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Style Drift and Portfolio Management for Active Australian Equity Funds

by
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Abstract:

Using monthly active equity fund portfolio holdings, we examine the magnitude of style drift and decompose it into active and passive components. We find that while fund style tilts are consistent with their self-stated investment objective, there is variation in the degree of style bias within style groups. We document that funds actively adjust their portfolio holdings in response to passive style drift to retain a desired portfolio tilt. The degree of adjustment varies with the frequency over which the drift is measured, with funds being most responsive to changes in book-to-market and momentum drift. We also find that certain types of style drift affect portfolio turnover.

Keywords:

INVESTMENT STYLE; STYLE DRIFT; CONSISTENCY; PORTFOLIO MANAGEMENT; INVESTMENT PERFORMANCE.

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This research was funded through an ARC Linkage Grant (LP0561160) involving Vanguard Investments Australia and SIRCA. The authors thank Adrian Lee and an anonymous referee for helpful comments and suggestions. We also thank Vanguard Investments Australia for research support.

Australian Journal of Management, Vol. 32, No. 3, Special Issue, March 2008, © The University of New South Wales

1. Introduction

Do fund managers remain 'true to label'? The usefulness of style classifications depends to the extent that fund managers actually adhere to these self-reported fund indicators (Brown & Goetzmann 1997; Cooper, Gulen & Rau 2005). Indeed, the blending of different managed funds into a multiple-manager structure is predicated on the belief that diversification across managers (and styles) provides an important control of manager-specific risk (i.e. alpha forecast accuracy) and is motivated with the goal of ensuring the aggregate portfolio achieves its desired risk-return objective (O'Neal 1997; Brands & Gallagher 2005; Gallagher & Gardner 2006; diBartolomeo 1999).[1] Fund aggregation also assumes that individual fund managers possess superior stock-picking ability in their particular area of specialisation. The prominence of this multiple manager approach in the execution of investment policies of pension plans and other investment structures such as fund-of-funds and master trusts highlights the importance of style classification in defining the investment services being offered, and the risk/return implications of their use.

As the fund's active stock holdings determines its actual style orientation, this distinction between self-stated and actual investment style is of crucial importance in ensuring the benefits of a multi-manager fund accrue to its investors. Furthermore, style consistency is critical in allowing a centralized manager to construct a blended portfolio with the ex ante desired risk-return properties. If growth (value) managers do not remain committed to growth (value) stocks over time and tilt their portfolio away from stocks belonging to their self-stated style specialisation, then this will lead to an increase in the potentially diversifiable risk in the overall portfolio to the extent that their active positions correlate with other managers (diBartolomeo 1999). This style drift could have adverse effects on the underlying fund's performance, risk and other fund attributes.

This study contributes to our understanding of the role and implications of style drift in institutional portfolios by addressing whether style flexibility and discretion has any material impact on investor experience. Whereas many previous studies have used returns-based approaches to assess style exposures and drift, we utilise the actual portfolio holdings of managers to allow for more accurate and timely inferences regarding style drift. Our study also addresses a number of hypotheses regarding investment styles and institutional investors. We find that active equity managers are generally 'true to label', and on average differentiate themselves from the index in a way that is consistent with their stated investment objective (e.g. value, style-neutral, etc.). Furthermore, funds with different investment objectives differentiate themselves from other groups by varying the strength of their portfolio tilt.

We also disaggregate each fund's style drift across three characteristics (book-to-market, size and momentum) into passive and active components. The degree of drift differs across fund styles, with most of the drift occurring in the momentum dimension, with the least drift occurring across the size characteristic. We find that funds adjust their portfolio holdings to counter passive style drift for the book-to-market and momentum characteristics. This occurs at monthly,

1. diBartolomeo (1999) proposes an alternative approach to centralised management. For further discussion of decentralised portfolio management see Elton and Gruber (2004) and Sharpe (1981).

quarterly and semi-annual frequencies. Fund managers pay less attention to drift in the portfolio's tilt on market capitalisation.

In terms of performance, there is no systematic relationship between style drift and performance, and as a result, it does not assist in differentiating between those funds that perform poorly and those that do not. However, drift does have implications for turnover. Funds with more extreme drift across the value-growth continuum are generally associated with higher turnover. These findings are relevant for fund-of-fund portfolio managers.

This study is organised as follows. Section 2 provides a brief review of the literature. This is followed by a description of our data. Section 4 develops the style drift measures used in the study, and section 5 analyses the implications of style drift on institutional investor's portfolios. Section 6 concludes.

2. Background Literature

The tilting of portfolios towards a given style reflects the fact that certain fund managers have preferences for stocks with certain characteristics. Chen, Jegadeesh and Wermers (2000) find that U.S. mutual funds prefer large stocks, growth stocks, high momentum stocks and stocks that are more liquid. Chan, Chen and Lakonishok (2002) compare a sample of U.S. mutual funds with the S&P 500 index and find they overweight smaller stocks, growth stocks and high momentum stocks relative to the index. In Australia, Pinnuck (2004) finds that fund managers prefer stocks with a larger market capitalisation, greater liquidity, lower volatility and to a lesser extent higher momentum. There is no distinguishing preference for growth or value stocks in Pinnuck's sample. Utilising a different sample and time period for Australian equity fund managers, Brands, Gallagher and Looi (2006) report portfolios being tilted towards stocks with larger market capitalisation, higher earnings yield, higher price volatility, higher analyst coverage and lower transactions costs.

A fund manager's self-stated investment objective should convey accurate information to the investor about how the portfolio should be internally managed. This is also critically important for pension funds and institutions with endowments that typically delegate investment responsibility to external fund managers, since the combination of managers within the investment structure needs to be optimised to achieve the investment objectives. Cooper, Gulen and Rau (2005) document that changes in the self-stated style of mutual funds in the U.S. indeed affects a fund's flow with greater fund inflows experienced by funds that change their name to identify with styles that are 'popular' at a particular time. We can infer from this that investors deem style-based information to be relevant in their decision making. Furthermore, fund managers do not always maintain a portfolio consistent with their investment philosophy. Brown and Goetzmann (1997) and diBartolomeo and Witkowski (1997) find that some funds suffer from a misclassification problem, and are therefore unlikely to be delivering a risk and return combination which is consistent with investor expectations.

One issue in discussing consistency and style drift is how to define and measure a fund's style. The literature has considered a number of related approaches using either fund returns or fund stock holdings. Sharpe (1992) employs an asset class factor model, decomposing a fund's return into selection ability and exposures to specific asset classes or styles. With the assistance of certain constraints, the coefficients from Sharpe's regression-based approach can be interpreted as the percentage weight in the asset classes that are used as regressors. This method of performance attribution is used extensively by investment management practitioners and has been utilised by Chan, Chen and Lakonishok (2002), Brown and Harlow (2005) and Busse (1999). Fama and French (1992, 1993) have made significant contributions to the asset pricing literature. They document that the book-to-market equity ratio and market capitalisation, serving as proxies for common risk factors in addition to firms' market betas, better explain the cross-sectional differences in stock returns. Carhart (1997) extends the Fama and French risk model by incorporating a momentum factor. The four factor model of Carhart relies on regressing returns on these risk factors, and therefore provides an indication of a fund's style bias over time. Brown and Goetzmann (1997) propose a returns-based clustering method that group funds together based on their realised monthly returns. They conclude that there are certain 'recognizable' strategies that fund managers employ and that their cluster analysis improves the explanatory power of fund returns out-of-sample.

An alternative approach to performance evaluation that is relevant to style identification, and hence style drift, utilises a funds' portfolio holdings to measure performance (Grinblatt & Titman 1989, 1993; Daniel, Grinblatt, Titman & Wermers 1997 [DGTW]). The DGTW approach creates a benchmark for each stock based on a conditional sort of an individual stock's market capitalisation, book-to-market value of equity and price momentum and then weights the outperformance of the individual stock relative to the benchmark to evaluate the fund's performance given its holding of each stock. Wermers (2002) and Pinnuck (2004) use this approach to identify stocks belonging to certain styles that managers tilt their portfolios towards.

