Investor Sentiment in Japanese and U.S. Daily Mutual Fund Flows

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Abstract

We find evidence that is consistent with the hypothesis that daily mutual fund flows may be instruments for investor sentiment about the stock market. We use this finding to construct a new index of investor sentiment, and validate this index using data from both the United States and Japan. In both markets exposure to this factor is priced, and in the Japanese case, we document evidence of negative correlations between flows of "Bull" and "Bear" domestic funds. The flows to bear foreign funds in Japan display some evidence of negative correlation to foreign bull and equity funds. They appear to be independent of domestic bull and bear fund flows, suggesting that there is a foreign vs. domestic sentiment factor in Japan that does not appear in the contemporaneous U.S. data. By contrast, U.S. mutual fund investors appear to regard domestic and foreign equity mutual funds as economic complements. We also present supporting evidence using monthly data and conduct a cross-country analysis.

JEL classification: G15

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Abstract

We find evidence that is consistent with the hypothesis that daily mutual fund flows may be instruments for investor sentiment about the stock market. We use this finding to construct a new index of investor sentiment, and validate this index using data from both the United States and Japan. In both markets exposure to this factor is priced, and in the Japanese case, we document evidence of negative correlations between flows of "Bull" and "Bear" domestic funds. The flows to bear foreign funds in Japan display some evidence of negative correlation to foreign bull and equity funds. They appear to be independent of domestic bull and bear fund flows, suggesting that there is a foreign vs. domestic sentiment factor in Japan that does not appear in the contemporaneous U.S. data. By contrast, U.S. mutual fund investors appear to regard domestic and foreign equity mutual funds as economic complements. We also present supporting evidence using monthly data and conduct a cross-country analysis.

1 Introduction

Ever since the theoretical work of De Long, Shleifer, Summers, and Waldmann (1990) [DSSW] researchers have sought empirical evidence of a sentiment factor that reflects fluctuations in the opinions of traders regarding the future prospects for the stock market. It is potentially valuable to find an empirical measure of sentiment because of the suggestion that it may be priced. In particular, it could be source of non-diversifiable risk generated by the very existence of an asset market that simultaneously serves as a mechanism for impounding expectations and beliefs about the future, and provides liquidity to savers. Finding an empirical instrument for the sentiment factor would allow a test of the DSSW model and its implications, including the possibility that market prices temporarily deviate from true economic values as a function of investor sentiment.[1]

Shiller, Kon-Ya and Tsutsui (1996) take a direct approach to capturing market sentiment by sending a semi-annual mail survey to institutional investors, asking their opinion about the market in the U.S. and Japan. Lee, Shleifer and Thaler (1991) argue that the closed-end fund discount measures small investor sentiment, although Elton, Gruber and Busse (1998) find that exposure to this variable is not priced. Barber (1999) considers odd-lot trading as a measure of investor sentiment and finds a relation to the small-firm effect. Froot and Dabora (1999) interpret the shifting differential between prices of Royal Dutch and Shell as a potential sentiment factor. Goetzmann, Massa and Rouwenhorst (1999) find evidence of a negative correlation between the daily flows to equity mutual funds, money market funds and precious metals funds. These flows explain part of the covariance structure of mutual fund returns. Froot, O'Connell and Seasholes (2001) find evidence that cross-border flows reflect shifting investor sentiment regarding foreign markets, and that this in turn affects asset prices. Using a Finish dataset, Grinblatt and Keloharju (2000) find, among other things, that foreign investor flows have some impact on share prices. Iihara, Kato and Tokunaga (2001) document herding behavior in various investor classes on the Tokyo Stock Exchange. The money-flow instruments we study in this paper are particularly valuable in the context of past research, because they allow the separation of the measurement of sentiment from measurement of asset returns. This separation is important because if DSSW—and

[1] The empirical instrument for investor sentiment need not necessarily have a low frequency, as the overlapping generations structure of the DSSW model apparently implies. As they note (pp.712-713), their main results can obtain in the absence of overlapping generations, as long as (i) returns to holding risky assets are uncertain (for example, dividends are stochastic), and (ii) the horizon of the sophisticated investors is no longer than that of the noise traders.

more recently Barberis and Shleifer (2003) —are valid models of investor behavior, then we would expect the sentiment-based flows to affect asset returns. Consequently, a measure distinct from returns is useful.

One drawback to most empirical attempts to capture sentiment thus far is that few papers save Shiller, Kon-Ya and Tsutsui (1996) have access to explicit sentiment measures. They are based instead on the presumption that flows, or purchases of odd-lots, or fund discounts can be logically interpreted as a proxy for investor sentiment. Money flows typically are not labeled as "optimistic" or "pessimistic" as such. They can be alternatively interpreted as reflecting correlated liquidity trades or even groups of traders following dynamic portfolio insurance strategies. It would be nice to actually have a variable explicitly tied to expectations about the market trajectory—a way for investors to "vote" if you will on whether they foresee a bull or a bear market.

In this paper, we use a daily panel dataset of United States and Japanese mutual fund flows. The Japanese dataset is particularly interesting in this context, as it contains a number of funds explicitly named "Bull" and "Bear," reflecting investor opportunities to effectively bet on the rise or fall of the Japanese stock market. In a sense, we are the beneficiaries of poor market performance in Japan. The last decade has made pessimists out of many Japanese equity investors, and the mutual fund industry has responded to growing demand for speculative instruments that profit on continued market decline. In our analysis, we find that the daily flows to bull and bear funds in Japan are strongly negatively correlated. This pattern is consistent with a strong, common sentiment factor among Japanese mutual fund investors. Our evidence suggests that this sentiment factor is priced. These results further suggest that the structure of correlation in daily mutual fund flows both in the U.S. and Japan is a useful measure of attitudes beyond the simple domestic equity markets. For example, Barberis and Shleifer (2003) argue that herding may take place in sub-sectors of the equity universe, not simply with respect to the stock market as a whole. Our Japanese flow data is consistent with the existence of a foreign-domestic sentiment factor as well as a domestic equity factor. We find flows into and out of foreign mutual funds are negatively correlated with flows to domestic equity funds.

The paper is organized as follows. The next section reviews the Japanese mutual fund industry and provides a brief introduction to derivative funds. Section 3 describes our data and methodology used. A first quantitative look at Japanese bull and bear funds will also be given here. In Section 4, we identify the flow factor that we argue captures investor sentiment. We then examine its explanatory power over individual fund returns and present some robustness tests. Alternative stories such as information and liquidity are also considered here. Section 5 extends the analysis to the cross section of stocks using long monthly data and examines cross-country effects. The final section concludes with a discussion of future research agenda.

2 The Japanese Mutual Fund Industry and Derivative Funds

Since the Japanese equity market has evolved along a path that sharply contrasts the U.S. experience, and since it offers distinctive products that are not marketed in the U.S., namely derivative funds, in this section we briefly review the Japanese mutual fund industry and investment opportunities it provides. While mutual funds have grown to become a dominant vehicle for savings in the United States over the past decade, its Japanese counterpart, the investment trust sector—a term that includes both closed-end and open-end funds—has grown more modestly. That said, it is one of the most well-developed investment fund sectors in the world, with hundreds of billions of dollars in savings and several thousand investment products. At the end of April, 1999, the entire Japanese investment trust industry was 48.2 trillion yen or 403 billion dollars at the prevailing exchange rate, with 4,296 trusts.[2] Equity investment trusts held 11.8 trillion yen or 98.5 billion dollars in total net assets.[3] By comparison, U.S. equity mutual funds held approximately $4 trillion in net assets at the end of 1999—an order of magnitude difference. The strong contrast in the growth of the U.S. and Japanese mutual fund industries over the last ten years may in part be due to the bursting Japanese stock market bubble in the early 1990's, and the extended bear market that followed.

Japanese fund classification differs from its U.S. counterpart. The main differences are the existence of derivative funds and the lack of a standard fixed-income category. Table 1 shows the classification by the Investment Trust Association of Japan (ITAJ), an intra-industry association for fund management firms. It officially classifies every open-end equity fund into one of the seven

[2] Source for the industry total net assets and number of funds: the Investment Trust Association of Japan, http://www.toushin.or.jp/result/getuji/2000/4/g1-1.htm, with English translation. The yen-dollar exchange rate at the end of April 1999 is 119.59 and is taken from the Bank of Japan,
http://www2.boj.or.jp/en/dlong/stat/data/cdab1690.txt, with English translation. U.S. figures are from the Investment Company Institute *Mutual Fund Fact Book 2000.* http://www.ici.org .

broadly defined and 31 narrowly defined categories during our sample period. A distinctive category in the table is the "derivatives" funds, which aggressively make use of derivative contracts for non-hedging purposes. This is a relatively new category. Until the end of 1994, Japanese mutual funds could not trade derivatives except for hedging purposes. This regulation was relaxed in 1995, when Yamaichi Asset Management created the first derivative fund "Power Active Open." Since then, the number of derivative funds has increased from zero to 191 in 2000. Defined as one of the broad ITAJ categories, derivative funds complete the product line of every major fund family, serving the speculative needs of investors. A typical fund family now includes bear, bull and bull-bear derivative funds that bet on the rise or fall of domestic and foreign equity indices, and sometimes even bet on bonds and currencies. These derivative funds have primarily attracted retail investors who may switch at low cost among funds in the same family.[4] They are two-tiered, comprised of those serving small investors and others geared towards wealthier individuals. The former type is sold in very small lots with one-yen increments, while the latter usually requires a purchase of at least 10 million yen with one-million-yen increments. Both types can be conveniently bought or sold at branch offices of banks as well as security firms. Of course, targeting retail investors does not mean that trading on derivative funds has no pricing implication. In fact, it is said that the significant increase in the net asset values per share of mutual funds in the bearish 1998 market was related to the deregulation that allowed banks to sell mutual funds which consequently promoted retail investor sales. It is exactly this possibility that we wish to examine in this paper—the possibility that small investor sentiment might be priced, as DSSW's theory implies.

The second distinctive feature of Japanese fund classification is the lack of a bond category. Strictly speaking, there do exist pure bond funds (*ko-sha-sai* trusts) in the Japanese market, but they are neither in the ITAJ classification system nor are included in our dataset that will be discussed in the next section. Japanese open-end investment trusts correspond to open-end mutual funds in the U.S., and are further classified into equity and bond (*ko-sha-sai*) trusts. Because of data availability, researchers, like us, often focus on equity trusts, for which the ITAJ classification is

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[3] Open-end equity investment trusts. The 48.2-trillion-yen industry consists of these and open-end bond trusts as well as their closed-end counterparts. Open-end equity and bond investment trusts together correspond to U.S. mutual funds. We will use the words "investment trust" and "fund" interchangeably when there is no confusion.

[4] Our dataset indicates that both derivative and other funds charge a front-end commission ranging between 0.0% and 3.5% and an annual management fee of 0.5% to 2.0%. Churning among sister funds in the same family costs less, with only a one-time reserve fee of between 0.20% and 1.0% and no discrimination against derivative funds.

available.[5] However, some equity investment trusts are free to hold fixed-income securities, and thus are effectively bond funds. These funds belong to the "balanced" category in Table 1. It includes not only funds that invest up to 70% of their total net assets in domestic and/or foreign equities, but also those that hold up to 100% in fixed-income securities. This mingling of equity and effective bond funds is not a problem *per se*, as long as we can identify the factors driving returns and flows. Nonetheless, we are interested in extracting pure bond funds from the balanced category, for the sake of consistency with the U.S. data. We address this bond-isolation problem in the next section.

3 Data and Methodology

This section describes the data used and discusses our fund classification method. The data for the two countries come from independent sources and require proper screening before use. Exactly this independence, however, allows us to infer that a model captures some general pricing rule when it is indeed found working.

3.1 U.S. Data and Classification

The U.S. data is obtained from TrimTabs, which contains the net asset value per share (NAV), the total net assets (TNA), and investment objectives for 999 U.S. funds over the period February 2, 1998 through June 28, 1999. The average fund sizes sum up to 839 billion dollars.[6] Since some authors report discrepancies in the TNAs recorded in this dataset and those filed at the Security and Exchange Commission (SEC), we check for this possibility.[7] Obviously, it is important for us to address this potential problem as our results hinge on the accuracy of daily flows. The discrepancies arise when funds record TNAs that do not reflect the day's transactions. Greene and Hodges (2002) discuss a simple way to correct the TNAs of such "pre-flow" funds. Following them, we compare the TrimTabs figures and their corrections with SEC filings, and identify whether a fund is pre-flow, post-flow, or indeterminate. The exact procedure is described in

[5] For example, Brown, Goetzmann, Hiraki, Otsuki and Shiraishi (2001) and Cai, Chan and Yamada (1997) both concentrate on equity investment trusts in their historical performance studies.
[6] More details about the Trimtabs data can be found in Edelen and Warner (2001) and Greene and Hodges (2002).
[7] See Greene and Hodges (2002), Zitzewitz (2002), and Edelen and Warner (2001).

Appendix A. We only save funds that are identified as pre- or post-flow for the subsequent analyses, with TNAs of pre-flow funds corrected. We do this examination for those funds for which the machine-readable N-SAR filings can be found on the SEC's EDGAR database. We also collect N-30D filings manually for additional funds to ensure that each asset class contains an adequate number of funds. Table 2 shows the number of funds used and the breakdown of pre- and post-flow funds by asset class. In summary, we use 188 funds whose timing is identified, and apply the pre-flow TNA correction to 69.7% of them (131 funds). This ratio is comparable to Greene and Hodges (2002), who classify 68.5% of funds as pre-flow (556 out of 812 funds).

