**					
Yes	11%	No	89%		51k to 75k	45%	76k to 100k	28%	101k to 125k	27%

Team - Year (60 Obs.)

Number of Team Members					**Age of Second Person in Charge**					
Avg:	2,58	Min:	1	Max: 5	Avg:	37,58	Min:	28	Max:	55

Table 5: Relative Performance and Risk-Taking

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *First Half* is a dummy variable that takes value 1 for the months from January to June. *Above Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. In columns (1), (3), (5), and (7) standard errors are clustered at the portfolio level.

USD 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	0.118***	0.0487*	1.158***	0.352***	0.208*	-0.00689	0.825	-2.949***
	(0.0107)	(0.0259)	(0.233)	(0.0622)	(0.110)	(0.0310)	(0.734)	(0.718)
First Half	0.0181*	0.0125	0.126**	0.0433**	0.0331**	0.00956	0.467	0.0723
	(0.00824)	(0.00874)	(0.0461)	(0.0210)	(0.0130)	(0.0105)	(0.416)	(0.242)
Above Bmk	0.0151***	0.0235***	0.0882**	0.0351**	0.0193	-0.00777	0.269	-0.0362
	(0.00441)	(0.00643)	(0.0296)	(0.0155)	(0.0153)	(0.00770)	(0.425)	(0.178)
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
Year× Port. FE	N	Y	N	Y	N	Y	N	Y
N	880	880	880	880	880	880	880	880
adj. R^2	0.167	0.356	0.513	0.798	0.340	0.731	0.490	0.710

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

JPY 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	-0.0423	0.0974	-0.358	0.353*	0.334	-0.0114	1.342	-0.587
	(0.0654)	(0.0669)	(0.632)	(0.183)	(0.290)	(0.0491)	(1.578)	(0.822)
First Half	0.0267**	0.0375***	-0.0279	0.0304	0.0271	0.00540	0.111	-0.0501
	(0.0102)	(0.0109)	(0.0484)	(0.0300)	(0.0252)	(0.00803)	(0.0889)	(0.134)
Above Bmk	-0.00388	0.00382	-0.0581*	-0.000464	-0.0102	-0.00248	0.168	-0.00489
	(0.00838)	(0.00652)	(0.0271)	(0.0179)	(0.00927)	(0.00479)	(0.189)	(0.0801)
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
Year× Port. FE	N	Y	N	Y	N	Y	N	Y
N	792	792	792	792	792	792	792	792
adj. R^2	0.254	0.386	0.394	0.701	0.360	0.666	0.321	0.562

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Relative Performance and Risk-Taking: Best vs Worst Performers

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *Low Rank* is a dummy variable that takes value 1 if the portfolio j's return in month t is below the month's median. *First Half* is a dummy variable that takes value 1 for the months from January to June. $>$ *Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. Standard errors are clustered at the portfolio level.

USD 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	0.0401*	0.0210	0.490	0.671**	0.000207	-0.0659	0.604	0.782
	(0.0216)	(0.0417)	(0.411)	(0.281)	(0.263)	(0.142)	(2.516)	(4.042)
Distance^2	0.0753***		0.650*		0.202		0.215	
	(0.0228)		(0.307)		(0.190)		(1.891)	
Dist.×Low Rank		0.0936*		0.473*		0.265*		0.0418
		(0.0430)		(0.243)		(0.137)		(3.663)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	880	880	880	880	880	880	880	880
adj. R^2	0.170	0.168	0.526	0.516	0.346	0.344	0.490	0.490

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

JPY 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	-0.262	-0.0159	-1.795*	-0.486	0.276	0.207	0.734	-0.221
	(0.237)	(0.191)	(0.988)	(0.624)	(0.303)	(0.240)	(4.270)	(1.653)
Distance^2	0.744		4.869		0.197		2.060	
	(0.665)		(2.717)		(0.449)		(9.613)	
Dist.×Low Rank		-0.0318		0.155		0.152		1.880
		(0.202)		(0.407)		(0.114)		(1.310)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	792	792	792	792	792	792	792	792
adj. R^2	0.257	0.253	0.402	0.393	0.359	0.363	0.320	0.323

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 7: Relative Performance and Risk-Taking: Calendar Year and Benchmark Effects

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *Worse* is a dummy variable that takes value 1 if the portfolio experienced a widening of the performance differential with the top ranked portfolio over the current month. *First Half* is a dummy variable that takes value 1 for the months from January to June. *> Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. Standard errors are clustered at the portfolio level.