With such a menu of methods to determine the style orientation (and performance) of managed funds, there are differentiating features of each approach that limit its application. Although fund returns are more frequently and readily available, they suffer from two major problems: benchmark measurement error and non-constant portfolio holdings through time (Dybvig & Ross 1985a, b). Brown and Goetzmann (1997) highlight that changing portfolio weights are also an issue for style identification using linear factor models. Pastor and Stambaugh (2002) propose improvements to the returns-based approach to performance measurement by using Bayesian methods. Daniel and Titman (1997) argue that stock returns are due to characteristics rather than priced risk factors, while Chan, Chen and Lakonishok (2002) note that the characteristics-based approach allows for a more precise estimate of future fund returns. This is consistent with the findings of Daniel and Titman (1997). Christopherson (1995) also asserts that characteristics of equity holdings are more insightful in terms of style than the fund's correlation with a set of style indices. This is due to regression-based approaches being slow to react to changes in a fund's overall style exposures, whereas the use of portfolio holdings provide a more timely and accurate style orientation classification system.

Only a small number of studies have explored the role of style consistency in investment management. Brown and Harlow (2005) examine style consistency using the tracking error from a regression of fund returns on style benchmarks and the R^2 from the four-factor model of Carhart (1997). The prior three years of returns are used to estimate consistency and all the funds are then separately ranked by these two statistics to obtain high and low consistency funds relative to median. They report that funds exhibiting style consistency (i.e. a low tracking error or high R^2) have lower portfolio turnover and exhibit greater performance persistence. They also find that style consistent funds outperform less consistent funds in months when the benchmark return is positive and *vice versa* when the benchmark return is negative.

Chan, Chen and Lakonishok (2002) reveal that funds exhibit consistency in their stated style by using the correlation between factor loadings over time from a three-factor model. Comparing the value-growth and size dimensions separately, they identify underperforming funds as those that begin to drift away from their historical style. This therefore has significant implications for multiple manager portfolio structures. Indeed, their finding that managers are unable to successfully 'time' styles suggests that style drift is a fund feature that needs to be monitored. Contrary to this, Levis and Liodakis (1999) note that style consistency is not necessarily a desirable property of a fund manager, as style rotation can improve returns. Gibson and Gyger (2007) examine the style consistency of hedge funds and find that style consistent funds do not outperform funds that display less style consistency.

Idzorek and Bertsch (2004) propose a style drift score based on Sharpe's style analysis. The square root of the average variance of each asset class coefficient defines their drift measure. As noted above, the return-based approach relies on rolling regressions, and therefore a minimum number of observations to calculate the style drift score. Similarly, Bär, Kempf and Ruenzi (2005), utilise a measure of style consistency based on Carhart's four-factor model by calculating the average of the rescaled standard deviation of factor weightings. They also use a variant of this approach, where the factor weighting is relative to a style benchmark, and find that team managed funds are more style consistent than single-manager funds.

Wermers (2002) investigates style drift using a characteristics-based portfolio management perspective, decomposing drift into both active and passive elements. He finds that less style-consistent funds outperform more style-disciplined managers, although the managers as a group allow the portfolio's characteristics to drift over time rather than undertake active trading to maintain a given style orientation. Indeed, Wermers finds that funds' active trading actually exacerbates the drift of the portfolio.

Recent theoretical work by Barberis and Shleifer (2003) also provides some insights on whether style drift should be value enhancing to investors. They develop a model of style investing which implies stocks that change styles (e.g. from having value characteristics to growth characteristics) are likely to exhibit price behaviour similar to their new style cohort. If fund managers do not adjust their holdings accordingly, then their portfolio will start to drift away from its current style orientation. Teo and Woo (2004) find evidence in the U.S. that there is short-term momentum in returns to different style groupings and longer term reversals, with this finding more prominent for the value-growth style classification. As such, style drift may be justifiable from the individual fund manager's perspective (as opposed to a fund-of-fund manager) in order to benefit from superior alpha forecasts. Chen and Wermers (2005) examine the style migration of individual stocks (the shifting of stocks between style groups) and report that these stocks achieve higher returns relative to their style-matched benchmarks. This is relevant from a consistency perspective as style migration induces drift and thus, the style tilt of the fund if they do not rebalance their portfolio in a timely manner. Style drift may therefore be rational and justifiable in order to reap the higher returns exhibited by these high style-shifting stocks.

3. Data

The fund portfolio holdings data employed in this study is from the *Portfolio Analytics Database* (Gallagher & Looi 2006). Our sample contains month-end individual stock holdings for 37 Australian equity funds from December 1996 to December 2001. The dataset also includes stock options held by managers. We calculate the instantaneous share equivalent of these option holdings and include them in the total manager holdings of that particular stock consistent with Pinnuck (2003, 2004). Stock price information and the market index return is from the Stock Exchange Automated Trading System (SEATS) via SIRCA with the shares on issue and market capitalisation data sourced from the AGSM Share Price Relative. The book value of equity is taken from the ASPECT Huntley database. Stock weights in the S&P/ASX300 are provided by Vanguard Investments Australia.

A stock has to satisfy certain criteria to be included in our sample. Stocks need to have a book value of equity and 13 months of price history to allow for the construction of the style characteristics. The book-to-market variable uses the month-end market capitalisation and the most recent book value with a balance date that is at least three months earlier.[2] Momentum is the previous 12-month stock return ending one month earlier. Our sample is also limited to stocks that are in the S&P/ASX300 index as this is the universe of stocks to which managers are benchmarked. We rank all available stocks into percentiles based on their book-to-market (B/M) ratio, market capitalisation and 12-month price momentum. Stocks are re-sorted every month to capture relative changes in stock characteristics in a more timely manner than would be achieved with an annual ranking procedure.

4. Methodology: Measuring Style Drift and Portfolio Tilts

Following Chen, Jegadeesh and Wermers (2000) and Pinnuck (2004), the weighted rank for each fund for each of the three style characteristics is calculated to determine each funds style tilt. The weighted rank for fund *j* across characteristic *k* is calculated as follows:

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} \qquad (1)$$

2. Under ASX listing rules, stocks listed on the ASX have to file their annual report within three months of their balance date.

H_{ijt} is fund *j*'s holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k*. This is divided by the dollar value of fund *j*'s portfolio captured by the *N* stocks in our sample at the end of month *t*.

With a monthly series of each fund's portfolio tilt across all three characteristics, we are able to examine the change in this weighted characteristic rank to obtain a measure of gross style drift for each characteristic-fund combination:

$$\text{Gross Style Drift}_{jt}^{k} = \Delta\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it-1} C_{it-1}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it-1}} \quad (2)$$

Motivated by Wermers (2002), we can further decompose this total drift into three components. Firstly, a fund's gross active style drift (ASD) presents the style drift that relates to the trades made by fund managers within a given month. By holding price and stock characteristics constant at their current levels we are able to isolate the impact of manager trading on the change in style tilt:

$$\text{Gross Active Style Drift}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it}} \quad (3)$$

It is expected that fund managers will adjust their portfolio holdings to maintain an overweight position in stocks belonging to the style that reflects their stated investment approach.

There are two other causes of drift in a portfolio that are outside of the fund manager's control, but still impact the bets that are inherent in the manager's portfolio. The first, gross passive price drift (PPD) looks at the impact of a change in the price of stock *i* on the fund's weighted characteristic, after taking account of the intertemporal change in fund holdings, whilst holding the percentile rank constant at its current value:

$$\text{Gross Passive Price Drift}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it-1} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it-1}} \quad (4)$$

As a firm's stock price (relative to other stocks) rises, so does its market capitalisation (assuming no capital restructuring), thus leading to a rise in its share of a market capitalisation weighted benchmark index, such as that used in Australia. So, if a manager does not trade a stock, yet its relative price and weight in the manager's portfolio increases, it will do so in a similar proportion to that of the index. Fund managers may or may not correct for this drift in their portfolio.