We use the eight categories in Table 2 to aggregate fund returns and flows at the category level. The eight categories are U.S. equity, foreign equity, precious metals, U.S. sector, U.S. bonds, cash, foreign bonds, and municipal bonds, which correspond to the TrimTabs investment objectives in a fairly straightforward manner. Goetzmann, Massa, and Rouwenhorst (1999) also use the same categories. Since the category names are self explanatory, a further discussion is omitted.

3.2 Japanese Data

The primary Japanese dataset is compiled and provided by QUICK Corporation, a financial information vender of the Nikkei Group. The dataset contains the daily NAVs, TNAs and the ITAJ classifications for virtually all 2,241 equity investment trusts during the period January 19, 1998 through January 18, 2000. The average total net assets represented are 11.6 trillion yen or 97.0 billion dollars.[8] Thus, our dataset covers about half of funds in the whole Japanese mutual fund industry (including bond investment trusts), and about a quarter of the total net assets. QUICK also separately provided information about invested assets for 1,935 funds or 86% of the above sample at the beginning, at the midpoint, and at the end of the sample period. This enables us to extract effective bond funds from the ITAJ balanced category. We use the common trading days for the two countries, resulting in 329 trading days between February 2, 1998 and June 28, 1999. Finally, Kinyu Data Services (KDS) provided a third Japanese dataset, which contains fund attributes, investment policies, and strategies for most of funds in our sample.[9] This is used in interpreting the

[8] The cross-sectional sum of the average total net assets during the sample period. The dollar number is computed by the exchange rate at the end of April 1999.

[9] The KDS dataset does not contain fund codes. Therefore, the QUICK and KDS files are matched by names of both the funds and managing firms. The matching result was satisfactory; for example, of the 188 derivative funds in the first QUICK file, we could find 170 funds in the KDS file.

Generalized Style Classification (GSC) categories discussed in the next subsection and confirming the trading strategies of bull and bear derivative funds in a later section.

We wish to form Japanese fund classes similar to the U.S., but this task is not so easy due to the lack of a fixed-income category. We address this problem by two alternative classifications, the GSC and the augmented Investment Trust Association (ITA) classification, which are described in the next two subsections.

3.3 Japanese GSC Classification

The first Japanese classification is the Generalized Style Classification (GSC) proposed by Brown and Goetzmann (1997). This algorithm classifies funds with similar return characteristics into a pre-specified number of groups, by minimizing the sum of squared deviations between individual fund returns and the group mean. A virtue of this methodology is that it can classify funds based solely on *ex-post* performance. Thus, it can potentially pick up factors driving returns that might be independent of *ex-ante* characteristics such as invested assets. Previous research has applied the GSC algorithm to both U.S. mutual funds (Brown and Goetzmann, 1997) and Japanese funds (Brown, Goetzmann, Hiraki, Otsuki and Shiraishi, 2001) in the analysis of fund styles. Since the GSC algorithm classifies funds based solely on the return variability and assigns no objective characteristics *a priori*, we shall interpret each GSC category by known characteristics of the component funds. Table 3 tabulates the GSC categories against the original ITAJ classification and summarizes their interpretation. GSC1 is heavily loaded on Japanese domestic equity funds and hence is considered a domestic equity category. Both the GSC2 and GSC3 categories include international equity funds. However, GSC2 is tilted toward Asian funds while GSC3 is geared toward North American and European funds. This classifies them as Asian and Western equity categories, respectively.[10] GSC4 is loaded on domestic equity funds. We interpret this category as focused equity in the sense that the component funds are dominantly managed by non-big three firms (non-Nomura, Daiwa or Nikko, not shown in the table). These funds follow non-standard strategies as indicated by their fund titles and policy statements in the KDS file. GSC5 can be regarded as the balanced or cash category, because it is comprised mainly of the ITAJ balanced

[10] Although not indicated in the table, it is interesting to note that more funds in the GSC3 category are managed by foreign firms than are those in the GSC2 category.

funds and domestic money pools. GSC6 shares a similar composition to GSC5, but a notable difference is that it contains 22 out of the 37 convertible bond funds. This is a balanced-convertibles category. GSC7 and GSC8 clearly represent index-fund and cash categories, respectively.

3.4 Japanese ITA Classification and Bull-Bear Funds

The second Japanese classification relies on the ITAJ categories and assigns funds to approximate asset classes, delineating the "balanced" category funds as either Japanese bond funds, foreign bond funds or "not applicable" using the invested asset information in the second QUICK dataset. Specifically, we use the second QUICK dataset and pick only those balanced category funds that invest no less than 70% of their TNAs in either Japanese or foreign bonds. This resulted in 26 Japanese and 75 foreign "pure" bond funds out of the 415 ITAJ balanced category funds. Other 314 balanced funds are unclassified. We form the following twelve asset classes: Japanese equity, index, cash, Japanese bull, Japanese bear, foreign bull, foreign bear, foreign equity, Japanese sector, Japanese bond, foreign bond, and other derivatives. Table 4 shows the cross tabulation between them and the ITAJ categories. We call this the "ITA" classification.

We form the above five derivative categories by dividing the ITAJ derivative funds into Japanese and foreign, and then each into bull and bear funds (and others) as follows. We first classify each ITAJ equity derivative fund into either bull, bear, or other type using its fund name. In order to be classified as an equity derivative fund, a fund must not have the word "bond," "yen," or "dollar" in its name. No other words that imply non-equity assets were found in the sample fund names. Then we construct the potential set of bull funds by taking those whose names contain the words "bull" and/or "double" and not "bear" or "reverse."[11] The bear funds are those whose names contain the word "bear" or "reverse." In our sample, no fund has the words "bull" and "bear" simultaneously in its name. Then, we further divide the bull and bear funds into domestic and foreign. Specifically, if a fund contains any one of the following words in its name, it is classified as a foreign bull or bear fund: U.S., Hong Kong, U.K., France, Italy, Germany, Global, World, and

[11] The words "bull" and "double" are synonyms because when a fund is of double-bull type, the word "bull" is often omitted from its name. In order to reject double-bear funds, we exclude funds whose names contain the words "bear" or "reverse." One fund has the word "triple" implying triple-bull/bear type, but it invests in bond futures with the word "bond" in its name, and therefore is correctly classified as other derivative type.

their equivalents and literal derivatives. Otherwise, it is classified as a domestic fund. No other word that implies a country or region was found in the sample fund names.

Next, in order to ensure that our bull and bear funds are indeed bets on the rise and fall, respectively, of the stock market, we check the fund characteristics in the KDS dataset. The specific column in the dataset often describes how a fund operates, like "This fund aims to realize approximately twice the reverse movement of the domestic stock market by shorting about twice as much Nikkei index futures as its total net assets." This, for example, confirms that the fund is a domestic double bear fund. In addition, we also check performance reports found on the management firms' web sites. These reports typically carry the positions of futures contracts. Whenever possible, we take reports issued in the sample period or as close as possible to it. After this process, we still have five funds that we cannot confirm to be bets on the stock market. For completeness, we discard these five funds and determine the final sets of domestic and foreign bull and bear funds. 54 out of 89 finalists or 61% of them are explicitly stated or known to trade in equity index futures.

Table 5 shows the characteristics of the bull and bear derivative funds. We see that bull funds are relatively large sized, while bear funds are generally small. Japanese bull funds account for 40.9% in TNA of all derivative funds, while Japanese bear funds merely 3.8%, although the number of funds is almost equal at 27 and 28, respectively. The average TNA of Japanese bull funds is more than ten times that of Japanese bear funds. Similarly, we see that foreign bull funds are in general bigger in size than foreign bear funds.

The rightmost column of Table 5 shows that, in the above screening process, performance reports are found on the Internet for 10, 9, 6, and 8 funds in the Japanese bull, bear, and foreign bull, bear categories, respectively. The mean leverages of these funds, measured as the position of index futures in percentage of TNA, are 178.8%, -162.8%, 200.7% and -99.2%, respectively. Figure 1 confirms the trading activity of bull and bear funds in index futures. In Panel (a), the Japanese bull category return (the equally-weighted average of component fund returns) is plotted during the first-half sample period, along with the ITA index category return for a comparison purpose.[12] The bull category return almost always fluctuates in exactly the same direction as the index category return, and slightly less than twice in magnitude, in line with the estimated futures position of 178.8%. In contrast, in Panel (b), the Japanese bear and index category returns fluctuate

[12] The plots for the second-half sample period are similar and hence omitted.

exactly in the opposite ways. Panel (b) of Table 9, discussed in a later section, indicates that the bull and bear returns are strongly positively and negatively correlated with the index return, respectively, with the absolute values of correlations exceeding 0.95.

Finally, we confirm our bull and bear designations by applying the GSC procedure to the 189 ITAJ derivative funds. Table 6 reports the results. 19 out of 27 Japanese bull funds are clustered in the GSC I category. This GSC category thus represents funds that bet on the rise of the Japanese stock market. Similarly, the GSC II, III and IV categories represent Japan bear, foreign bull, and foreign bear categories, respectively. Foreign bull and bear funds that fall in GSC I and II might be bets on Asian indices that are strongly correlated to Japanese ones. GSC V will be a non-equity derivative category, such as bond or currency derivatives.[13] This confirms that the labeling of our domestic and foreign bull and bear funds corresponds to differences in the return-generating processes.

3.5 Measurement of Flows and Returns

We compute the return for category g on day t, $RET_{g,t}$, as the equally weighted average of returns on component funds:

$$RET_{g,t} = \frac{1}{N_{g,t}} \sum_{n \in g} R_{n,t},$$

where $R_{n,t} \equiv NAV_{n,t} / NAV_{n,t-1} - 1$ and $NAV_{n,t}$ are the return and net asset value per share, respectively, of fund n on day t, and $N_{g,t}$ is the number of funds in category g on day t. Following standard practice in the literature, we compute the flow to fund n on day t by[14]

$$F_{n,t} = TNA_{n,t} - TNA_{n,t-1}(1 + R_{n,t}),$$

[13] The fact that a nontrivial number of "other derivatives" funds fall in GSC I and III suggests that our classification method based on fund names is not picking up all of the Japanese and foreign bull funds.

[14] The Japanese dataset includes dividend information. We also computed the fund flows with dividends using the formula $F_{n,t} = TNA_{n,t} - TNA_{n,t-1} \cdot (NAV_{n,t} + DIV_{n,t}) / NAV_{n,t-1}$ for Japan, where $DIV_{n,t}$ is the dividends for fund n on day t. Since the results are qualitatively similar, we omit them.

where $TNA_{n,t}$ is the total net assets of fund n on day t. Since net purchases and sales are recognized at the end of the day, the issue of the potential timing effects of intra-day flows is not material for this study, although for analysis of longer-horizon fund flows it can be a worry. The total net flow (TNF) for category g, $TNF_{g,t}$, is the sum of component fund flows:

$$TNF_{g,t} = \sum_{n \in g} F_{n,t}.$$

The average percentage flow (APF) for category g on day t, $APF_{g,t}$, is the equally weighted average of normalized flows over component funds, where the normalization is by each fund's total net assets on the previous day:[15]

$$APF_{g,t} = \frac{1}{N_{g,t}} \sum_{n \in g} \frac{F_{n,t}}{TNA_{n,t-1}}.$$

With these aggregate measures in hand, we are now ready to address the asset pricing problem.

4 Constructing a Sentiment Factor from Mutual Fund Flows

We start our search for a priced sentiment factor by first examining the correlation structure of fund flows. We look at flows since a sentiment factor should be based on investor behavior, and if sentiment affects prices, it should appear in demand changes of investors. We thus estimate a sentiment factor as a linear combination of category flows. Next we document evidence that it is priced, using a version of Fama-MacBeth (1973) framework. It is then confirmed that the flow

[15] The accounting practice of international funds managed in Japan is worth mentioning. Because of the time lag, the total net assets and the net asset values per share of international funds are not determined within day t. At 10a.m. on day t+1, they are calculated by the day-t local closing stock prices in the foreign markets (which are known) and the prevailing exchange rates (i.e., those prevailing at 10a.m. on day t+1). These are customarily called the total net assets and the net asset values *on day t+1* and are recorded as such in our datasets. Consequently, a purchase or sales order of international fund n submitted on day t is not executed at $NAV_{n,t}$, but at $NAV_{n,t+1}$. We correct for this by using the one-day lead TNA and NAV in computing flows and returns of international funds in Japan.

factor is highly correlated to logical instruments for sentiment. The section proceeds to present some robustness tests.

4.1 U.S. Flow Correlations

Table 7 shows correlations between U.S. category flows (measured by APFs) and returns. Panel (a) indicates that flows into and out of domestic equity funds are strongly positively correlated with flows to foreign equity funds at 0.45. This is consistent with the hypothesis that U.S. investors regard domestic and foreign equity funds as economic complements. A similar positive correlation obtains for flows to U.S. sector funds, which represent nontrivial equity investments. They are significantly negatively correlated with cash and precious metal funds at -0.18 and -0.15, respectively.