USD 2002-2009

	(1) Duration t+1	(2) Curve t+1	(3) Spread t+1	(4) Turnover t+1
Distance	-0.0920*	-0.0962	-0.258**	1.028
	(0.0488)	(0.240)	(0.0837)	(3.339)
Distance×July-Dec	0.158***	0.0993	-0.186	-3.586**
	(0.0404)	(0.205)	(0.215)	(1.170)
Distance×<Bmk	0.0679	1.323***	0.733**	3.659
	(0.0630)	(0.396)	(0.299)	(2.762)
First Half; >Bmk	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y
N	880	880	880	880
adj. R^2	0.176	0.552	0.396	0.493

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

JPY 2002-2009

	(1) Duration t+1	(2) Curve t+1	(3) Spread t+1	(4) Turnover t+1
Distance	-0.132	-1.959*	0.345	1.020
	(0.139)	(0.985)	(0.354)	(2.745)
Distance×July-Dec	0.0828	1.393**	-0.170	-1.290
	(0.129)	(0.583)	(0.184)	(2.041)
Distance×<Bmk	0.0454	1.086	0.466**	4.854***
	(0.184)	(0.712)	(0.201)	(1.054)
First Half; >Bmk	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y
N	792	792	792	792
adj. R^2	0.253	0.409	0.387	0.333

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Relative Performance and Risk-Taking: Deteriorating Rank and Cumulative Performance

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *July-Dec* is a dummy variable that takes value 1 for the months from July to December. *<Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is below the return of the tactical benchmark. *First Half* is a dummy variable that takes value 1 for the months from January to June. *> Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. Standard errors are clustered at the portfolio level.

USD 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	0.0772**	0.168***	1.376***	0.479***	0.161*	0.123	2.080*	0.982
	(0.0265)	(0.0477)	(0.179)	(0.149)	(0.0780)	(0.151)	(1.096)	(2.275)
Dist.×Worse	0.0478*		-0.229		0.0760		-1.277	
	(0.0265)		(0.246)		(0.0520)		(1.150)	
Cum. Perf.		0.0758		-0.599***		-0.0624		0.551
		(0.0544)		(0.185)		(0.142)		(2.433)
First Half	Y	Y	Y	Y	Y	Y	Y	Y
>Bmk	Y	N	Y	N	Y	N	Y	N
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	800	880	800	880	800	880	800	880
adj. R^2	0.155	0.162	0.523	0.505	0.341	0.338	0.494	0.489

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

JPY 2002-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	-0.291*	0.101**	-0.304	-0.411	0.457	0.106	1.350	-0.447
	(0.143)	(0.0399)	(1.071)	(0.592)	(0.320)	(0.160)	(1.720)	(1.024)
Dist.×Worse	0.253**		-0.137		-0.102***		0.626	
	(0.106)		(0.483)		(0.0304)		(0.708)	
Cum. Perf.		0.211***		-0.298		-0.396*		-2.194*
		(0.0635)		(0.575)		(0.197)		(1.056)
First Half	Y	Y	Y	Y	Y	Y	Y	Y
>Bmk	Y	N	Y	N	Y	N	Y	N
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	707	792	707	792	707	792	707	792
adj. R^2	0.264	0.260	0.405	0.389	0.363	0.379	0.329	0.321

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Relative Performance and Risk-Taking: USD Portfolios

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *Ranking* is an ordinal measure of relative performance that takes values from 1 to N, where N is the total number of portfolios. *First Half* is a dummy variable that takes value 1 for the months from January to June. $>$ *Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. Standard errors are clustered at the portfolio level.

USD 2002-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	0.0793***		1.266***		0.172		0.601	
	(0.0149)		(0.191)		(0.102)		(0.828)	
Ranking		-0.00127		-0.00474		-0.0102*		-0.0856
		(0.000884)		(0.00649)		(0.00481)		(0.0572)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	528	528	528	528	528	528	528	528
adj. R^2	0.363	0.346	0.604	0.435	0.446	0.464	0.565	0.571

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

USD 2006-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	0.207***		0.529		0.145		1.470	
	(0.0398)		(0.365)		(0.152)		(2.253)	
Ranking		0.00183		-0.00145		0.000757		-0.0260
		(0.00218)		(0.00250)		(0.00277)		(0.0208)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	352	352	352	352	352	352	352	352
adj. R^2	0.162	0.143	0.453	0.436	0.328	0.314	0.450	0.449

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10: Relative Performance and Risk-Taking: JPY Portfolios

We report estimates for the linear regression of risk and turnover at time $t+1$ on relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. *Distance* is the difference in returns of portfolio j with respect to the best performer portfolio of month t. *Ranking* is an ordinal measure of relative performance that takes values from 1 to N, where N is the total number of portfolios. *First Half* is a dummy variable that takes value 1 for the months from January to June. $>$ *Bmk* is a dummy variable that takes value 1 if portfolio j's year to date return is above the return of the tactical benchmark. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility. Standard errors are clustered at the portfolio level.