The third component of drift is that due to changes in stock characteristics. Gross passive characteristic drift (PCD) arises when a stock's characteristic and therefore percentile rank for this characteristic changes, thus impacting the overall portfolio tilt. In measuring the passive characteristic drift, we hold stock prices and fund holdings constant to see the effect solely resulting from relative changes in fund characteristics:

$$\text{Gross Passive Characteristic Drift}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt-1}P_{it-1}C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1}P_{it-1}} - \sum_{i=1}^{N} \frac{H_{ijt-1}P_{it-1}C_{it-1}^{k}}{\sum_{i=1}^{N} H_{ijt-1}P_{it-1}} \qquad (5)$$

It is also possible to calculate the tilt that the index has towards each style using the above equations. We can subsequently determine each of the gross drift measures for the index. Given fund managers are benchmarked against a certain index (e.g. the S&P/ASX300), any style tilt needs to be measured versus the tilt already inherent in the index, because of risk management and tracking error constraints. As such, we can define the net value of any drift variable as the difference between the individual fund drift and the drift for the S&P/ASX300 index:

$$\text{Net Active Style Drift}_{jt}^{k} = \text{Gross ASD}_{jt}^{k} - \text{Gross ASD}_{Index,t}^{k} \qquad (6)$$

$$\text{Net Passive Price Drift}_{jt}^{k} = \text{Gross PPD}_{jt}^{k} - \text{Gross PPD}_{Index,t}^{k} \qquad (7)$$

$$\text{Net Passive Characteristic Drift}_{jt}^{k} = \text{Gross PCD}_{jt}^{k} - \text{Gross PCD}_{Index,t}^{k} \qquad (8)$$

5. Results

5.1 Fund Manager Portfolio Tilts

We begin by documenting the style-based stock characteristics inherent in the fund managers' portfolio. Panel A of table 1 contains the weighted characteristic ranks for the market index (S&P/ASX300) as well as the value-weighted and equal-weighted rank for all the funds in our sample. This indicates that the aggregate manager is overweight growth stocks, large stocks and positive momentum stocks relative to the index. This is broadly consistent with the findings of Chen, Jegadeesh and Wermers (2000) and Pinnuck (2004). However, grouping all fund managers together masks differences that exist between managers of different style designations.

To better understand funds style tilts, panel B of table 1 tests the difference between the weighted characteristic ranks of managers grouped by self-stated style against the benchmark index from 1997 to 2001. The results confirm our expectations across the various characteristics. Value managers tilt their portfolios towards high B/M stocks, smaller capitalisation stocks as well as those with relatively low past 12-month returns. This is consistent with the contrarian approach that value investors execute. The growth, style-neutral and other funds all favour stocks with a relatively high B/M and have experienced relatively higher returns over the past 12 months, to varying degrees. Growth-at-a-reasonable-price (GARP) funds are similar, tilting towards growth stocks and high momentum stocks, though not differing to the market index in terms of size. Growth and value funds are indeed polar opposites in terms of the characteristics that they prefer, with growth funds having the largest tilt on growth, large and high momentum stocks. Table 2 also presents results suggesting that the difference between style grouped funds is significant across essentially all three characteristics. Figures 1, 2 and 3 present the weighted characteristic ranks of each group of fund managers over time highlighting the total style drift of each group.

Table 1
Style Tilts of Institutional Investors

At the end of each month between January 1997 and December 2001 all stocks that are members of the S&P/ASX300/All Ordinaries index are ranked into percentiles based on their book-to-market value of equity, market capitalisation and prior one-year return. Three weighted percentile ranks are calculated for book-to-market value of equity, market capitalisation and prior one-year return for each fund based on the value of its month-end stock holdings:

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}}.$$

H_{ijt} is fund *j*'s holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k* (B/M, size and momentum). This is divided by the dollar value of fund *j*'s portfolio captured by the *N* stocks in our sample at the end of month *t*. Panel A contains the time-series average of these weighted ranks for the index and for the sample on both an equal- and value-weighted basis. Panel B presents the monthly average of the weighted percentile rank for funds grouped by self-stated investment objective less the weighted percentile rank for the index on both an equal- and value-weighted basis. *t*-statistics are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively.

	Equal-Weighted			Value-Weighted			No.
	B/M	Size	Momentum	B/M	Size	Momentum	Managers
Panel A: Aggregate Characteristic Percentile Ranks							
Index	40.365	88.438	60.019	40.365	88.438	60.019	
All funds	38.268	89.570	61.898	38.410	89.409	61.087	37
Panel B: Characteristic Ranks by Style Group Relative to the S&P/ASX300 Index							
GARP	–1.416***	–0.416	0.962**	–2.132***	0.295	1.525***	11
	(–6.12)	(–1.61)	(2.29)	(–11.71)	(1.27)	(4.49)	
Growth	–7.345***	3.372***	5.342***	–8.847***	3.882***	6.941***	5
	(–52.66)	(58.49)	(16.49)	(–50.27)	(27.51)	(14.35)	
Other	–3.144***	2.863***	3.910***	–2.562***	3.570***	3.630***	4
	(–17.92)	(26.82)	(18.04)	(–19.83)	(24.46)	(15.98)	
Style Neutra	–3.136***	1.679***	3.308***	–1.321***	2.833***	3.823***	7
	(–15.10)	(18.64)	(19.44)	(–7.98)	(8.42)	(20.50)	
Value	2.948***	–1.470***	–2.486***	2.071***	–0.389**	–2.945***	10
	(14.43)	(–9.53)	(–5.03)	(7.09)	(–2.25)	(–4.81)	

Table 2
Style Tilt Differences Between Fund Groups

At the end of each month between January 1997 and December 2001 all stocks that are members of the S&P/ASX300/All Ordinaries index are ranked into percentiles based on their book-to-market value of equity, market capitalisation and prior one-year return. Three weighted percentile ranks are calculated for book-to-market value of equity, market capitalisation and prior one-year return for each fund based on the value of its month-end stock holdings

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}}.$$

H_{ijt} is fund j's holding of stock i at the end of month t, P_{it} is the price of stock i at the end month t and C_{it}^{k} is the percentile rank of stock i at the end of month t based upon characteristic k (B/M, size and momentum). This is divided by the dollar value of fund j's portfolio captured by the N stocks in our sample at the end of month t. The value-weighted average for each self-stated style is calculated and a pair-wise t-test of the difference between the weighted percentile ranks is conducted across each characteristic for all combinations of fund investment objectives. t-statistics are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively.

Investment Style Pairs	B/M	Size	Momentum
GARP—Style Neutral	–0.812***	–2.538***	–2.298***
	(–3.29)	(–7.93)	(–6.12)
Growth—GARP	–6.715***	3.587***	5.416***
	(–30.02)	(10.37)	(8.28)
Growth—Other	–6.285***	0.312	3.312***
	(–32.82)	(1.23)	(6.69)
Growth—Style Neutral	–7.526***	1.049**	3.118***
	(–36.96)	(2.36)	(6.67)
Other—GARP	–0.430*	3.275***	2.104***
	(–1.85)	(13.38)	(4.37)
Other—Style Neutral	–1.241***	0.737***	–0.193
	(–8.35)	(3.31)	(–0.87)
Value—GARP	4.204***	–0.684***	–4.470***
	(12.82)	(–4.60)	(–10.10)
Value—Growth	10.918***	–4.271***	–9.886***
	(54.79)	(–15.40)	(–13.61)
Value—Other	4.633***	–3.959***	–6.575***
	(14.10)	(–21.6)	(–8.77)
Value—Style Neutral	3.392***	–3.222***	–6.768***
	(11.17)	(–11.75)	(–11.78)

Figure 1
Style Consistency: Value-Growth

All stocks are ranked into percentiles at the end of every month based on their book-to-market ratio. A value-weighted characteristic rank is calculated for each fund as

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}}.$$

H_{ijt} is fund *j*'s holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k*. This is divided by the dollar value of fund *j*'s portfolio captured by the *N* stocks in our sample at the end of month *t*. The funds are grouped by investment objective and their value-weighted characteristic rank is presented net of the S&P/ASX300 index weighted characteristic ranking. A positive number indicates a tilt towards value stocks relative to the index and a negative number indicates a tilt towards growth stocks, relative to the index.