Goetzmann, Massa and Rouwenhorst (1999) consider three possible explanations for negative correlations between equity and cash/bond fund flows. First, they may simply be the result of investors using cash funds as checking accounts, preliminary to investing in other assets. Second, investors may be following common portfolio insurance strategies. Finally, the negative correlations may be caused by negative investor sentiment about future equity returns. Using U.S. data, they find evidence supporting the last explanation; a negative correlation between flows to equity funds vs. precious metal funds. Since precious metals have been traditionally considered a hedge during times of uncertainty, the negative correlation is consistent with negative investor sentiment causing money to shift from equity to precious metals during such periods. However, like the negative correlations we find, this is only suggestive and certainly not conclusive. This is exactly why we turn to Japanese data in the next subsection.

Panel (b) shows cross-correlations between flows and returns. We see a much stronger correlation structure here. A clear message is that money tends to flow into equity funds on days when returns are positive, both domestically and internationally. Flows to domestic and foreign equity funds are correlated with contemporaneous U.S. equity fund returns at 0.53 and 0.57, and with foreign equity returns at 0.24 and 0.40, respectively. Other findings relate to cash and metal funds. First, flows to metal funds are strongly positively correlated with returns on themselves at 0.60. Second, flows to cash and metal funds tend to decrease when equity and sector returns are positive, as indicated by negative correlations. Overall, the strong association with returns suggests that it is worthwhile looking for a priced factor in flows.

4.2 Japanese Derivative Funds and Sentiment

Panel (a) of Table 8 shows the correlations between Japanese GSC category flows. Japanese equity fund flows are positively correlated with flows to index funds and Asian equity funds, and are negatively correlated with flows to Western equity funds. A notable difference from the U.S. result is the strongly negative correlations between index fund flows and cash (-0.71) or balanced/cash (-0.48) categories. These two cash related categories also stand out prominently in Panel (b), where their returns exhibit extreme negative correlations to equity and index returns. In particular, the cash category returns are negatively correlated to equity and index returns at startling -0.90 and -0.96, respectively. Thus, the Japanese market seems to contain instruments that are fundamentally different from, or opposite to, equity investment in terms of payoff. Moreover, they appear to be *perceived* by investors as such, as the negative flow correlations imply. The likely driver of these extreme negative correlations is bear funds. In a sense, the two GSC categories may be mislabeled: they contain not only cash funds, but very likely derivative funds that bet on the fall of equity indices. Table 3 indeed shows that a nontrivial number of ITAJ derivative funds fall in these categories.

We can confirm the above hypothesis by examining the ITA category correlations in Table 9. Since the correlation matrix is already voluminous, only selected columns are shown. Panel (a) demonstrates that the bear fund flows are negatively correlated with equity, index, and bull fund flows at -0.22, -0.38, and -0.69, respectively. Flows to cash funds are similarly negatively correlated with flows to equity, index, bull, and sector funds at -0.25, -0.31, -0.65, and -0.26, respectively. In Panel (b), returns on bear funds are negatively correlated with returns on equity, index, and bull funds at -0.90, -0.96, and -0.99, respectively. In contrast, returns on the mirror instruments, bull funds, are extremely positively correlated with returns on equity and index funds at 0.90 and 0.96.

The magnitudes of negative flow correlations are impressive. In fact, there is no *a priori* reason to anticipate that the bull and bear flows should be correlated at all in either direction. If Japanese retail investors had diverse opinions about future market trends, some might be optimistic and others pessimistic on the same day. Goetzmann and Massa (2000a, 2000b), for example, find evidence of index fund purchases and sales by investors on the same day, and further that these events are correlated with other measures of the dispersion of opinions among investors. The above negative flow correlations are more consistent with the sentiment story than the other two explanations that Goetzmann, Massa and Rouwenhorst (1999) offer; it is unlikely that bear funds are used as either a checking account or a device to provide portfolio insurance.

There is some evidence that the sentiment of Japanese investors extends to foreign markets, albeit in a different fashion. In Panel (a) of Table 9, we find that flows to foreign bull and bear funds are negatively correlated at -0.20. They are also positive and negative correlates, respectively, to flows to foreign equity funds at 0.25 and -0.14. However, they appear to be generally independent of Japanese bull and bear fund flows. This is consistent with the hypothesis that Japanese investors might have separate sentiments about domestic versus foreign markets. In summary, so far we have argued that mutual fund flows may be a useful proxy for investor sentiment. We are now ready to address our main problem, whether or not they are priced, and if so, by how much.

4.3 Estimating a Sentiment Flow Factor

In this subsection, we construct what we call a sentiment flow factor and examine how well it explains the cross-section of fund returns. If flows are a sufficient statistic for priced investor sentiment, there should be a unified flow-based approach for both countries, even though they experienced sharply contrasting markets over our sample period. In addition, it will validate the inconclusive U.S. evidence that precious metal fund flows may represent investor sentiment.

For each country, we first find the linear combination of category flows that is maximally correlated to a linear combination of category returns. This procedure is known as canonical correlation analysis. Mathematically,

$$(\alpha^*, \gamma^*) = \underset{\alpha,\gamma}{\operatorname{argmax}}\, Corr(F^g \alpha, R^g \gamma)$$
$$\text{s.t.}\ \mathbf{1}'\alpha = \mathbf{1}'\gamma = 1,$$

where F^g and R^g are the $T \times G$ matrices of category flows (APFs) and returns (RETs), respectively, α and γ are the $G \times 1$ vectors of weights on them, and **1** is the vector of ones. T and G denote the number of days and categories, respectively. The weights are constrained to add up to 1. We call the optimal combination of flows, $f^* \equiv F^g\alpha^*$, the sentiment flow factor for a reason that will become clear shortly. The optimal linear combination of returns, $r^* \equiv R^g\gamma^*$, in turn can be interpreted as the return on a sentiment-flow-factor mimicking portfolio. We use the eight asset classes for the U.S. and the twelve ITA categories for Japan.[16]

Table 10 shows the correlations of f^* with category flows and returns. It is positively correlated to equity fund flows in both countries. This correlation is 0.698 for U.S. (with equity funds) and 0.658 for Japan (with index funds). The key features are the strong (negative) correlations with the suspects of investor sentiment, which justifies its labeling as a sentiment flow factor;[17] the U.S. sentiment flow factor is negatively correlated to flows of precious metal and cash funds at -0.577 and -0.112, respectively. The Japanese counterpart is correlated to bull, bear, and cash fund flows at 0.658, -0.839, and -0.349, respectively. Qualitatively similar statements hold for TNFs, so these correlations are not driven by either a few big or small funds.

The correlation between the sentiment flow factor and the factor mimicking portfolio return (the maximum canonical correlation) is a measure of how well our sentiment factor would explain the individual fund returns. This correlation is strong for the U.S. at 0.702. This is because there is a rich correlation structure between U.S. flows and returns, as we saw in Panel (b) of Table 7. In fact, the third column of Table 10 shows that the U.S. sentiment flow factor is correlated significantly to key category returns, equity (0.572) and metal funds (-0.272). The maximal correlation is a decent 0.461 for Japan, despite the lack of strong contemporaneous flow-return correlations.[18] One might wonder whether this is coming from the relatively active correlations to foreign bull or bear fund returns, and consequently whether this has implications for explaining the domestic fund returns. We now turn to this question.

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[16] In constructing the U.S. sentiment flow factor, the cash and foreign bond categories are excluded because none of their component funds existed in the first 40 days of the sample period. Alternatively, we tried throwing away the period and constructed the sentiment factor using all eight categories. The results were qualitatively unchanged, which are available upon request.

[17] A more detailed discussion of this point is provided in the robustness section.

[18] Although not shown, we do find a strong cross-autocorrelation between flows and lagged returns. Bull fund flows are strongly negatively correlated to lagged equity and index returns. Similarly, a strong positive correlation is observed between bear fund flows and lagged equity returns. The magnitudes of these correlations exceed 0.50. It is possible to extend our analysis to incorporate these lead-lag patterns. We will return to this point in the final section.

4.4 Estimation of Factor Risk Premia

This subsection presents our main pricing results. The estimation of factor premia is based on a version of the Fama-MacBeth (1973) framework. Before starting, we orthogonalize the sentiment flow factor against all the category returns and their one-day lags. That is, for a given country, we run

$$f^* = Qb + e,$$

where $Q \equiv [\mathbf{1}\ R^g\ \ R^g_{-1}]$ is the $T\times(2G+1)$ matrix of a constant, category returns, and their one-day lags and b is the $(2G+1)\times 1$ vector of coefficients. We call the residuals from this regression, $\hat{e} \equiv f$, the orthogonalized sentiment flow factor, and use them in the subsequent analyses. This ensures that the explanatory power of our sentiment flow factor is purely incremental to return factors. Regressing on the previous-day returns is meant to negate any explanatory power due to trading strategies known as positive or negative feedback trading at the daily frequency.

In the first step, we estimate factor loadings by regressing each fund return on a constant, category returns, and the orthogonalized sentiment flow factor using *even* days:

$$R_n = Z\beta_n + \eta_n,$$

where R_n is the $T_1\times 1$ vector of returns on fund n, $Z = [\mathbf{1}\ R^g\ f]$ is the $T_1\times(G+2)$ matrix of factors, β_n is the $(G+2)\times 1$ vector of factor loadings for fund n, and T_1 is the number of even days. In the second step, using *odd* days, we regress the cross-section of fund returns on the factor loadings with the constraint that coefficients are constant over time:

$$R_{\bullet,t} = X\lambda + \varepsilon_t, \quad \forall t, \qquad (1)$$

where $R_{\bullet,t} = [R_{1,t}\ \ R_{2,t}\ \ \ldots\ \ R_{N,t}]'$ is the $N\times 1$ vector of cross-sectional returns on day t, $X = [\hat{\beta}_1^*\ \hat{\beta}_2^* \cdots \hat{\beta}_N^*]'$ is the $N\times(G+2)$ matrix of estimated factor loadings, $\hat{\beta}_n^*$ is the $(G+2)\times 1$ vector of estimated factor loadings of fund n from the previous step with its constant term replaced by one, and λ is the $(G+2)\times 1$ vector of factor risk premia. Use of alternate days for factor-loading and factor-risk-premium estimations is meant to alleviate the errors-in-variables problem.[19] Roll and Ross (1980) also use different observation days between the two phases, in developing a Fama-MacBeth (1973) framework suitably modified for factor models.

Jones (2001) shows that failure to correct for temporal changes in residual variance can lead to significant reduction in the power of asset pricing tests. We control for the documented shifts in residual variance that occurred over the time period of our study. We implement this as a groupwise heteroskedastic model and estimate it by two-step feasible generalized least squares that account for both intertemporal and cross-sectional heteroskedasticity. The details are provided in Appendix B.[20]

Table 11 summarizes the estimation results. The estimated (orthogonalized) sentiment flow factor risk premium is significantly positive and economically large for both countries. The U.S. estimate implies that a unit increase in the factor loading rewards an investor by 7.74 basis points daily or 21.5% annual, which is comparable to the estimate of annual domestic equity risk premium at 27.0%. These numbers are reasonable given the bullish U.S. market during our sample period. For example, Ibbotson Associates (2001) estimates the annual returns on large company stocks at 28.58% for 1998 and 21.04% for 1999.

The estimated Japanese sentiment factor risk premium is 23.6 basis points daily or 81.3% annual. While the premium might look huge at a first glance, it may be justified if one considers the fact that the sentiment factor is highly loaded on the bull and bear fund flows (see Table 10, Panel (b)). These derivative fund flows have high premiums, which are estimated at 45.1% and -26.5% annual for the bull and bear funds, respectively. These premiums in turn result from the high leverage of derivative funds on index futures (see Table 5). However, the estimated equity return premium of 29.8% may be admittedly high, given the bearish Japanese market during our sample period. We also observe that the foreign bull and bear return premia are significant with expected signs. The premium on foreign bull category return is 63.8%, which is higher than the domestic bull return premium even after adjusting for the leverage. This is consistent with the fact that major foreign markets outperformed the Japanese equity market during the sample period, and with the

[19] Rolling beta regression is not appropriate for short data like ours.
[20] When returns are conditionally heteroskedastic, the original Fama-MacBeth procedure does not necessarily overstate the t-statistics of the estimated factor risk premia. See Jagannathan and Wang (1998) on this.

hypothesis that pessimistic Japanese investors might have been expecting more from the foreign markets.

Before leaving this subsection, it is interesting to examine whether our sentiment flow factors for the two countries are correlated, because evidence in Froot, O'Connell and Seasholes (2001) implies potential existence of structural relationships in cross-border equity flows. However, we do not find a significant correlation between the two sentiment flow factors; the correlation is virtually zero after the return orthogonalization (not reported).[21] Nor do we find evidence of structural cross-border relations in category flows. This is consistent with the results of Lin and Ito (1994), who find no volume spillovers between the U.S. and Japan. This suggests that our flow factor may represent autonomous country-specific sentiment in each of the two countries.

4.5 Robustness Tests

This subsection presents two robustness tests. The first test examines the generality of our flow-based approach. If flows to cash funds as well as U.S. metal and Japanese bull and bear funds indeed capture investor sentiment as we argue, the sentiment flow factor may be readily constructed from them without optimization. The second test investigates the qualitative nature of our factor, whether it represents indeed investor sentiment or something correlated to known priced factors, in particular size, book-to-market, and momentum. Alternative explanations such as information and liquidity will also be discussed.