JPY 2002-2005

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	-0.121		0.828*		1.055***		4.154*	
	(0.155)		(0.398)		(0.139)		(2.239)	
Ranking		-0.00213		0.00840		0.00939		0.0147
		(0.00191)		(0.00506)		(0.00659)		(0.0639)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	528	528	528	528	528	528	528	528
adj. R^2	0.248	0.251	0.507	0.506	0.459	0.411	0.310	0.301

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

JPY 2006-2009

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Duration t+1		Curve t+1		Spread t+1		Turnover t+1	
Distance	-0.0300		-0.0788		0.0394		1.820	
	(0.120)		(0.142)		(0.0245)		(1.644)	
Ranking		-0.00856*		0.00133		0.000422		0.0666
		(0.00348)		(0.00946)		(0.00134)		(0.0512)
First Half; >Bmk	Y	Y	Y	Y	Y	Y	Y	Y
Mkt Risk Controls	Y	Y	Y	Y	Y	Y	Y	Y
Time and Port. FE	Y	Y	Y	Y	Y	Y	Y	Y
N	264	264	264	264	264	264	264	264
adj. R^2	0.347	0.361	0.677	0.677	0.225	0.221	0.617	0.613

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 11: Career Events and Managers' Characteristics

Panel A: Managers' characteristics at the time of the career event, compared to the rest of the sample

		Tenure	Salary	Age	Obs.
Promotion (t)	**No**	15.63	3.00	41.52	48
	Yes	15.75	2.88	40.25	8
Separation (t+1)	**No**	14.34	2.85	40.19	62
	Yes	3.67	2.33	30.50	6
Lateral Move (t+1)	**No**	13.40	2.78	39.15	60
	Yes	13.38	3.00	40.75	8

Panel B: Time-invariant characteristics of managers who undergo a career event, compared to the rest of the sample

		Female	Previous Experience	Education (avg.)	Obs.
Promoted	**No**	8%	58%	2.17	12
	Yes	43%	29%	1.86	7
Left	**No**	20%	45%	2.00	20
	Yes	33%	50%	2.17	6
Moved	**No**	28%	44%	2.06	18
	Yes	13%	50%	2.00	8

Table 12: Career Events and Performance

Portfolio Currency	**Promoted**			**Left**			**Moved**		
USD	Yes: 7	No: 12	Δ	Yes: 3	No: 21	Δ	Yes: 8	No: 16	Δ
Performance	0.073	0.088	-0.015	-0.048	0.091	-0.139**	0.089	0.066	0.023
Distance	0.097	0.169	-0.072*	0.259	0.132	0.127**	0.152	0.146	0.006
JPY	Yes: 5	No: 6	Δ	Yes: 6	No: 13	Δ	Yes: 5	No: 14	Δ
Performance	0.005	0.005	0.000	-0.010	0.016	-0.026*	0.000	0.010	-0.010
Distance	0.074	0.114	-0.040*	0.136	0.085	0.051*	0.072	0.112	-0.040
Average USD&JPY [a)]	Yes: 5	No: 6	Δ	Yes: 3	No: 13	Δ	Yes: 5	No: 11	Δ
Performance	0.042	0.035	0.007	-0.033	0.050	-0.083**	0.048	0.028	0.020
Distance	0.089	0.151	-0.062*	0.176	0.109	0.067**	0.129	0.118	0.011

[a)] Refers to managers in charge of both USD and JPY denominated portfolios. Performance and distance are computed as the arithmetic average of the corresponding values for the two portfolios

Table 13: Relative Performance, Risk-Taking and Career Concerns: USD portfolios

We report estimates for the linear regression of risk and turnover at time $t+1$ on manager characteristics and their interactions with relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. The variables *Tenure Age Salary Male* refer to the head of the management team for each portfolio. *Early Career* is a dummy variable that takes value 1 if $Tenure \leq 5$. *Late Career* is a dummy variable that takes value 1 if $Tenure \geq 23$.Market risk controls include TED spread, term spread and 10-year bond volatility. Other controls include the variables *First Half*, *Above Bmk*, *Distance* and their interactions.