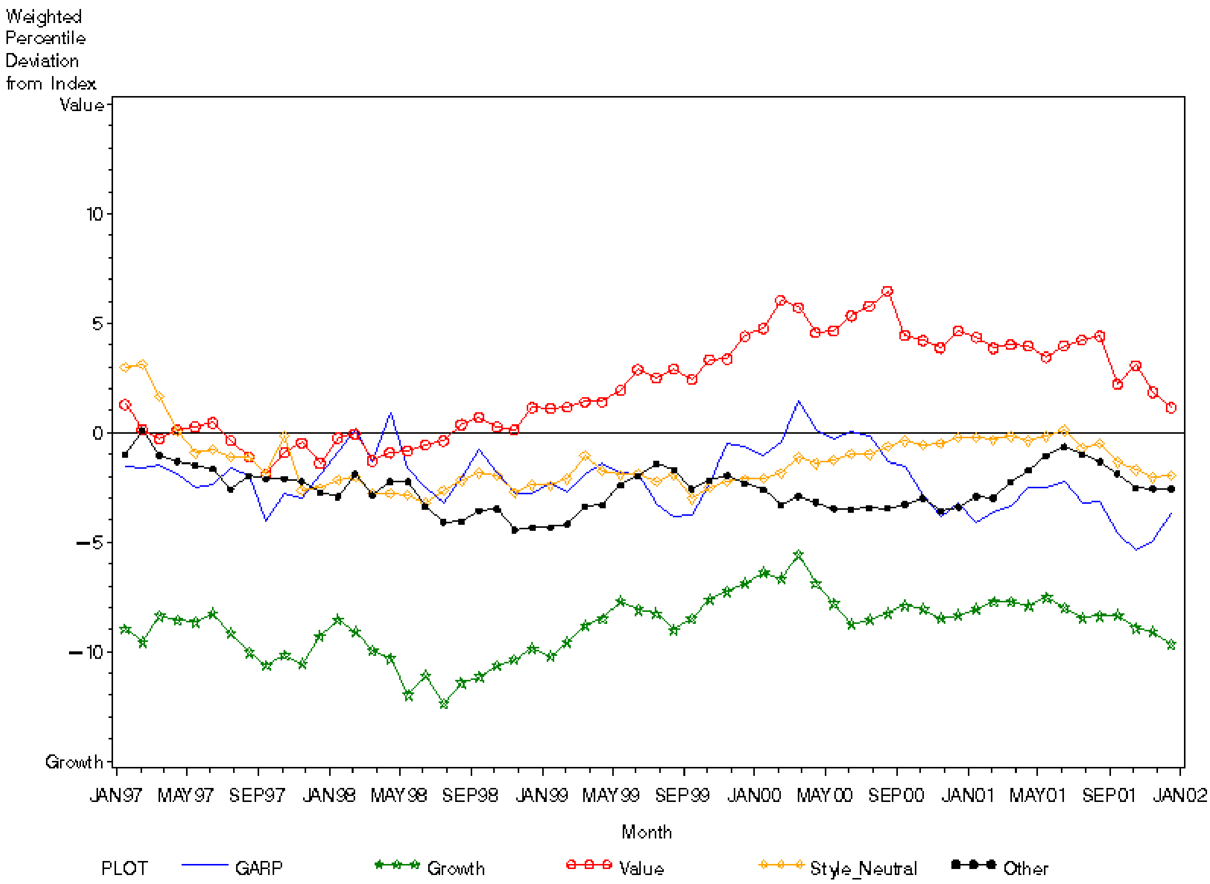


Figure 2
Style Consistency: Size

All stocks are ranked into percentiles at the end of every month based on their market capitalisation. A value-weighted characteristic rank is calculated for each fund as

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} .$$

H_{ijt} is fund *j*'s holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k*. This is divided by the dollar value of fund *j*'s portfolio captured by the *N* stocks in our sample at the end of month *t*. The funds are grouped by investment objective and their value-weighted characteristic rank is presented net of the S&P/ASX300 index weighted characteristic ranking. A positive number indicates a tilt towards large capitalisation stocks relative to the index and a negative number indicates a tilt towards small-capitalisation stocks, relative to the index.