4.5.1 Does a Simple Construction Work?

The canonical correlation approach revealed that a valid sentiment factor may load positively on equity and bull derivative funds and negatively on cash, bear, and metal funds. Based on this heuristic, we construct a "simple" sentiment factor from average percentage flows to these categories by

$$\text{U.S.: Equity} - 0.5 \times (\text{Cash} + \text{Metal}),$$

[21] Since Japanese Standard Time is 14 hours ahead of the U.S. Eastern Standard Time (13 hours ahead in summer time), a contemporaneous correlation may suggest a spillover from Japan to the U.S. The opposite direction may be examined by using a lag for the U.S.

Japan: Index – 0.5 × (Cash + Bear),

The category weights add up to zero, so these are flows of zero-investment portfolios, although in practice mutual funds may not be shorted. The use of the index category in Japan, instead of the domestic equity category, is due to the higher correlation to the sentiment flow factor. It has an additional advantage of capturing bull derivative fund flows, whose underlying assets are indices, rather than individual stocks. Indeed, Panel (a) of Table 9 demonstrates that bull fund flows are correlated more to index fund flows than to equity fund flows. We repeat the same procedure as in the previous section, including the orthogonalization against category returns, with these simple sentiment flow factors.

The results are summarized in Table 12. The simple sentiment flow factors carry premia of similar magnitude as before, 35.4% for the U.S. and 99.6% for Japan. However, t-statistics for these estimates have decreased. Although the U.S. premium is still significant by any standard, the Japanese premium is now significant only at the 10% level. The magnitudes and significance of return factor premia are almost unchanged for all categories in both countries. Thus, this heuristic method seems to capture investor sentiment to some extent. However, the decreased statistical significance suggests that it is missing some important component that was present in the canonical correlation factor. This might be foreign funds, since the correlation analysis suggested that foreign fund flows were related to foreign fund returns.

4.5.2 Is It Subsumed in Known Factors?

It is important that our sentiment flow factor be orthogonal to known priced factors, in particular size, value/growth and momentum factors in the U.S. market, because other work in the literature has clearly shown that mutual fund styles orient to them. If our flow factor really captures investor sentiment that is not driven by these styles, it should survive their inclusion.

We repeat the Fama-MacBeth procedure using the Fama-French three factors, the momentum factor, and our sentiment flow factor (from the original canonical correlation method, orthogonalized). The excess market factor (EXMKT) is the return on the CRSP NYSE/AMEX/NASDAQ value-weighted return less the 30-day T-bill return. The size factor (SMB) is the return on a zero investment portfolio in which small and large capitalization firms are held long and short, respectively. Similarly, the book-to-market (B/M) factor (HML) is the returns on high B/M stocks less low B/M stocks. The momentum factor (UMD) is the returns on past winners less losers.[22] The test assets are again individual mutual fund returns. Effectively, we are adding our sentiment flow factor to an asset pricing model including Fama-French (1993) three factors and the Jegadeesh-Titman (1993, 2001) momentum factor (Carhart (1997)).

Table 13 presents the results. Because of data availability, this exercise is possible only for the U.S. Our sentiment flow factor is robust to the inclusion of the Fama-French three and the momentum factors. The estimated premium is significant at the 1% level and is as significant as the momentum factor, albeit its magnitude is halved at 11.6% annual. The excess market factor has a 24.1% premium, which is close to the 27.0% equity fund premium less the virtually zero premium of cash or bond funds in Panel (a) of Table 11. The size factor has a positive but small and insignificant premium, consistent with the well-known fact that 1998 was a year of disaster for small stocks. Ibbotson Associates (2001) reports that the return on the NYSE/AMEX/NASDAQ smallest decile portfolio was -11.32% for 1998, while the largest decile earned 35.31%.[23] The B/M factor has a significantly negative premium. This is in line with the fact that it is the blue-chip firms with large market capitalization that performed well in our sample period. Again, according to Ibbotson Associates, returns on value stocks were 12.07% and 5.40% in 1998 and 1999, respectively, while growth stocks marked 33.11% and 29.81%. Finally, the momentum factor is strong, as expected in a bullish market. Overall, our sentiment flow factor survives the inclusion of factors which themselves may reflect behavioral biases. This suggests that our flow factor may capture something new and priced, and perhaps most importantly, it is based entirely on investors' trading behavior.[24]

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[22] All these daily return factors are downloaded from Jeffrey Busse's web site for our sample period, http://www.bus.emory.edu/jbusse/daily.htm. The construction specifically is EXMKT = Busse's VWRETD - T30RETDY. Our SMB, HML, and UMD factors are simply Busse's SMBDAY, HMLDAY, and UMDDAY series, respectively.

[23] The 1999 figures were 28.36% and 24.82% for the smallest and largest decile portfolios, respectively.

[24] Although we are unable to test the robustness of a Japanese sentiment factor, we believe that it is not driven by a momentum or contrarian strategy for two reasons. First, our sentiment flow factor is orthogonalized against one-day lagged category returns. This will preclude daily return predictability from affecting our results. Indeed, although not shown, we find significant daily autocorrelations for U.S. equity fund returns, but not for Japan. Second, at longer horizons, it is known that the momentum effect does not obtain in Japan (Chui, Titman and Wei [2000]). This contrasts sharply with the evidence in the U.S. and Europe (Jegadeesh and Titman [1993, 2001], Rouwenhorst [1998]). This might be due to differences in investor composition. In the U.S., equity has been a very popular investment vehicle for decades, attracting rather unsophisticated investors. In contrast, less than ten percent of Japanese household savings are invested in stocks, even in recent years. According to the Ministry of Public Management, Home Affairs, Posts and Telecommunications, the fraction is only 9.8% (1.68/17.16 million yen) as of the end of March 2002, even including

4.5.3 Discussions: Sentiment versus Information, Liquidity, and Others

This subsection discusses alternative interpretations to sentiment. Edelen and Warner (2001) and Warther (1995, 1998) consider several reasons why flows and returns might be positively correlated. The most traditional account is perhaps information about future payoffs. In fact, the models of Brennan and Cao (1996, 1997) imply that, when investors have differential information precision, less-informed investors behave like trend-followers. That is, trade flows of the less informed are positively correlated with returns. Their trade motives are rational—the less informed investors increase their demands upon good public price signals, because they update their beliefs more than the better informed do. By way of market clearing, better-informed investors follow a contrarian strategy. If mutual fund investors are relatively less-informed than the market average, then it is possible that we are capturing their information-based trades.

Liquidity needs can also drive trading. Some investors might simply need to liquidate their portfolios in a timely manner independently of price movement. Liquidity trading has important pricing implications, because it must be absorbed by those whose marginal valuation affects prices. In contrast to such "mechanical" traders, liquidity traders in practice may have "wills," in that they might minimize trading costs by allocating trades over time or over securities. This will further complicate the pricing implication of flows.

Finally, there are other factors that are studied relatively less well and that nonetheless may affect investor demands and hence prices; for example, common changes in risk aversion, demographic changes, and employment changes. In fact, Jagannathan and Wang (1996) find that return on human capital adds significant explanatory power over the static Capital Asset Pricing Model. Some of these may even be subject to daily fluctuations. These are maintained as reasonable alternative hypotheses to the sentiment story.

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investments in bond equity trusts (http://www.stat.go.jp/data/sav/2002qn/zuhyou/a801.xls, in Japanese). This suggests that households actively participating in equity markets may be relatively sophisticated, if gathering information about the future stock market is costly for unsophisticated investors. If this is indeed the case, investors' under- or over-reaction may be limited in Japan. Although out of the scope of the current paper, this is potentially an interesting hypothesis to test that is related to investor sentiment.

5 Extensions

The previous sections have identified daily flows as possible proxy for investor sentiment. In this section, we extend the analysis in two important ways: cross-country analysis and asset pricing tests using longer monthly data. We do these in a standard framework using cross sections of stocks rather than mutual funds as in the preceding section.

5.1 Cross-country Analysis

The analysis so far has tested domestic asset pricing models separately for the U.S. and Japan. If these two markets are integrated, flows of one country may reflect a priced risk in the other. Is there any such evidence? This is the question we first turn to.

For the purpose of this subsection and the next, we focus on the U.S. for which well-known asset pricing models are available. We incorporate flow factors into a daily version of the Fama-French (1993) three factor model. The excess market return (MKT), size (SMB), and book-to-market (HML) factors are downloaded from Kenneth French's web site. Our primary interest is on the flow factors, which are constructed from an updated Trimtabs dataset covering a period February 2, 1998 through October 6, 2003.[25] Flows are therefore available from February 3, 1998. We construct FLOW, the canonical-correlation flow factor, as described in the previous section. That is, FLOW is the linear combination of the eight category flows that is maximally correlated with a linear combination of the eight category returns. We also examine the equally weighted average percentage flow (APF) for the domestic equity funds (APF_US_Equity) as an alternative flow factor. This is for consistency with the monthly analysis in the next subsection; at a monthly frequency, the only category that has flow series long enough is the domestic equity category. Therefore, the monthly canonical-correlation flow factor coincides with the equity fund flows. Added to these are the flows of the sector funds (APF_US_Sector) and foreign equity funds (APF_US_ForEq). The former serves as another alternative equity flow and the latter a control for the possibility that the Japanese flows merely proxy for the foreign trade of U.S. investors.[26]

[25] This section is written as an update and extensions of the initial analyses in the previous sections.

[26] Unlike the previous section, this section applies the pre-flow timing correction to all funds to avoid loss of funds due to the unavailability of N-SAR filings. Zitzewitz (2003) demonstrates that the total net assets in the Trimtabs dataset very likely do not reflect the day's transactions and apply the pre-flow timing correction to all funds. We also repeated the analysis without the timing correction. The results are qualitatively similar and therefore are omitted.

The stock returns to be explained are those of 25 portfolios formed as the cross section of five size and five book-to-market (B/M) quintiles. We use all the common shares on NYSE, AMEX, and NASDAQ in the CRSP-Compustat merged dataset to form these portfolios. Calculation of size and the book-to-market ratio closely follows Fama and French (1993). Size is defined as the price times the number of shares outstanding. Each month, size is calculated for all stocks and five quintiles are formed. B/M is calculated quarterly as the Compustat book value divided by the market capitalization with a two-quarter lag.[27] We use the NYSE breakpoints to classify all the stocks into size and B/M quintiles independently.[28] The 25 portfolios are formed monthly and their value weighted returns are calculated daily. The estimation is by the Fama-MacBeth (1973) two-pass procedure. We use all the available observations in the first-pass time-series regressions to estimate factor betas.[29] In the second pass, the cross section of returns are regressed on a constant and estimated betas from the first pass each day to obtain time-series estimates of factor premiums.

Table 14 shows the estimated daily premiums (multiplied by 100) with p-values in parentheses, based on the standard errors corrected for the errors-in-variable problem as in Shanken (1992). Column 1 shows that FLOW has a positive premium that is significant almost at the 1% level. Note that FLOW in this section is normalized so that it has a mean zero and a standard deviation of 1, and therefore it is not appropriate to compare the apparent large premium to those of return factors.[30] The Fama-French three factors are insignificant, implying that trading activity rather than characteristic risks may have a significant bearing on the pricing at a daily frequency. A large intercept is partly due to the fact that the returns on the left hand side are raw rather than excess returns; therefore, it partly represents an estimate of the risk free rate. However, it may also be suggesting an omission of some risk factors. Column (2) demonstrates that an alternative flow factor, APF_US_Equity, also has a positive premium that is significant at 1%. The premium is economically large at 6bp daily, which implies that buying an equally weighted portfolio of domestic equity funds (and therefore increasing the flow loading from 0 to 1) increases annual

[27] We calculate the book value of a firm as the Compustat balance-sheet stockholders' equity plus deferred taxes and investment tax credit less preferred stock. For preferred stock, we use the first available of the redeemable, liquidating, or carrying value. Negative-book-value firms are excluded from the analysis. Lag of two quarters is meant to allow enough time for the accounting information to disseminate among investors.

[28] It is confirmed that our size and B/M breakpoints closely replicate those posted on Kenneth French's web site.

[29] Again, rolling beta regression is inappropriate for short data like ours.

[30] In the future, we plan to normalize the weights rather than moments so as to allow an economic interpretation of canonical flow premiums.

return by approximately 15%. Column (3) indicates that the foreign equity flows are also priced. Thus, it seems necessary to control for this factor when we incorporate Japanese flow factors in the cross-country analysis. Column (4) shows that another flow factor, sector fund flows, has twice as large a premium as the domestic equity flows. Overall, domestic flow factors appear to be strongly priced, and so are the foreign equity fund flows.

We next explore the possibility of cross-country pricing. We retain one of the domestic flow factors (either FLOW or APF_US_Equity) and the foreign equity fund flow (APF_US_ForEq) as well as the Fama-French factors while incorporating one of the Japanese flow factors into the model. Based on the results from previous sections, we examine the followings as premier suspect of priced Japanese flow factors: the canonical-correlation flow factor (FLOW_JP), the Japanese domestic equity fund flows (APF_JP_Equity), the index fund flows (APF_JP_Index), and the bull and bear derivative fund flows (APF_JP_Bull, APF_JP_Bear). These flow factors are also constructed from an updated Japanese daily mutual fund dataset obtained from QUICK Corporation. The sample period is from January 19, 1998 through December 28, 2001. We construct the same 12 categories as in the previous section, and FLOW_JP is the linear combination of the 12 category flows that is maximally correlated with a linear combination of the 12 category returns. Average percentage flows are computed the same way as in Section 3.5.