USD 2002-2009; Observations: 660

		Duration t+1	**Curve t+1**	**Spread t+1**	**Turnover t+1**
Fund Manager:					
	Tenure	0.0066*	0.0174***	0.0101**	-0.0186
		(0.0029)	(0.006)	(0.0039)	(0.0577)
	Age	-0.0037	-0.0159	-0.0127*	0.106
		(0.0027)	(0.0148)	(0.0066)	(0.0763)
	Salary	0.0089	-0.0326	0.011	1.1642
		(0.0175)	(0.063)	(0.0222)	(0.6863)
	Male	-0.0625	-0.2171	-0.0295	-2.8402***
		(0.038)	(0.135)	(0.0652)	(0.5904)
Team Size		0.0285***	0.0847*	0.0093	0.4396
		(0.0095)	(0.0394)	(0.0188)	(0.2886)
Distance#Early Career		0.0268	0.8803**	0.4233	-1.6678
		(0.1158)	(0.3289)	(0.234)	(5.9626)
Distance#Late Career		-0.4342***	-0.8268*	-0.3302	-7.2273**
		(0.1287)	(0.3758)	(0.3031)	(2.9239)
Distance#Age		0.0074	0.0115	0.0220*	-0.0591
		(0.008)	(0.033)	(0.0097)	(0.3064)
Distance#Salary		0.0507	0.4251*	0.1911	-3.5605*
		(0.0616)	(0.1895)	(0.1039)	(1.6121)
Market Risk Controls		Y	Y	Y	Y
Other Controls		Y	Y	Y	Y
Year, Month FE		Y	Y	Y	Y
Portfolio FE		Y	Y	Y	Y
R^2		0.2770	0.6832	0.5176	0.6137

Table 14: Relative Performance, Risk-Taking and Career Concerns: JPY portfolios

We report estimates for the linear regression of risk and turnover at time $t+1$ on manager characteristics and their interactions with relative performance at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the portfolio j and time t level; in the table suffixes are suppressed for brevity. The variables *Tenure Age Salary Male* refer to the head of the management team for each portfolio. *Early Career* is a dummy variable that takes value 1 if $Tenure \leq 5$. *Late Career* is a dummy variable that takes value 1 if $Tenure \geq 23$.Market risk controls include OIS spread, term spread and 10-year bond volatility. Other controls include the variables *First Half*, *Above Bmk*, *Distance* and their interactions.

JPY 2002-2009; Observations: 520		**Duration t+1**	**Curve t+1**	**Spread t+1**	**Turnover t+1**
Fund Manager:					
	Tenure	0.0024	-0.0026	-0.0016	0.3630***
		(0.0024)	(0.0078)	(0.0024)	(0.03)
	Age	-0.0029	-0.0008	-0.001	-0.2091***
		(0.0017)	(0.0046)	(0.0023)	(0.0292)
	Salary	0.0675***	0.1487*	0.0236	0.5569
		(0.0172)	(0.0737)	(0.052)	(0.3167)
	Male	0.0378***	0.0962*	-0.0148***	0.0771
		(0.0036)	(0.0486)	(0.0039)	(0.1276)
Team Size		-0.022	-0.1287*	-0.0214	-2.2837***
		(0.0144)	(0.0593)	(0.0298)	(0.2096)
Distance#Early Career		-0.0451	-0.4664	0.3475**	3.596
		(0.1137)	(0.5924)	(0.1369)	(2.4204)
Distance#Late Career		0.3593	0.4601	0.1597	-6.3804*
		(0.1946)	(0.5813)	(0.2386)	(2.8782)
Distance#Age		0.0031	-0.1069***	-0.0294	0.2671
		(0.0099)	(0.0362)	(0.0221)	(0.2325)
Distance#Salary		-0.1717*	0.7320***	0.4089***	2.0178
		(0.0868)	(0.2446)	(0.0964)	(1.1979)
Market Risk Controls		Y	Y	Y	Y
Other Controls		Y	Y	Y	Y
Year, Month FE		Y	Y	Y	Y
Portfolio FE		Y	Y	Y	Y
R^2		0.3045	0.6467	0.5475	0.469

Table 15: Risk Taking and Performance

We report estimates for the linear regression of portfolio returns at time $t+1$ on risk and turnover at time t. Risk is defined as duration, curve and spread positions in absolute difference with the corresponding measures for the tactical benchmark. Observations are at the manager i, portfolio j and time t level; in the table suffixes are suppressed for brevity. Market risk controls include TED and OIS spread, term spread and 10-year bond volatility.

	USD	**JPY**
	Performance t+1	**Performance t+1**
Duration	0.0328*	-0.0148
	(0.0152)	(0.0132)
Curve	-0.0073	-0.0011
	(0.0169)	(0.0043)
Spread	-0.0923	-0.0371***
	(0.0491)	(0.0096)
Turnover	0.0003	-0.0004
	(0.0012)	(0.0007)
Market Risk Controls	Y	Y
Year, Month, Portfolio Manager FE	Y	Y
R^2	0.1222	0.2850
Obs.	712	520