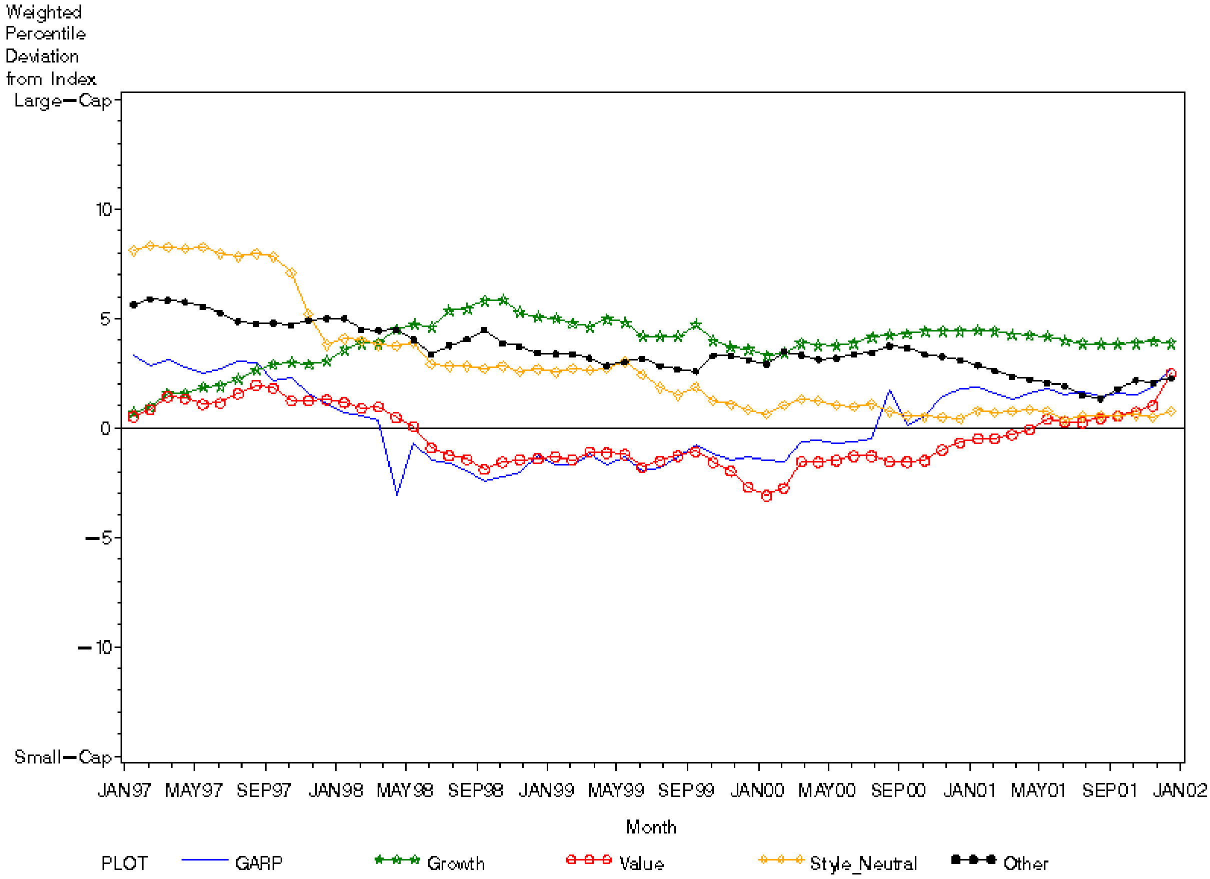
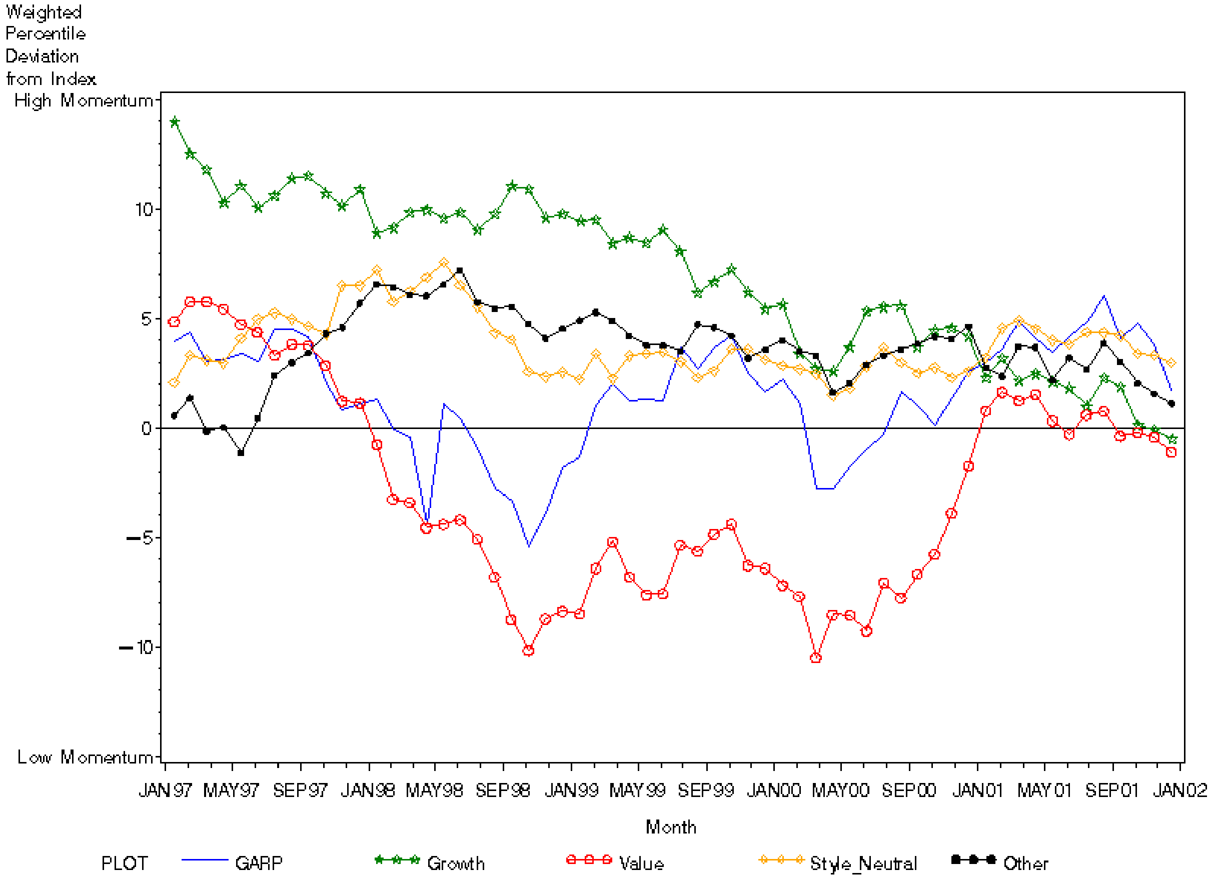


Figure 3
Style Consistency: Momentum

All stocks are ranked into percentiles at the end of every month based on their past 12 month price momentum. A value-weighted characteristic rank is calculated for each fund as

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}}.$$

H_{ijt} is fund j's holding of stock i at the end of month t, P_{it} is the price of stock i at the end month t and C_{it}^{k} is the percentile rank of stock i at the end of month t based upon characteristic k. This is divided by the dollar value of fund j's portfolio captured by the N stocks in our sample at the end of month t. The funds are grouped by investment objective and their value-weighted characteristic rank is presented net of the S&P/ASX300 index weighted characteristic ranking. A positive number indicates a tilt towards high momentum stocks relative to the index and a negative number indicates a tilt towards low momentum stocks, relative to the index.



As the grouping of all fund mangers into one aggregate fund may hide differences at the style-level, grouping funds by investment approach may also not truly reveal the behaviour of individual funds. Table 3 reveals that not all funds have the same preferences, consistent with our expectations. Two of the ten value managers actually tilt their portfolios toward growth stocks during the sample, thus highlighting a potential problem for managers attempting to blend portfolios ex ante. Four of the value funds also prefer larger stocks relative to the index whereas two funds prefer high momentum stocks. There are also a few funds whose portfolio does not significantly differ from the index across some characteristics. Growth, style neutral and unclassified funds are also consistent with their style group as to their overweight positions. Also of note is that some GARP managers have characteristics similar to value funds whilst others GARP managers more closely resemble growth managers. This indicates that the GARP style designation may not contain useful information from a portfolio blending perspective.

Table 3

Individual Fund Style Tilts by Investment Objective

At the end of each month between January 1997 and December 2001 all stocks that are members of the S&P/ASX300/All Ordinaries index are ranked into percentiles based on its book-to-market value of equity, market capitalisation and prior one-year return. A weighted percentile rank is calculated for the S&P/ASX300/All Ordinaries index and for each fund based on its month-end stock holdings across all three characteristics:

$$\text{Characteristic Rank}_{jt}^{k} = \sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} .$$

H_{ijt} is fund *j*'s (or index) holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k* (B/M, size and momentum). This is divided by the dollar value of fund *j*'s (or index) portfolio captured by the *N* stocks in our sample at the end of month *t*. A *t*-test of the between each fund and the index is conducted. If the difference between the fund and index is positive and statistically significant then it is deemed "greater than index". If the difference is not statistically different from the index it is termed "same as index". If the difference between the fund and index is negative and statistically significant then it is deemed "less than index". A 5% level of significance is used. Funds are grouped by investment objective and the results of the *t*-tests are tallied across the book-to-market value of equity, market capitalisation and prior one-year return characteristics.

	B/M			Size			Momentum		
Fund Investment Objective	Greater than index	Same as index	Less than index	Greater than index	Same as index	Less than index	Greater than index	Same as index	Less than index
GARP	3	1	7	6	1	4	7	1	3
Growth	0	0	5	4	1	0	4	1	0
Other	0	0	4	4	0	0	4	0	0
Style Neutral	0	1	6	5	0	2	7	0	0
Value	8	0	2	4	0	6	2	3	5

5.2 Fund Manager Gross Style Drift: Descriptive Statistics

We must bear in mind that these drift estimates are relevant for the specific time period we are examining, as we are essentially comparing the change in a fund's weighted percentile rank between the beginning and the end of the sample. Table 4 presents time-series summary statistics on the cause of the gross style drift for the index, the aggregate fund and the style sub-groups for the period between 1997 and 2001. Across the value-growth dimension, the index does not exhibit statistically significant drift (panel A). Panel B shows that portfolio characteristic changes are not driven by stock characteristic changes. All fund sub-groups, except value funds,

Table 4
Average Gross Drift by Investment Objective

At the end of each month all stocks that are members of the S&P/ASX300/All Ordinaries index are ranked into percentiles based on its book-to-market value of equity, market capitalisation and prior one-year return. Fund *j*'s gross active style drift from time *t*–1 to t for characteristic *k* is defined as

$$\sum_{i=1}^{N} \frac{H_{ijt} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt} P_{it}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it}}.$$

Gross passive price drift for fund *j* between *t*–1 and *t* for characteristic *k* is measured as:

$$\sum_{i=1}^{N} \frac{H_{ijt-1} P_{it} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it-1} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it-1}}.$$

Gross passive characteristic drift for fund *j* between *t*–1 and *t* for characteristic *k* is defined as

$$\sum_{i=1}^{N} \frac{H_{ijt-1} P_{it-1} C_{it}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it-1}} - \sum_{i=1}^{N} \frac{H_{ijt-1} P_{it-1} C_{it-1}^{k}}{\sum_{i=1}^{N} H_{ijt-1} P_{it-1}}.$$

H_{ijt} is fund *j*'s (index) holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k* (B/M, size or past one year momentum). This is divided by the dollar value of fund *j*'s (index) portfolio captured by the *N* stocks in our sample at the end of month *t*. Total drift is the sum of the active, passive price and passive characteristic drift components. The value-weighted average is taken for the aggregate fund and for funds grouped by investment objective. The table contains the average drift over the sample period from January 1997 to December 2001. *t*-statistics are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively.