Table 15 shows the result of the cross-country analysis. Column (1) of Panel (a) employs FLOW and FLOW_JP as the U.S and Japanese flow factors, respectively. We find that FLOW_JP has a positive premium that is marginally significant at the 10% level.[31] As is found earlier, the U.S. canonical flow factor (FLOW) and the U.S. foreign equity fund flows (APF_US_ForEq) are also significant. Columns (2) and (3) replace the Japanese canonical-correlation flow factor with the Japanese equity and index fund flows, respectively. The results indicate that the former is insignificant while the latter has a significant positive premium.[32] More of our interest are the bull and bear derivative fund flows, whose estimates are shown in Columns (4) and (5). Both APF_JP_Bull and APF_JP_Bear have significant premiums with expected signs; the former positive and the latter negative. The estimated premiums might appear a little too large, but may be

[31] Again, the canonical variables are standardized in terms of moments and not of weights, so a direct economic interpretation is not appropriate.

[32] One possibility for this difference is that novice traders tend to invest in index funds and therefore flows of such funds may represent the noise trader risk better than those of the equity funds. It is also noted that index funds track the underlying assets (such as the Nikkei Index) of bull and bear derivative funds. However, we will see that at the monthly frequency equity fund flows are priced more strongly than index fund flows.

justified given (1) their leverage that is almost plus or minus 170% (see Table 5) and (2) their standard deviations that are higher than, for example, the equity fund flows by a factor of 10.[33] Panel (b) repeats the analysis with APF_US_Equity substituted for FLOW. The premiums of the Japanese index, bull, and bear fund flows remain significant at 1% to 2%. Notably, this happens while APF_US_Equity becomes insignificant. Note also that at a daily frequency the Japanese flow factors have some predictive power due to the time lag; the U.S. market opens after the Japanese market closed on the same day. This paves the way to constructing a profitable trading strategy if the net asset values (NAV) and the total net assets (TNA) of the Japanese derivative funds are available to U.S. investors in a timely manner. Overall, Japanese flow factors, in particular the bull and bear fund flows, have significant premiums in the U.S. stock market controlling for the US domestic and foreign equity fund flows. It is surprising given that the priced flows are trades of investors across the Pacific Ocean. This suggests the possibility for the existence of an international flow factor, which is pursued in a future research.

5.2 Asset Pricing Tests Using Monthly Series

While pricing results from short daily data are suggestive, standard asset pricing tests typically employ monthly data that span over several decades. We now extend the analysis to monthly data and examine if the daily pricing results still hold. The primary datasets for the monthly analysis are the CRSP Survivor-bias Free US Mutual Fund Database for the U.S. and a monthly mutual fund dataset from QUICK for Japan. We classify all funds in the CRSP mutual fund database by the Strategic Insight's Fund Objective Code into the same eight asset classes as in the previous sections. Since this information is available only from 1992, we back-fill the code for each fund in earlier years.[34] We construct flows starting in 1963, which is the starting period that standard asset pricing tests typically adopt. Our full sample period is from January 1963 through September 2004. One limitation with the monthly data is the availability of flows; while returns and net asset values (NAV) for many funds appear monthly in the CRSP dataset, the total net assets (TNA) for a majority of them are recorded only on a quarterly basis before December 1990.[35] Before 1980, only

[33] The daily standard deviations of APF_JP_Bull and APF_JP_Bear are 0.012 and 0.064, respectively. In contrast, the standard deviation for APF_JP_Equity is only 0.0015.
[34] The exact classification of funds is omitted for brevity but is available from the authors upon request.
[35] The number of funds in each category typically fluctuates by a factor of ten or more between end-of-quarter months and others before 1991. For example, the number of funds in the domestic equity category, the largest category, is 671

the domestic equity fund category has flows of three or more individual funds available on a monthly basis. Flows of other categories are either non-existent or include only one or two funds. Even for the domestic equity category, there are only three funds as of January 1963 for which monthly flows are calculated, which is a caveat in interpreting the results in this subsection.[36] For this reason, the only available category flows in the canonical correlation analysis is the domestic equity fund flow (APF_US_Equity) and therefore the canonical-correlation flow factor coincides with it.

The Japanese funds in the QUICK dataset are classified into the same 12 categories. The sample period for the Japanese data is from January 1981 through June 1999. We again focus on the flows of the Japanese domestic equity, index, and foreign equity funds (APF_JP_Equity, APF_JP_Index, APF_JP_ForEq). These are also the only existing Japanese categories before 1984. Therefore, we construct the Japanese canonical-correlation flow factor as the linear combination of these three category flows that is maximally correlated with a linear combination of their category returns. Unfortunately, the bull and bear derivative funds came into existence in 1995 and hence are not included in the monthly pricing test.

Table 16 reports the estimation results. Column (1) indicates that the U.S. domestic equity fund flows have a significant positive monthly premium of 1.15%, which corresponds to an annual premium of 13.8%. As expected, both HML and UMD kick in significantly at the monthly frequency. However, once FLOW_JP is included as in Column (2), which limits the sample period to approximately the second half of the whole sample, APF_US_Equity becomes insignificant. FLOW_JP is marginally significant at 11%. Columns (3) and (5) show that APF_JP_Equity and APF_JP_ForEq are also significant at approximately 10% and 9%, respectively. In sum, despite a limited number of observations, the Japanese flow factors appear to have some explanatory power over the cross section of U.S. stock returns (except for APF_JP_Index in Column (4)).

6 Conclusion

in September 1990, but it drops to 45 and 45 in October and November, respectively, and then reverts back to 686 in December.

[36] We also constructed flows and returns at a quarterly frequency, which allows including flows of 140 funds in the equity fund category. The significance of the U.S. equity flow factor premium is stronger at a quarterly frequency. The cross-country analysis, however, is inappropriate since there are less than 60 quarterly observations for Japanese funds.

This paper finds evidence that is consistent with the hypothesis that daily mutual fund flows may be instruments for investor sentiment about the stock market. Specifically, using data from both the United States and Japan, we document that equity fund flows are negatively correlated with flows to funds that allow investors to bet on their pessimistic views about the stock market—the precious metal funds in the U.S. and the bear derivative funds in Japan. In addition, equity fund flows are positively correlated with flows to bull derivative funds in Japan. Based on this finding, we construct a flow factor by maximizing correlation between linear combinations of category flows and category returns. We argue that this flow factor represents investor sentiment because it is positively loaded on flows to equity and bull funds (Japan), while negatively on precious metal (U.S.) and bear funds (Japan). We show that the sentiment flow factor is priced both in the U.S. and Japan. It survives a number of robustness tests, such as inclusion of size, value/growth, and momentum factors, and an alternative construction method that does not rely on optimization. Moreover, the Japanese flows are priced significantly in the U.S. at a daily frequency. The analysis of long monthly data also supports these findings.

There are several directions to explore in future research. First, examining the characteristics of stocks that are unduly sensitive to our sentiment factor will be of interest to both academics and practitioners—for example, are such stocks value or growth stocks?

Second, sentiment may have lagged pricing implications. In fact, we find that flows to bull and bear funds are strongly negatively and positively correlated, respectively, to lagged equity returns. This suggests that there may be a close relationship between investor sentiment and positive/negative feedback trading behavior. The current framework allows addressing this question easily by including lagged returns in the canonical correlation analysis.

Finally, although we did not find evidence of correlated sentiment between the two countries, this investigation could be extended to the second moments of returns and flows. Consistent with Hamao, Masulis, and Ng (1990), we find asymmetric return volatility spillover from the U.S. to Japan, but not in the other direction (not reported).[37] While their interpretation of volatility spillover is information generation, one might add a sentiment story if flow volatility

[37] Following Hamao, Masulis, and Ng (1990), we conducted a two-step test of return volatility spillover. In the first step, a GARCH(1,1)-MA(1)-in-mean model is estimated for each country. In the second step, as a measure of information generation, the square of the previous foreign market's residuals from the first step is added in the conditional variance equation of each country's GARCH(1,1)-MA(1)-in-mean model. The coefficient on the squared foreign residuals is significant for Japan, but not for the U.S. Interestingly, for Japan, the coefficient on the lagged domestic squared residual becomes insignificant upon inclusion of the U.S. squared residuals.

spillover is in fact found. Needless to say, it would be useful to quantify the “variability” of sentiment.

Appendix

A. Flow Timing Correction of the U.S. TrimTabs Data

This appendix describes the way we identify and correct the timing of the U.S. TrimTabs data. We adopt a similar methodology to Greene and Hodges (2002). They note that if a fund reports pre-flow total net assets (TNA) for day t that do not reflect the day's transactions, the correct TNA can be recovered by

$$TNAc_t = TNA_{t+1} \cdot NAV_t \,/\, NAV_{t+1},$$

where $TNAc_t$ is the corrected post-flow TNA on day t, TNA_{t+1} is the recorded pre-flow TNA on day t+1, and NAV_t is the net asset value per share on day t. We compare $TNAc_t$ and TNA_t to the GAAP-consistent figures in SEC filings (N-SARs or N-30Ds). The GAAP requires that the TNAs reflect all transactions as of the end of the conformed period (i.e., post-flow TNAs). Since SEC filings are semiannual, it is possible to find at most three filings for a given fund during our 17-month sample period. If both $TNAc_t$ and TNA_t are away from the GAAP figure by 2%, we classify the *observation* as "indeterminate." We proceed to the subsequent classification if either $TNAc_t$ or TNA_t falls within the 2% tolerance. If $TNAc_t$ is closer to the SEC figure than TNA_t, we regard the observation as "pre-flow." If the opposite is true, it is categorized as "post-flow." If $TNAc_t$ is exactly as far away from the SEC figure as TNA_t, it is classified as "indeterminate." Next, we follow a majority rule to classify a *fund* as either pre-flow, post-flow, or indeterminate. Those funds with more pre-flow observations than post-flow ones are classified as pre-flow. If more post-flow observations are found, the fund is classified as post-flow. There can be a tie—such funds, as well as those with no pre- or post-flow observation, are classified as indeterminate and thrown away from the analyses.

We match TrimTabs and the SEC filings by fund names. Since our TrimTabs data do not include fund names, we do this by first matching TrimTabs to the CRSP Mutual Fund File by ticker symbols and then matching CRSP to the SEC filings by fund names. Since SEC's N-SARs are machine-readable, we start the above screening with those funds for which N-SARs are found on the SEC's EDGAR database.[38] This identifies the timing of 152 funds of which 108 funds (71.1%)

[38] http://www.sec.gov/edgar.shtml

are pre-flow. Since this yielded only several funds in the precious metal, cash, and foreign bond categories, N-30Ds are manually collected for additional funds in each of the three categories. We chose these funds by first sorting the funds in each category by TNAs and then picking a dozen top rankers, so that they may be considered representative of the category. Table 2 summarizes the final set of funds used in the analyses of this paper. The relatively small number of funds used in the precious metal category is due to the fact that the entire TrimTabs dataset contains only eight precious metal funds. 181 funds are used, 131 (69.7%) of which are identified as pre-flow. This demonstrates the importance of checking and correcting for the timing of flows.

B. Estimation of Factor Risk Premia

This appendix presents the details of factor premium estimation. We wish to estimate Equation (1) by allowing for intertemporal heteroskedasticity. At first, we assume that

$$Var(\varepsilon) \equiv \Omega = \begin{bmatrix} \sigma_1^2 I & & & \mathbf{0} \\ & \sigma_2^2 I & & \\ & & \ddots & \\ \mathbf{0} & & & \sigma_{T_2}^2 I \end{bmatrix},$$

where $\varepsilon \equiv [\varepsilon_1' \ \varepsilon_2' \cdots \varepsilon_{T_2}']'$ is the $NT_2 \times 1$ vector of stacked residual vectors in (1) and T_2 is the number of odd days. The block-diagonal design of Ω is in line with Fama and MacBeth (1973), who assumed the serial independency of residuals over time. In addition, the most naïve implementation of Fama-MacBeth regression typically assumes homoskedasticity, that $\sigma_1^2 = \sigma_2^2 = \cdots = \sigma_{T_2}^2 \equiv \sigma^2$. We can also deal with cross-sectional heteroskedasticity once we form a panel regression, as discussed later. Equation (1) coupled with the above error variance structure is typically termed a groupwise heteroskedastic model (in which the groups are observation days) and can be found in any standard econometrics textbook (see, for example, Greene [1997], Examples 11.2 and 12.9). Exploiting the common-*X* structure over groups, the generalized least squares (GLS) estimator is given by

$$\hat{\lambda} = \left[\sum_t \frac{1}{\sigma_t^2} X'X\right]^{-1} \left[\sum_t \frac{1}{\sigma_t^2} X'R_{\bullet,t}\right]$$
$$= \sum_t w_t b_t,$$

where $w_t \equiv \frac{1/\sigma_t^2}{\sum_t 1/\sigma_t^2}$ and $b_t \equiv (X'X)^{-1}X'R_{\bullet,t}$ is the ordinary least squares (OLS) estimator for day (group) t. Thus, the GLS estimator in this model is simply the weighted average of OLS estimators over days. Following the common practice, we implement this as a two-step feasible GLS. In the first step, the OLS is used to obtain a consistent estimate of Ω. That is, set $\sigma_t^2 \equiv \sigma^2$ or $w_t = 1/T_2$ to obtain the OLS estimator $\bar{\lambda} = \frac{1}{T_2}\sum_t b_t$. The OLS residuals, $\hat{\varepsilon}_t = R_{\bullet,t} - X\bar{\lambda}$, are used to estimate $\hat{\sigma}_t^2 = \hat{\varepsilon}_t'\hat{\varepsilon}_t / N$ for every t. In the second step, the estimates of residual variances are fed back into the above equation for $\hat{\lambda}$. It can be shown that this is equivalent with a panel regression. t-statistics for estimates of factor risk premia in Tables 11-13 are based on White's (1980) heteroskedasticity-consistent standard errors from the panel regression and are corrected also for cross-sectional heteroskedasticity in this sense.