	B/M		Size		Momentum	
	Mean	*t*-stat	Mean	*t*-stat	Mean	*t*-stat
			Panel A: Total Drift			
Index	–0.008	(–0.05)	0.058*	(1.81)	0.093	(0.33)
Aggregate Fund	–0.061	(–0.32)	0.072	(1.31)	0.004	(0.01)
GARP	–0.060	(–0.27)	0.045	(0.45)	0.027	(0.07)
Growth	–0.001	(0.00)	0.114***	(2.98)	–0.110	(–0.33)
Other	–0.005	(–0.02)	0.009	(0.19)	0.072	(0.22)
Style Neutral	–0.088	(–0.43)	–0.067	(–1.30)	0.072	(0.21)
Value	–0.017	(–0.09)	0.094	(1.54)	0.003	(0.01)
			Panel B: Passive Characteristic Drift			
Index	0.094	(0.56)	–0.283***	(–4.83)	–0.276	(–1.02)
Aggregate Fund	0.079	(0.44)	–0.208***	(–3.99)	–0.166	(–0.53)
GARP	0.156	(0.87)	–0.200***	(–4.53)	–0.156	(–0.46)
Growth	0.183	(1.02)	–0.132	(–1.50)	–0.513	(–1.61)
Other	0.151	(0.81)	–0.154***	(–2.76)	–0.072	(–0.24)
Style Neutral	0.060	(0.31)	–0.167***	(–3.18)	–0.204	(–0.62)
Value	–0.084	(–0.43)	–0.253***	(–4.15)	0.082	(0.26)

Table 4 Continued

	B/M		Size		Momentum	
	Mean	*t*-stat	Mean	*t*-stat	Mean	*t*-stat
			Panel C: Passive Price Drift			
Index	–0.062	(–1.27)	0.390***	(6.05)	0.299***	(3.98)
Aggregate Fund	–0.073	(–1.59)	0.274***	(4.99)	0.213***	(3.02)
GARP	–0.110**	(–2.56)	0.336***	(5.77)	0.277***	(3.87)
Growth	–0.096*	(–1.74)	0.196**	(2.26)	0.151	(1.61)
Other	–0.116**	(–2.01)	0.269***	(4.26)	0.227***	(2.88)
Style Neutral	–0.106**	(–2.07)	0.267***	(4.82)	0.216***	(2.90)
Value	–0.052	(–0.97)	0.334***	(5.40)	0.227***	(3.19)
			Panel D: Active Drift			
Index	–0.040	(–1.00)	–0.049**	(–2.06)	0.070	(1.23)
Aggregate Fund	–0.067	(–1.17)	0.005	(0.12)	–0.043	(–0.53)
GARP	–0.106	(–1.01)	–0.091	(–0.98)	–0.095	(–0.66)
Growth	–0.087	(–1.52)	0.051*	(1.72)	0.252***	(3.80)
Other	–0.039	(–0.51)	–0.106***	(–2.79)	–0.083	(–0.90)
Style Neutral	–0.042	(–0.47)	–0.167***	(–3.66)	0.060	(0.74)
Value	0.120*	(1.89)	0.014	(0.35)	–0.307***	(–3.54)

drift towards growth stocks due to price movements in the stocks they hold (panel C). Value funds however, do not passively drift, but rather actively drift towards value stocks (panel D). This could be offsetting the negative average of both passive drift components.

For the size dimension, the market index and growth funds drift towards large stocks over the sample (panel A). Panels B and C show that the gross passive price drift biases all fund styles and the index in favour of larger stocks, the opposite of passive characteristic drift.[3] Style neutral and other funds drift actively away from larger stocks (panel D). Similarly, the index actively drifts towards smaller stocks as they are added to the index when it is rebalanced.

Over the sample, total momentum drift is not significant for funds following any investment objective (panel A). However, when we disaggregate the total drift into its active and passive components we see that surprisingly, the index, the aggregate fund, and some of the style sub-groups drift passively to high momentum stocks due to price changes (panel B). More interestingly, panel D reveals that growth funds actively shift their portfolio to positive momentum stocks while value funds actively trade their portfolios towards low momentum stocks (consistent with a contrarian investment approach).

3. This negative relationship is expected. Given the use of lagged holdings in the calculation of PPD and PCD, a stock with a positive change in the size characteristic (i.e. a share price rise) will be assigned a lower weight than a stock whose price falls (and becomes relatively smaller). Consider a stock whose price falls. P_{it} is less than P_{it-1} so passive price drift is negative, all else equal. C_{it} is less than C_{it-1} but as $H_{ijt-1}P_{it-1}$ is greater than $H_{ijt-1}P_{it}$, C_{it-1} is given a relatively higher weight compared to other shares (with a relatively higher percentile ranking) leading to the inverse relationship between PPD and PCD for the size characteristic.

5.3 Active Correction of Net Style Drift

To test whether fund managers adjust their portfolio holdings to remain style consistent we regress net active style drift against lagged disaggregated net drift components using a panel model with fixed time effects:

$$ASD_{j,t}^{k} = \beta_{0,t} + \beta_1 PPD_{j,t-1}^{k} + \beta_2 PCD_{j,t-1}^{k} + \beta_3 ASD_{j,t-1}^{k} + \varepsilon_{j,t} \quad (9)$$

where: $ASD_{j,t}^{k}$ = net active style drift for fund j in period t across characteristic k;

$ASD_{j,t-1}^{k}$ = net active style drift for fund j in period t–1 across characteristic k;

$PPD_{j,t-1}^{k}$ = net passive price drift for fund j in period t–1 across characteristic k;

$PCD_{j,t-1}^{k}$ = net passive characteristic drift for fund j in period t–1 across characteristic k;

k = stock characteristic—B/M, size or momentum; and,

$\varepsilon_{j,t}$ = error term of fund j in period t.

Regressions are estimated for each combination of the B/M, size and momentum characteristics at three different intervals—monthly, quarterly and semi-annually. The time-varying intercept accounts for similarities of changes in fund holdings for a given month. Panel Corrected Standard Errors (PCSE) are reported to account for contemporaneous correlation and heteroskedasticity across funds' active drift (Beck & Katz 1995)[4].

Table 5 reports the results of the regression model in equation 9 for each characteristic-frequency combination. Panel A contains the estimates of funds negating B/M drift. At a monthly frequency, funds offset about 14% of the drift in the portfolio tilt resulting from price movements, 30% when measured quarterly and 36% semi-annually. At larger intervals the active response to passive characteristic drift is stronger. Half of the passive characteristic drift is corrected for on a semi-annual basis indicating that funds maintain style consistency over the medium term. They also reverse the active trading of the previous period, indicating the presence of short-term trade reversals, which may capture fund manager's attempt at style timing (Chan, Chen & Lakonishok 2002). Gallagher, Gardner and Swan (2007) show that short-term trading within a three-month period generates significant alpha opportunities, and our work on style therefore corroborates why managers are motivated to trade aggressively over short-term periods.

Panel B documents the active and passive drift across funds' size tilt. Here, the results are fairly weak, with funds reversing their active drift on a monthly basis, but reinforcing their tilts at a quarterly frequency. However, they are generally not as concerned with the size dimension, only correcting for passive price drift over six months. As our sample includes predominantly large-cap managers that are concerned with tracking error this finding is somewhat expected.

4. As the panel is unbalanced, the adjustment to the PCSEs of Beck and Katz (1995) by Franzese (1996) is utilised.

Table 5
Net Style Drift Correction

This table reports the results of the regression $ASD^k_{j,t} = \beta_{0,t} + \beta_1 PPD^k_{j,t-1} + \beta_2 PCD^k_{j,t-1} + \beta_3 ASD^k_{j,t-1} + \varepsilon_{j,t}$. $ASD^k_{j,t}$ measures fund j's net active style drift from time t–1 to t for characteristic k and is defined as

$$ASD^k_{j,t} = \sum_{i=1}^{N}\left(\frac{H_{ijt}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{ijt}P_{it}} - \frac{H_{ijt-1}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{ijt-1}P_{it}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{i,Index,t}P_{it}} - \frac{H_{i,Index,t-1}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{i,Index,t-1}P_{it}}\right).$$

$ASD^k_{j,t-1}$ is the one period lagged value of $ASD^k_{j,t}$. $PPD^k_{j,t-1}$ measures the net passive price drift for fund j between t–2 and t–1 for characteristic k and is measured as

$$PPD^k_{j,t-1} = \sum_{i=1}^{N}\left(\frac{H_{ijt-2}P_{it-1}C^k_{it-1}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-1}} - \frac{H_{ijt-2}P_{it-2}C^k_{it-1}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t-2}P_{it-1}C^k_{it-1}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-1}} - \frac{H_{i,Index,t-2}P_{it-2}C^k_{it-1}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}}\right).$$

$PCD^k_{j,t-1}$ measures the net passive characteristic drift for fund j between t–2 and t–1 for characteristic k and is defined as

$$PCD^k_{j,t-1} = \sum_{i=1}^{N}\left(\frac{H_{ijt-2}P_{it-2}C^k_{it-1}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}} - \frac{H_{ijt-2}P_{it-2}C^k_{it-2}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t-2}P_{it-2}C^k_{it-1}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}} - \frac{H_{i,Index,t-2}P_{it-2}C^k_{it-2}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}}\right).$$

H_{ijt} is fund j's (index) holding of stock i at the end of month t, P_{it} is the price of stock i at the end month t and C^k_{it} is the percentile rank of stock i at the end of month t based upon characteristic k (B/M, size or past one year momentum). This is divided by the dollar value of fund j's (index) portfolio captured by the N stocks in our sample at the end of month t. Results for monthly, quarterly and semi-annual frequencies are presented. Time fixed effects are included. The data is from January 1997 to December 2001. t-statistics based on panel corrected standard errors are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively.

Independent Variables	Coefficient (Monthly)	*t*-stat	Coefficient (Quarterly)	*t*-stat	Coefficient (Semi-Annual)	*t*-stat
			Panel A: B/M			
Passive Price Drift	–0.136**	(–2.18)	–0.304***	(–2.98)	–0.360***	(–2.92)
Passive Characteristic Drift	–0.039	(–0.85)	–0.218***	(–2.93)	–0.458***	(–5.63)
Active Drift	–0.065**	(–2.25)	0.035	(0.43)	–0.057	(–0.48)
Adj. R^2	4.393		7.556		13.205	
F-stat.	2.196***		2.913***		4.081***	
No. Obs.	1614		516		244	
			Panel B: Size			
Passive Price Drift	–0.031	(–0.38)	–0.102	(–1.07)	–0.265*	(–1.83)
Passive Characteristic Drift	0.009	(0.11)	–0.070	(–0.58)	–0.270	(–1.33)
Active Drift	–0.128**	(–1.96)	0.228***	(2.91)	0.122	(0.87)
Adj. R^2	4.307		12.349		12.609	
F-stat.	2.171***		4.298***		3.922***	
No. Obs.	1614		516		244	
			Panel C: Momentum			
Passive Price Drift	–0.087	(–1.45)	–0.188**	(–2.52)	–0.222**	(–2.40)
Passive Characteristic Drift	–0.096***	(–3.72)	–0.201***	(–4.69)	–0.331***	(–5.60)
Active Drift	–0.090	(–1.62)	0.201***	(2.74)	0.159	(1.53)
Adj. R^2	3.777		18.727		31.968	
F-stat.	2.021***		6.394***		10.515***	
No. Obs.	1614		516		244	

The extent to which managers correct for momentum drift is contained in panel C. Trading that is aimed at reverting portfolios back to a targeted momentum tilt occurs in both the short and medium term. On a monthly basis, funds offset 10% of the passive characteristic drift with this increasing to 33% semi-annually. They also adjust for passive price drift in the longer term and maintain an active shift towards a certain portfolio tilt in the medium term, as indicated by the positive coefficient on the lagged active style drift (20%). To conclude, the institutional funds in our sample actively adjust their portfolio holdings to correct for passive drift in the value-growth and momentum dimensions, while not being highly responsive to size style drift. This result contrasts with Wermers (2002) finding that funds do not offset drift in their portfolios.

5.4 Regression Evidence: Net Drift and Performance

An important aspect of style drift is whether it has any relationship with future fund performance. High drift funds may perform better than low drift funds, as they are able to tilt their portfolio towards outperforming stocks, or conversely, high drift funds could underperform as they chase style returns outside of their area of specialisation (e.g. value managers overweighting growth stocks). We utilise the common performance metrics contained in the literature—excess returns, factor-model adjusted alphas and characteristic selectivity measures.[5] We control for fund-specific attributes that could influence fund performance by including investor flows, fund size and monthly turnover as controls. Lagged values of the explanatory variables are used to avoid any issues regarding endogeneity. A fixed time effect panel regression with PCSE is used as we are interested in the performance variation in the fund cross-section. In the regressions that follow, we aggregate passive price and passive characteristics drift into passive style drift as both of these are outside of the fund manager's control. We include dummy variables to control for the sign of the active and passive drifts. Dummy variables are also interacted with the level of the drift variables to capture different directional influences of drift on performance. Results are reported for monthly, quarterly and semi-annual frequencies:

$$\begin{aligned}\alpha_{j,t} = {} & \beta_{0t} + \beta_1 Flow_{j,t-1} + \beta_2 Turnover_{j,t-1} + \beta_3 lTNA_{j,t-1} + \sum_{k=1}^{3}\gamma_k D_{j,t-1}^{ASD,k} + \sum_{k=1}^{3}\delta_k D_{j,t-1}^{PSD,k} + \\ & \sum_{k=1}^{3}\lambda_k (D_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\theta_k (D_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \sum_{k=1}^{3}\phi_k (S_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \\ & \sum_{k=1}^{3}\omega_k (S_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \varepsilon_{j,t}\end{aligned} \tag{10}$$

where: $\alpha_{j,t}$ = performance measure for fund *j* in period *t*;

$Flow_{j,t-1}$ = dollar value of fund inflows/outflows as a percent of the fund total net assets for fund *j* during period *t*–1;

5. The method of Fong, Gallagher and Lee (2007) is similar to DGTW except they limit benchmark stocks to those included in the S&P/ASX300 index. We calculate fund alphas using factor models following the method of Elton, Gruber and Blake (2007). They propose calculating fund betas by value-weighting stock betas using portfolio holdings.

$Turnover_{j,t-1}$ = minimum dollar value of purchases and sales over average total net assets for fund *j* during period *t*–1;

$lTNA_{j,t-1}$ = natural logarithm of fund *j*'s total net assets at period *t*–1;

$ASD^{k}_{j,t-1}$ = net active style drift for fund *j* in period *t*–1 across characteristic *k*;

$PSD^{k}_{j,t-1}$ = net passive style drift for fund *j* in period *t*–1 across characteristic *k*;

$D^{ASD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is positive for characteristic *k* in period *t*–1;

$D^{PSD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is positive for characteristic *k* in period *t*–1;

$S^{ASD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is negative for characteristic *k* in period *t*–1;

$S^{PSD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is negative for characteristic *k* in period *t*–1;

k = stock characteristic—B/M, size or momentum; and,

$\varepsilon_{j,t}$ = error term of fund *j* in period *t*.