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Table 1
Definition of ITAJ Classification

This table shows the definition of seven broad and 31 narrow categories used by the Investment Trust Association of Japan.

Category: Broad	Narrow	Assets Invested / Characteristics
1. Domestic Equity		
	Big Cap	Over 70% in big-cap stocks (#shares listed > 200million)
	General	Over 70% in domestic stocks
	OTC	Over 70% in over-the-counter stocks
	Middle-Small Cap	Over 70% in middle-small cap's
	Million (periodic contribution)	Purchased automatically by monthly deduction from investors' payroll
	Sectors	Over 70% in domestic stocks. Investors can switch among several industry sectors.
2. International Equity		
	Asia-Pacific	Over 70% in Asian and Pacific region stocks, excluding Japan.
	Europe	Over 70% in European stocks
	General	Over 70% in foreign stocks
	Latin America	Over 70% in Latin American stocks
	North America	Over 70% in North American stocks
3. Balanced Funds		Balanced between domestic and/or foreign bonds and stocks (<=70%), or focused on bonds.
4. Convertible Bonds		Mainly in convertible bonds, no more than 30% in stocks, domestic or foreign.
5. Domestic Index Linked		
	Nikkei225 linked	Stocks, designed to track Nikkei 225 index
	Nikkei300 linked	Stocks, designed to track Nikkei 300 index
	Other Indices linked	Stocks, designed to track indices other than Nikkei 225, 300 or TOPIX
	TOPIX linked	Stocks, designed to track TOPIX index
6. Domestic Industry Sector		
	Automobile-Machinery	Over 70% in automobile and/or machinery industry stocks
	Chemical-Textile-Pulp	Over 70% in chemical, textile and/or pulp industry stocks
	Commerce	Over 70% in commerce industry stocks
	Construction-Real Estate	Over 70% in construction and/or real estate industry stocks
	Electric-Precision Machinery	Over 70% in electric and/or precision machinery industry stocks
	Financial	Over 70% in financial industry stocks
	Oil-Nonferrous	Over 70% in oil and/or nonferrous industry stocks
	Pharmaceutical-Food	Over 70% in pharmaceutical and/or food industry stocks
	Steel-Shipbuilding	Over 70% in steel and/or shipbuilding industry stocks
	Utility	Over 70% in utility industry stocks
7. Derivatives		Aggressively uses derivative contracts for non-hedging purposes
8. Others	Limited	
	Savings (Domestic Zaikei)	
	Domestic Money Pool	

Table 2
U.S. Asset-class Categories

This table shows U.S. categories and number of funds used in each category. We classify the TrimTabs funds into eight asset classes. The identification of pre- and post-flow funds is based on a method similar to Greene and Hodges (2002) and is described in Appendix A.

	# Category Funds Used	(# Pre-flow Funds)	(# Post-flow Funds)
US Equity	80	(57)	(23)
Foreign Equity	20	(11)	(9)
Metal	6	(6)	(0)
US Sector	14	(8)	(6)
US Bond	22	(15)	(7)
Cash	12	(9)	(3)
Foreign Bond	12	(6)	(6)
Muni Bond	22	(19)	(3)
Total	188	(131)	(57)

Table 3
Japanese GSC Categories

This table shows the Japanese Generalized Style Classification (GSC) categories and their interpretations. It also shows the cross-tabulation with the Investment Trust Association of Japan (ITAJ) categories. The primary dataset comes from QUICK corporation. The Japanese funds are classified into eight return-based categories (and "not applicable") by Brown and Goetzmann's (1997) GSC algorithm.

ITAJ Category		GSC Category and Interpretation									
		GSC1	GSC2	GSC3	GSC4	GSC5	GSC6	GSC7	GSC8		
		Dom.	Int'l	Int'l	Foc'd	Bal'd /	Bal'd /				
Broad	**Narrow**	Equity	Asian	West.	Equity	Cash	CB	Index	Cash	N/A	Total
1. Domestic Equity	Big Cap	13	0	0	4	0	0	0	0	0	17
	General	214	47	0	86	2	0	31	0	12	392
	OTC	32	0	0	4	0	0	0	0	0	36
	Middle-Small Cap	24	1	0	15	1	0	1	0	1	43
	Million	2	10	0	0	0	0	12	1	0	25
	Sectors	54	35	0	24	2	3	7	0	0	125
2. International Equity	Asia-Pacific	7	77	8	6	3	7	0	0	1	109
	Europe	0	12	48	4	0	6	0	3	0	73
	General	6	28	82	13	5	7	0	1	2	144
	Latin America	1	2	0	5	0	0	0	0	0	8
	North America	0	7	29	6	0	2	0	0	2	46
3. Balanced Funds		1	30	128	14	164	61	0	12	5	415
4. Convertible Bonds		0	5	3	4	0	24	0	0	1	37
5. Domestic Index Linked	Nikkei225 linked	0	0	0	0	0	0	45	0	0	45
	Nikkei300 linked	31	0	0	0	0	0	0	0	0	31
	Other Indices linked	5	0	0	0	0	0	1	0	1	7
	TOPIX linked	26	0	0	0	0	0	0	0	0	26
6. Domestic Industry Sector	Automobile-Machinery	6	10	0	2	0	0	0	0	0	18
	Chemical-Textile-Pulp	1	19	0	0	0	0	2	0	0	22
	Commerce	13	1	0	6	0	0	0	0	0	20
	Construction-Real Estate	4	12	0	0	0	0	5	0	0	21
	Electric-Precision Machinery	3	0	0	13	0	0	0	0	0	16
	Financial	14	0	0	0	0	0	0	0	0	14
	Oil-Nonferrous	0	7	0	0	0	0	6	0	0	13
	Pharmaceutical-Food	0	19	0	0	0	0	0	0	0	19
	Steel-Shipbuilding	5	3	0	0	0	0	3	0	0	11
	Utility	5	4	0	3	0	0	1	0	0	13
7. Derivatives		12	7	15	12	40	30	49	24	0	189
8. Others	Limited	23	97	0	28	0	28	0	1	0	177
	Savings (Domestic Zaikei)	0	11	0	0	0	4	0	0	0	15
	Domestic Money Pool	0	0	1	0	23	40	0	50	0	114
	Total	502	444	314	249	240	212	163	92	25	2241

Table 4
Japanese ITA Categories

This table shows the Japanese ITA categories and the cross-tabulation with the Investment Trust Association of Japan (ITAJ) categories. Funds in the primary QUICK dataset are classified into twelve asset classes. The ITAJ derivatives funds are further grouped into domestic and foreign bull and bear funds by fund name. The ITAJ balanced category funds are further broken into domestic and foreign bond funds using invested asset information in a second QUICK dataset. For unambiguous classification, we exclude the following ITAJ categories: million, convertible bonds, limited, and savings.

ITAJ Category		ITA Category													
Broad	Narrow	Japan Equity	Index	Cash	Japan Bull	Japan Bear	For'n Bull	For'n Bear	For'n Equity	Japan Sector	Japan Bond	For'n Bond	Other Deriv.	N/A	Total
1. Domestic Equity	Big Cap	17	0	0	0	0	0	0	0	0	0	0	0	0	17
	General	392	0	0	0	0	0	0	0	0	0	0	0	0	392
	OTC	36	0	0	0	0	0	0	0	0	0	0	0	0	36
	Middle-Small Cap	43	0	0	0	0	0	0	0	0	0	0	0	0	43
	Million	0	0	0	0	0	0	0	0	0	0	0	0	25	25
	Sectors	0	0	0	0	0	0	0	0	125	0	0	0	0	125
2. International Equity	Asia-Pacific	0	0	0	0	0	0	0	109	0	0	0	0	0	109
	Europe	0	0	0	0	0	0	0	73	0	0	0	0	0	73
	General	0	0	0	0	0	0	0	144	0	0	0	0	0	144
	Latin America	0	0	0	0	0	0	0	8	0	0	0	0	0	8
	North America	0	0	0	0	0	0	0	46	0	0	0	0	0	46
3. Balanced Funds		0	0	0	0	0	0	0	0	0	26	75	0	314	415
4. Convertible Bonds		0	0	0	0	0	0	0	0	0	0	0	0	37	37
5. Domestic Index Linked	Nikkei225 linked	0	45	0	0	0	0	0	0	0	0	0	0	0	45
	Nikkei300 linked	0	31	0	0	0	0	0	0	0	0	0	0	0	31
	Other Indices linked	0	7	0	0	0	0	0	0	0	0	0	0	0	7
	TOPIX linked	0	26	0	0	0	0	0	0	0	0	0	0	0	26
6. Domestic Industry Sector	Automobile-Machinery	0	0	0	0	0	0	0	0	18	0	0	0	0	18
	Chemical-Textile-Pulp	0	0	0	0	0	0	0	0	22	0	0	0	0	22
	Commerce	0	0	0	0	0	0	0	0	20	0	0	0	0	20
	Construction-Real Estate	0	0	0	0	0	0	0	0	21	0	0	0	0	21
	Electric-Precision Machinery	0	0	0	0	0	0	0	0	16	0	0	0	0	16
	Financial	0	0	0	0	0	0	0	0	14	0	0	0	0	14
	Oil-Nonferrous	0	0	0	0	0	0	0	0	13	0	0	0	0	13
	Pharmaceutical-Food	0	0	0	0	0	0	0	0	19	0	0	0	0	19
	Steel-Shipbuilding	0	0	0	0	0	0	0	0	11	0	0	0	0	11
	Utility	0	0	0	0	0	0	0	0	13	0	0	0	0	13
7. Derivatives		0	0	0	27	28	16	18	0	0	0	0	100	0	189
8. Others	Limited	0	0	0	0	0	0	0	0	0	0	0	0	177	177
	Savings (Domestic Zaikei)	0	0	0	0	0	0	0	0	0	0	0	0	15	15
	Domestic Money Pool	0	0	114	0	0	0	0	0	0	0	0	0	0	114
	Total	488	109	114	27	28	16	18	380	292	26	75	100	568	2241

Table 5
Characteristics of Japanese Bull and Bear Funds

This table shows the characteristics of bull and bear funds in the Japanese dataset. We first classify each ITAJ equity derivative fund into either bull, bear, or other type using fund name. In order to be classified as an equity derivative fund, a fund must not have the word “bond,” “yen,” or “dollar” in their names. No other words that imply non-equity assets were found in the sample fund names. Then we construct the potential set of bull funds by taking those whose names contain the words “bull” and/or “double” and not “bear” or “reverse.” The bear funds are those whose names contain the word ”bear” or “reverse.” In our sample, no fund has the words “bull” and “bear” simultaneously in its name. Then, we further divide the bull and bear funds into domestic and foreign. If a fund contains any one of the following words in its name, it is classified as a foreign bull or bear fund: U.S., Hong Kong, Britain, France, Italy, Germany, Global, World, and their equivalents and literal derivatives. Otherwise, it is classified as a domestic fund. No other word that implies a country or region was found in the sample fund names. Finally, we determine the final set of bull and bear funds by checking the fund characteristics as described in the text. The total net assets (TNA) are in hundreds of millions of yen. The average leverage is the percentage of TNA shorted in the futures contracts and is estimated from the performance reports found on management firms' web sites.

	Sum TNA	(% of total)	Mean TNA	# Funds	(% of total)	Average Leverage	# Reports
Japan Bull	4,745.8	(40.9%)	175.8	27	(14.3%)	178.8%	10
Japan Bear	435.8	(3.8%)	15.6	28	(14.8%)	-162.8%	9
Foreign Bull	590.5	(5.1%)	36.9	16	(8.5%)	200.7%	6
Foreign Bear	222.7	(1.9%)	12.4	18	(9.5%)	-99.2%	8
Other Derivatives	5,603.8	(48.3%)	56.6	100	(52.9%)		
Total	11,598.7	(100.0%)	61.7	189	(100.0%)		

Table 6
GSC Clustering Results of Japanese Derivative Funds

This table shows the number of Japanese derivative funds classified into five return-based clusters by Brown and Goetzmann's (1997) Generalized Style Classification (GSC) algorithm.

	GSC I	GSC II	GSC III	GSC IV	GSC V	N/A	Total
Japan Bull	19	0	0	0	0	8	27
Japan Bear	0	19	0	0	1	8	28
Foreign Bull	5	0	11	0	0	0	16
Foreign Bear	0	6	0	12	0	0	18
Other Derivatives	23	0	44	3	21	9	100
Total	47	25	55	15	22	25	189

Table 7
Flow and Return Correlations between U.S. Categories

This table shows the flow and return correlations between U.S. categories. The category flow is measured by the average percentage flow (APF), the equally weighted average of normalized flows over component funds, where the normalization is by each fund's total net assets on the previous day. The category return (RET) is the equally weighted average of returns on the component funds. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) Flow Correlations

	US Equity	Foreign Equity	Metal	US Sector	US Bond	Cash	Foreign Bond
Foreign Equity	0.45***						
Metal	-0.02	-0.10*					
US Sector	0.22***	0.21***	-0.15***				
US Bond	0.04	0.03	-0.04	0.04			
Cash	-0.07	-0.13**	0.03	-0.18***	0.12**		
Foreign Bond	0.02	0.00	0.08	-0.06	0.02	-0.01	
Muni Bond	0.04	-0.10*	-0.01	-0.02	0.14**	0.02	0.07

(b) Cross Correlations between Flows and Returns

APF \ RET	US Equity	Foreign Equity	Metal	US Sector	US Bond	Cash	Foreign Bond	Muni Bond
US Equity	0.53***	0.24***	0.03	0.47***	0.10*	-0.04	0.12**	-0.03
Foreign Equity	0.57***	0.40***	0.05	0.58***	0.11**	-0.09	0.19***	-0.07
Metal	-0.08	0.08	0.60***	-0.10*	-0.04	-0.03	0.08	-0.11*
US Sector	0.24***	0.11**	-0.01	0.20***	0.16***	-0.01	0.08	0.06
US Bond	0.01	-0.01	-0.04	0.00	0.05	0.02	-0.02	0.04
Cash	-0.14**	-0.11*	-0.01	-0.15**	-0.16***	-0.03	-0.11*	-0.04
For. Bond	0.00	0.05	0.00	0.00	0.08	0.03	0.09	0.03
Muni Bond	-0.06	-0.05	-0.05	-0.02	0.16***	0.23***	0.11*	0.18***

Table 8
Flow and Return Correlations between Japanese GSC Categories

This table shows the flow and return correlations between Japanese GSC categories. The category flow is measured by the average percentage flow (APF), the equally weighted average of normalized flows over component funds, where the normalization is by each fund's total net assets on the previous day. The category return (RET) is the equally weighted average of returns on the component funds. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) Flow Correlations

	Japan Equity	Asian Equity	Western Equity	Focused Equity	Balanced / Cash	Balanced / CB	Index
Asian Equity	0.41***						
Western Equity	-0.12**	0.19***					
Focused Equity	0.43***	0.43***	0.15***				
Balanced/Cash	-0.08	-0.09	0.08	-0.05			
Balanced/CB	-0.07	-0.07	0.08	-0.02	0.28***		
Index	0.44***	0.29***	-0.13**	0.30***	-0.48***	-0.33***	
Cash	-0.27***	-0.15***	0.22***	-0.13**	0.53***	0.38***	-0.71***

(b) Return Correlations

	Japan Equity	Asian Equity	Western Equity	Focused Equity	Balanced / Cash	Balanced / CB	Index
Asian Equity	0.92***						
Western Equity	0.20***	0.25***					
Focused Equity	0.95***	0.87***	0.36***				
Balanced/Cash	-0.48***	-0.38***	-0.38***	-0.57***			
Balanced/CB	0.60***	0.59***	0.19***	0.63***	-0.52***		
Index	0.93***	0.91***	0.17***	0.84***	-0.38***	0.55***	
Cash	-0.90***	-0.88***	-0.13**	-0.82***	0.40***	-0.54***	-0.96***

Table 9
Flow and Return Correlations between Japanese ITA Categories

This table shows the flow and return correlations between Japanese ITA categories. The category flow is measured by the average percentage flow (APF), the equally weighted average of normalized flows over component funds, where the normalization is by each fund's total net assets on the previous day. The category return (RET) is the equally weighted average of returns on the component funds. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) Flow Correlations

	Japan Equity	Index	Cash	Japan Bull	Japan Bear	Foreign Bull	Foreign Bear
Index	0.48***						
Cash	-0.25***	-0.31***					
Japan Bull	0.39***	0.52***	-0.65***				
Japan Bear	-0.22***	-0.38***	0.48***	-0.69***			
Foreign Bull	-0.02	0.03	-0.08	-0.05	0.00		
Foreign Bear	-0.05	-0.09*	0.16***	-0.06	0.09*	-0.20***	
Foreign Equity	0.12**	0.15***	0.03	-0.03	0.06	0.25***	-0.14**
Japan Sector	0.43***	0.38***	-0.26***	0.25***	-0.15***	-0.06	0.01
Japan Bond	0.06	0.02	0.04	-0.02	0.09*	0.09	-0.05
Foreign Bond	-0.06	0.02	-0.01	-0.01	0.02	0.07	0.04
Other Derivatives	-0.02	-0.07	0.19***	-0.19***	0.26***	0.06	0.14**

(b) Return Correlations

	Japan Equity	Index	Cash	Japan Bull	Japan Bear	Foreign Bull	Foreign Bear
Index	0.96***						
Cash	0.00	-0.05					
Japan Bull	0.90***	0.96***	-0.04				
Japan Bear	-0.90***	-0.96***	0.04	-0.99***			
Foreign Bull	0.33***	0.26***	0.06	0.21***	-0.20***		
Foreign Bear	-0.34***	-0.26***	0.08	-0.21***	0.21***	-0.98***	
Foreign Equity	0.41***	0.40***	-0.04	0.41***	-0.39***	0.25***	-0.28***
Japan Sector	0.98***	0.98***	-0.06	0.93***	-0.93***	0.28***	-0.29***
Japan Bond	-0.03	-0.01	0.22***	0.00	-0.03	-0.03	0.07
Foreign Bond	-0.03	-0.08	0.94***	-0.07	0.07	0.02	0.11**
Other Derivatives	0.90***	0.92***	-0.07	0.92***	-0.91***	0.30***	-0.31***

Table 10
Correlations between Sentiment Flow Factor and Category Flows/Returns

This table shows the correlations between the sentiment flow factor and category flows/returns. The average percentage flow (APF) is the equally weighted average of normalized flows over component funds, where the normalization is by each fund's total net assets on the previous day. The total net flow (TNF) is the sum of component fund flows. The category return (RET) is the equally weighted average of returns on the component funds. The sentiment flow factor is the linear combination of category flows (APFs) that is maximally correlated to a linear combination of category returns (RETs) and is found by the canonical correlation analysis. The factor mimicking portfolio return is the resulting optimal combination of category returns. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) US

	Correlation with Category		
	APF	TNF	RET
US Equity	0.698***	0.599***	0.572***
Foreign Equity	0.756***	0.643***	0.273***
Metal	-0.577***	-0.561***	-0.272***
US Sector	0.279***	0.205***	0.556***
US Bond	0.019	-0.039	0.121**
Cash	-0.112**	-0.048	-0.047
Foreign Bond	-0.028	-0.037	0.108**
Muni Bond	-0.025	-0.032	0.005
Correlation between Sentiment Flow Factor and Factor-Mimicking Portfolio Return			0.702***

(b) Japan

	Correlation with Category		
	APF	TNF	RET
Japan Equity	0.204***	0.081*	-0.018
Index	0.658***	0.490***	0.078*
Cash	-0.349***	-0.434***	-0.081*
Japan Bull	0.658***	0.647***	0.078*
Japan Bear	-0.839***	-0.653***	-0.067
Foreign Bull	0.114**	0.025	-0.295***
Foreign Bear	0.158***	0.124**	0.263***
Foreign Equity	0.039	0.137***	0.041
Japan Sector	0.256***	0.290***	0.045
Japan Bond	-0.056	-0.041	-0.005
Foreign Bond	0.186***	0.152***	-0.102**
Other Derivatives	-0.200***	0.092**	0.024
Correlation between Sentiment Flow Factor and Factor-Mimicking Portfolio Return			0.461***

Table 11
Estimated Sentiment Flow Factor Premium

This table shows the estimates of U.S. and Japanese sentiment factor risk premia. The estimation is by a version of Fama-MacBeth (1973) regression that controls for intertemporal heteroskedasticity. We first orthogonalize the sentiment flow factor against all the category returns and their one-day lags. Then, we estimate factor loadings by regressing each fund return on a constant, the category returns, and the orthogonalized sentiment flow factor using even days. Finally, using odd days, we regress the cross-section of fund returns on the factor loadings with the constraint that coefficients are constant over time. We implement this as a groupwise heteroskedastic model and estimate it by two-step feasible generalized least squares. The details are shown in Appendix B. Reported are the estimated coefficients or factor risk premia (multiplied by 1,000) and in brackets below, the corresponding t-values based on White's (1980) heteroskedasticity-consistent standard errors. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) US

	Factor Premium	t-stat	Annualized Premium
Sentiment Flow Factor	0.7742***	(7.09)	21.5%
Return Factors:			
US Equity	0.9483***	(14.58)	27.0%
Foreign Equity	0.7621***	(5.83)	21.2%
Metal	-0.4264	(-1.05)	-10.2%
US Sector	0.5210***	(5.28)	14.0%
US Bond	-0.0298	(-0.49)	-0.7%
Cash	-0.0246	(-0.76)	-0.6%
Foreign Bond	-0.3417***	(-3.77)	-8.3%
Muni Bond	-0.1951***	(-3.45)	-4.8%
Constant	-0.0729*	(-1.36)	-1.8%

(b) Japan

	Factor Premium	t-stat	Annualized Premium
Sentiment Flow Factor	2.3647***	(4.78)	81.3%
Return Factors:			
Japan Equity	1.0362***	(21.63)	29.8%
Index	0.9793***	(18.08)	28.0%
Cash	-0.0001	(-0.11)	0.0%
Japan Bull	1.4792***	(9.66)	45.1%
Japan Bear	-1.2215***	(-9.21)	-26.5%
Foreign Bull	1.9599***	(4.49)	63.8%
Foreign Bear	-1.3110***	(-5.08)	-28.1%
Foreign Equity	0.9330***	(11.83)	26.5%
Japan Sector	0.7070***	(14.61)	19.5%
Japan Bond	-0.1637***	(-4.39)	-4.0%
Foreign Bond	0.0941	(0.89)	2.4%
Other Derivatives	0.2285***	(4.08)	5.9%
Constant	-0.0002	(-0.01)	0.0%

Table 12
Estimated Simple Sentiment Flow Factor Premium

This table shows the estimates of U.S. and Japanese "simple" sentiment factor risk premia. The simple sentiment flow factor is constructed from category average percentage flows as follows, U.S.: Equity - 0.5*(Cash + Metal), Japan: Index - 0.5*(Cash + Bear). The estimation is by a version of Fama-MacBeth (1973) regression that controls for intertemporal heteroskedasticity. We first orthogonalize the simple sentiment flow factor against all the category returns and their one-day lags. Then, we estimate factor loadings by regressing each fund return on a constant, the category returns, and the orthogonalized simple sentiment flow factor using even days. Finally, using odd days, we regress the cross-section of fund returns on the factor loadings with the constraint that coefficients are constant over time. We implement this as a groupwise heteroskedastic model and estimate it by two-step feasible generalized least squares. The details are shown in Appendix B. Reported are the estimated coefficients or factor risk premia (multiplied by 1,000) and in brackets below, the corresponding t-values based on White's (1980) heteroskedasticity-consistent standard errors. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

(a) US

	Factor Premium	t-stat	Annualized Premium
Simple Sentiment Flow Factor	1.2041***	(4.11)	35.4%
Return Factors:			
US Equity	0.9677***	(14.76)	27.6%
Foreign Equity	0.7910***	(5.94)	22.0%
Metal	-0.3617	(-0.86)	-8.7%
US Sector	0.5700***	(5.82)	15.4%
US Bond	-0.1027**	(-1.65)	-2.6%
Cash	-0.0441*	(-1.32)	-1.1%
Foreign Bond	-0.3722***	(-3.89)	-9.0%
Muni Bond	-0.1949***	(-3.42)	-4.8%
Constant	-0.0628	(-1.16)	-1.6%

(b) Japan

	Factor Premium	t-stat	Annualized Premium
Simple Sentiment Flow Factor	2.7465*	(1.38)	99.6%
Return Factors:			
Japan Equity	1.0036***	(20.77)	28.8%
Index	0.9971***	(18.48)	28.6%
Cash	0.0007	(0.63)	0.0%
Japan Bull	1.4829***	(9.67)	45.3%
Japan Bear	-1.3496***	(-9.86)	-28.8%
Foreign Bull	1.8484***	(4.20)	59.3%
Foreign Bear	-1.2640***	(-4.88)	-27.3%
Foreign Equity	0.9229***	(11.69)	26.2%
Japan Sector	0.6815***	(13.85)	18.7%
Japan Bond	-0.2349***	(-6.13)	-5.7%
Foreign Bond	0.1004	(0.95)	2.6%
Other Derivatives	0.2419***	(4.30)	6.3%
Constant	0.0097	(0.28)	0.2%

Table 13
Estimated U.S. Sentiment Flow Factor Premium in a Fama-French Three Factor + Momentum Regression

This table shows the estimated U.S. sentiment factor risk premium in a Fama-French (FF, 1993) three factor and momentum regression. The estimation is by a version of Fama-MacBeth (1973) regression that controls for intertemporal heteroskedasticity. We first orthogonalize the sentiment flow factor from the canonical correlation analysis against all the category returns and their one-day lags. Then, we estimate factor loadings by regressing each fund return on a constant, the excess market (EXMKT), size (SMB), book-to-market (HML), and momentum (UMD) return factors, and the orthogonalized sentiment flow factor using even days. The daily FF three and momentum factors are downloaded from Jeffrey Busse's web site. Finally, using odd days, we regress the cross-section of fund returns on the factor loadings with the constraint that coefficients are constant over time. We implement this as a groupwise heteroskedastic model and estimate it by two-step feasible generalized least squares. The details are shown in Appendix B. Reported are the estimated coefficients or factor risk premia (multiplied by 1,000) and in brackets below, the corresponding t-values based on White's (1980) heteroskedasticity-consistent standard errors. *, **, and *** denote significance at the 10, 5, and 1% levels, respectively.

	Factor Premium	t-stat	Annualized Premium
Sentiment Flow Factor	0.4359***	(3.85)	11.6%
Return Factors:			
EXMKT	0.8557***	(15.68)	24.1%
SMB	0.1202	(1.21)	3.1%
HML	-0.9842***	(-10.01)	-22.0%
UMD	0.6827***	(3.79)	18.8%
Constant	-0.0584***	(-2.50)	-1.5%

Table 14
Estimated Daily Premiums of the US Model

This table shows the estimated daily premiums of the U.S. model. The estimation follows the Fama-MacBeth (1973) two-pass procedure with the Shanken (1992) correction for standard errors. The test portfolios are the 25 portfolios formed as the cross section of five size and five book-to-market quintiles. MKT, SMB, HML are the Fama French (1993) excess market, size, and book-to-market factors, respectively. FLOW is the U.S. flow factor constructed from the canonical correlation analysis. APF_US_Equity (ForEq, Sector) is the equally weighted average percentage flows for the U.S. equity (foreign equity, sector) funds. N is the number of observations used in the t-test and Start:End is the estimation period. Each column shows the daily premiums (multiplied by 100) with p-values in parentheses, based on the standard errors corrected for the errors-in-variable problem as in Shanken (1992). *, **, and *** represent significance at 10%, 5%, and 1%, respectively.

	(1)			(2)			(3)			(4)		
Intercept	0.117	***	(0.000)	0.104	***	(0.000)	0.124	***	(0.000)	0.085	***	(0.005)
MKT	-0.031		(0.612)	-0.013		(0.827)	-0.032		(0.597)	0.004		(0.950)
SMB	0.027		(0.348)	0.032		(0.268)	0.026		(0.350)	0.032		(0.269)
HML	0.007		(0.835)	0.005		(0.882)	0.006		(0.841)	0.009		(0.780)
FLOW	17.894	**	(0.013)									
APF_US_Equity				0.060	***	(0.005)						
APF_US_ForEq							0.164	**	(0.012)			
APF_US_Sector										0.126	**	(0.020)
N	1384			1424			1424			1424		
Start:End	4/1/1998:10/6/2003			2/3/1998:10/6/2003			2/3/1998:10/6/2003			2/3/1998:10/6/2003		

Table 15
Estimated Daily Premiums of the US Model with Japanese Flow Factors

This table shows the estimated daily premiums of the U.S. model augmented with the Japanese flow factors. The estimation follows the Fama-MacBeth (1973) two-pass procedure with the Shanken (1992) correction for standard errors. The test portfolios are the 25 portfolios formed as the cross section of five size and five book-to-market quintiles. MKT, SMB, HML are the Fama-French (1993) excess market, size, and book-to-market factors, respectively. FLOW (_JP) is the U.S. (Japanese) flow factor constructed from the canonical correlation analysis. APF_US_ ForEq (Equity) is the equally weighted average percentage flows for the U.S. foreign equity (domestic equity) funds. APF_JP_ Equity (Index, Bull, Bear) is the equally weighted average percentage flows for the Japanese equity (index, bull, bear) funds. N is the number of observations used in the t-test and Start:End is the estimation period. Each column shows the daily premiums (multiplied by 100) with p-values in parentheses, based on the standard errors corrected for the errors-in-variable problem as in Shanken (1992). *, **, and *** represent significance at 10%, 5%, and 1%, respectively.

(a) FLOW

	(1)			(2)			(3)			(4)			(5)		
Intercept	0.114	***	(0.007)	0.123	***	(0.001)	0.135	***	(0.003)	0.122	***	(0.007)	0.138	***	(0.003)
MKT	-0.017		(0.834)	-0.024		(0.751)	-0.042		(0.623)	-0.032		(0.710)	-0.045		(0.609)
SMB	-0.010		(0.814)	0.003		(0.931)	-0.004		(0.927)	-0.002		(0.956)	0.003		(0.955)
HML	-0.016		(0.749)	-0.016		(0.732)	0.003		(0.950)	-0.016		(0.767)	-0.018		(0.744)
FLOW	21.607	**	(0.024)	20.822	**	(0.018)	13.756		(0.184)	19.647	*	(0.050)	23.011	**	(0.028)
APF_US_ForEq	0.191	**	(0.019)	0.225	***	(0.004)	0.168	*	(0.052)	0.153	*	(0.079)	0.167	**	(0.049)
FLOW_JP	31.314		(0.109)												
APF_JP_Equity				0.016		(0.682)									
APF_JP_Index							0.215	**	(0.015)						
APF_JP_Bull										0.687	**	(0.021)			
APF_JP_Bear													-4.002	**	(0.013)
N	827			892			892			827			827		
Start:End	4/1/1998:12/28/2001			4/1/1998:12/28/2001			4/1/1998:12/28/2001			4/1/1998:12/28/2001			4/1/1998:12/28/2001		

Table 15 - Continued

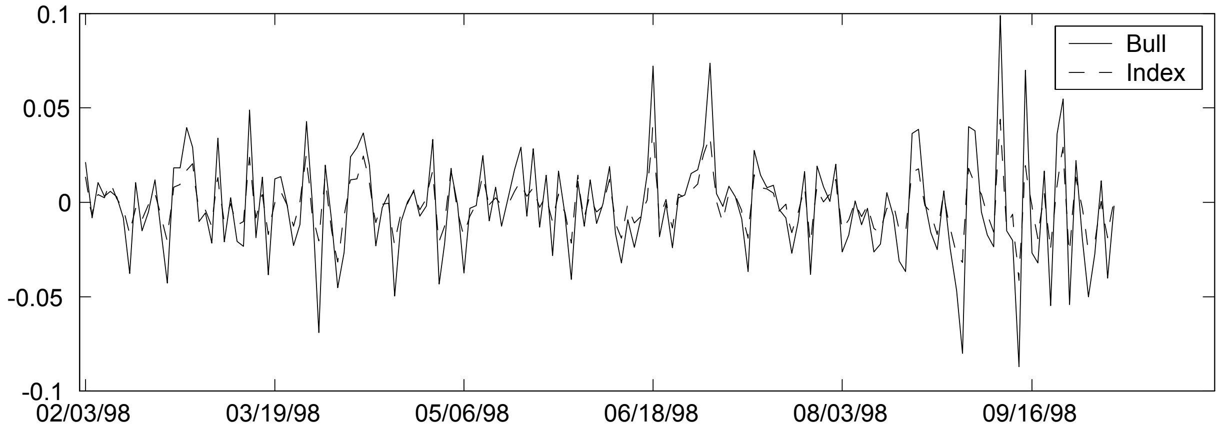
(b) US Equity

	(1)			(2)			(3)			(4)			(5)		
Intercept	0.131	***	(0.001)	0.114	***	(0.001)	0.123	***	(0.005)	0.141	***	(0.000)	0.163	***	(0.000)
MKT	-0.025		(0.749)	-0.009		(0.903)	-0.026		(0.757)	-0.041		(0.608)	-0.059		(0.467)
SMB	-0.012		(0.768)	0.012		(0.765)	0.006		(0.897)	-0.008		(0.858)	-0.008		(0.858)
HML	-0.016		(0.738)	-0.018		(0.692)	0.003		(0.958)	-0.016		(0.746)	-0.017		(0.736)
APF_US_Equity	0.011		(0.819)	0.049		(0.252)	0.047		(0.412)	0.012		(0.820)	-0.001		(0.986)
APF_US_ForEq	0.203	**	(0.035)	0.191	**	(0.030)	0.127		(0.250)	0.164		(0.103)	0.200	*	(0.054)
FLOW_JP	32.075		(0.116)												
APF_JP_Equity				0.017		(0.667)									
APF_JP_Index							0.244	**	(0.010)						
APF_JP_Bull										0.651	**	(0.022)			
APF_JP_Bear													-3.534	**	(0.023)
N	866			931			931			866			866		
Start:End	2/3/1998:12/28/2001			2/3/1998:12/28/2001			2/3/1998:12/28/2001			2/3/1998:12/28/2001			2/3/1998:12/28/2001		

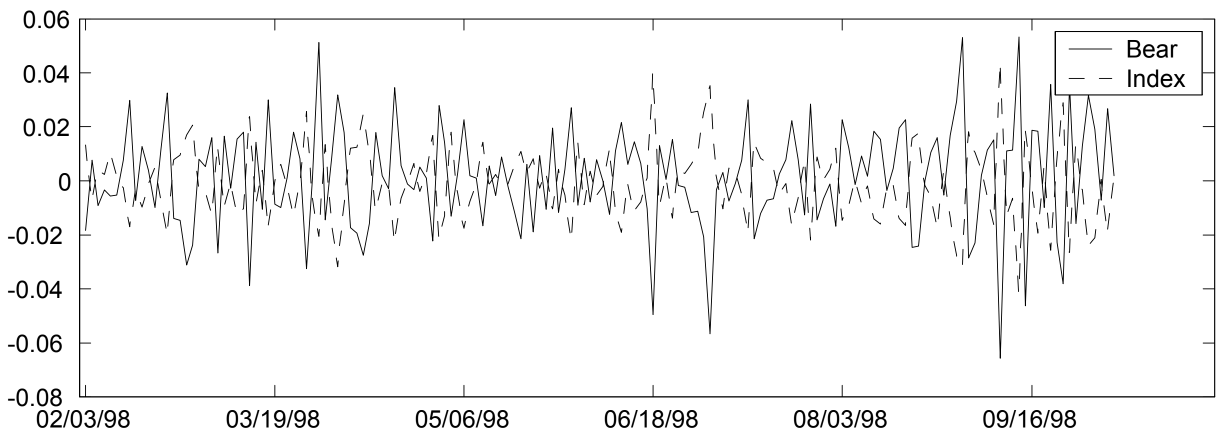
Table 16
Estimated Monthly Premiums of the US Model including Japanese Flow Factors

This table shows the estimated monthly premiums of the U.S. model augmented with the Japanese flow factors. The estimation follows the Fama-MacBeth (1973) two-pass procedure with the Shanken (1992) correction for standard errors. The test portfolios are the 25 portfolios formed as the cross section of five size and five book-to-market quintiles. MKT, SMB, HML are the Fama-French (1993) excess market, size, and book-to-market factors, respectively. UMD is the momentum factor. APF_US_Equity is the equally weighted average percentage flows for the U.S. equity funds. FLOW_JP is the Japanese flow factor constructed from the canonical correlation analysis. APF_JP_Equity (Index, ForEq) is the equally weighted average percentage flows for the Japanese equity, index, and foreign equity funds. N is the number of observations used in the t-test and Start:End is the estimation period. Each column shows the monthly premiums with p values in parentheses, based on the standard errors corrected for the errors-in-variable problem as in Shanken (1992). *, **, and *** represent significance at 10%, 5%, and 1%, respectively.

	(1)		(2)		(3)		(4)		(5)	
Intercept	0.0108 **	(0.022)	0.0266 ***	(0.000)	0.0298 ***	(0.000)	0.0248 ***	(0.000)	0.0254 ***	(0.000)
MKT	-0.0005	(0.928)	-0.0130 *	(0.052)	-0.0162 **	(0.033)	-0.0111 *	(0.093)	-0.0114	(0.102)
SMB	0.0023	(0.347)	-0.0023	(0.399)	-0.0022	(0.462)	-0.0024	(0.378)	-0.0024	(0.373)
HML	0.0051 **	(0.022)	0.0050 *	(0.083)	0.0052 *	(0.094)	0.0048 *	(0.089)	0.0047 *	(0.100)
UMD	0.0253 **	(0.013)	0.0130 *	(0.083)	0.0172 **	(0.036)	0.0132 *	(0.078)	0.0138 *	(0.063)
APF_US_Equity	0.0115 **	(0.047)	-0.0049	(0.472)	-0.0024	(0.740)	-0.0058	(0.388)	-0.0057	(0.418)
FLOW_JP			0.4702	(0.112)						
APF_JP_Equity					0.0183	(0.103)				
APF_JP_Index							0.0139	(0.284)		
APF_JP_ForEq									0.0176 *	(0.087)
N	501		222		222		222		222	
Start:End	196301:200409		198101:199906		198101:199906		198101:199906		198101:199906	



(a) Bull Funds



(b) Bear Funds

Figure 1: Time-series plots of the daily Japanese bull and bear category returns during the first-half sample period, February 3, 1998 through October 6, 1998. The dashed line is the index category return.