Table 6, panels A to C contain the results of the above regression for each of the three frequencies. Substantial differences exist across the different measurement frequencies. When measured at a monthly interval, higher positive passive B/M drift leads to better performance, though funds with positive passive size drift tend to underperform. Here, active drift does not relate to performance. At a quarterly frequency, negative passive size drift leads to poor performance. Funds that actively drift away from the index in a downward direction for the momentum characteristic have higher risk-adjusted performance, though this is somewhat marginal. For the characteristic based performance measures, funds with positive active B/M drift tend to underperform. The results differ again when drift is calculated over a semi-annual frequency. Funds with positive active B/M drift underperform those funds with negative active B/M drift. Positive passive momentum drift leads to outperformance. For the 3- and 4-factor model alphas, higher positive active size drift correlates with future outperformance. From these results it is evident that passive drift has a stronger association with performance. So, although drift does relate to performance, it does not do so in a systematic manner across drift types or different measurement intervals.

From a blending perspective this indicates that neither positive or negative performance consequences consistently result from style drift. As such, penalties should not be imposed on those managers that exhibit excessive drift in terms of the performance criteria. Thus, we are unable to provide support for the conflicting results of Wermers (2002) and Brown and Harlow (2005) as to whether style drift has a positive or negative influence on performance.

Table 6

Performance and Net Style Drift: Monthly, Quarterly and Semi-Annual

This table reports the results of the performance and drift regression:

$$\alpha_{j,t} = \beta_{0t} + \beta_1 Flow_{j,t-1} + \beta_2 Turnover_{j,t-1} + \beta_3 lTNA_{j,t-1} + \sum_{k=1}^{3}\gamma_k D_{j,t-1}^{ASD,k} + \sum_{k=1}^{3}\delta_k D_{j,t-1}^{PSD,k} +$$
$$\sum_{k=1}^{3}\lambda_k (D_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\theta_k (D_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \sum_{k=1}^{3}\phi_k (S_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\omega_k (S_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \varepsilon_{j,t}.$$

α is fund j's performance in time period t. Performance is measured using Fong *et al.* (2007) characteristic selectivity (FGL CS), DGTW characteristic selectivity (DGTW CS), CAPM alpha, Fama and French (1993) three-factor alpha, Carhart (1997) four-factor alpha and fund return in excess of the S&P/ASX300 Index. *Flow* is the dollar value of fund inflows/outflows as a percent of the fund total net assets for fund j. *lTNA* is the natural logarithm of fund average total net assets over time t. $ASD_{j,t}^{k}$ measures fund j's net active style drift from time t–1 to t for characteristic k and is defined as

$$ASD_{j,t}^{k} = \sum_{i=1}^{N}\left(\frac{H_{ijt}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{ijt}P_{it}} - \frac{H_{ijt-1}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{ijt-1}P_{it}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{i,Index,t}P_{it}} - \frac{H_{i,Index,t-1}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-1}P_{it}}\right).$$

$ASD_{j,t-1}^{k}$ is the one period lagged value of $ASD_{j,t}^{k}$. $PSD_{j,t-1}^{k}$ measures the net passive style drift for fund j between t–2 and t–1 for characteristic k and is measured as

$$PSD_{j,t-0}^{k} = \sum_{i=1}^{N}\left(\frac{H_{ijt-2}P_{it-1}C_{it-1}^{k}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-1}} - \frac{H_{ijt-2}P_{it-2}C_{it-2}^{k}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t-2}P_{it-1}C_{it-1}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-1}} - \frac{H_{i,Index,t-2}P_{it-2}C_{it-2}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}}\right).$$

H_{ijt} is fund j's (index) holding of stock i at the end of month t, P_{it} is the price of stock i at the end month t and C_{it}^{k} is the percentile rank of stock i at the end of month t based upon characteristic k (B/M, size or past one year momentum). This is divided by the dollar value of fund j's (index) portfolio captured by the N stocks in our sample at the end of month t. $D_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund j's net active style drift is positive for characteristic k in period t–1. $D_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund j's net passive style drift is positive for characteristic k in period t–1. $S_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund j's net active style drift is negative for characteristic k in period t–1. $S_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund j's net passive style drift is negative for characteristic k in period t–1. Characteristics are indexed by k, where k=1 for B/M, k=2 for size and k=3 for momentum. Results for monthly, quarterly and semi-annual frequencies are presented. Time fixed effects are included. The data is from January 1997 to December 2001. t-statistics based on panel corrected standard errors are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively.

Independent Variables	FGL CS	DGTW CS	1-factor α	3-factor α	4-factor α	Excess Return
			Panel A: Monthly			
Investor Flow	0.004	0.050	0.018	0.073	0.039	–0.017
	(0.04)	(0.41)	(0.12)	(0.51)	(0.27)	(–0.12)
Turnover	–0.070	–0.359	–0.597	–0.835	–1.238	–1.205
	(–0.11)	(–0.50)	(–0.75)	(–1.04)	(–1.55)	(–1.44)
Log(TNA)	–0.040***	–0.043**	–0.036*	–0.046**	–0.056***	–0.038**
	(–2.98)	(–2.54)	(–1.91)	(–2.38)	(–2.71)	(–2.15)
Passive B/M Drift—Dummy	0.018	–0.075	–0.071	–0.037	–0.071	–0.041
	(0.24)	(–0.88)	(–0.73)	(–0.39)	(–0.74)	(–0.40)

Table 6 Continued

Independent Variables	FGL CS	DGTW CS	1-factor α	3-factor α	4-factor α	Excess Return
Active B/M Drift—Dummy	–0.018	–0.032	–0.036	–0.042	–0.047	–0.077
	(–0.30)	(–0.45)	(–0.45)	(–0.53)	(–0.60)	(–0.91)
Passive Size Drift—Dummy	–0.176**	–0.197**	–0.216**	–0.147	–0.157*	–0.295***
	(–2.49)	(–2.49)	(–2.39)	(–1.63)	(–1.77)	(–3.11)
Active Size Drift—Dummy	0.049	0.034	–0.005	–0.025	0.006	0.064
	(0.87)	(0.52)	(–0.07)	(–0.36)	(0.09)	(0.87)
Passive Momentum Drift—Dummy	–0.046	–0.026	–0.042	–0.038	–0.061	–0.006
	(–0.62)	(–0.3)	(–0.43)	(–0.39)	(–0.64)	(–0.06)
Active Momentum Drift—Dummy	–0.016	–0.045	–0.073	–0.094	–0.109	0.024
	(–0.25)	(–0.62)	(–0.91)	(–1.17)	(–1.36)	(0.29)
Passive B/M Drift—Positive	0.078	0.227**	0.294***	0.272**	0.235**	0.291***
	(0.91)	(2.37)	(2.70)	(2.48)	(2.20)	(2.62)
Passive B/M Drift—Negative	–0.079	–0.059	–0.175	–0.136	–0.138	–0.199
	(–0.82)	(–0.55)	(–1.41)	(–1.07)	(–1.07)	(–1.53)
Active B/M Drift—Positive	0.040	0.048	0.056	0.037	0.055	0.090
	(0.63)	(0.65)	(0.67)	(0.44)	(0.66)	(1.01)
Active B/M Drift—Negative	–0.001	0.041	0.031	0.060	0.054	0.011
	(–0.02)	(0.69)	(0.45)	(0.90)	(0.81)	(0.16)
Passive Size Drift—Positive	0.060	–0.047	–0.020	0.056	0.126	0.000
	(0.55)	(–0.38)	(–0.14)	(0.38)	(0.86)	(0.00)
Passive Size Drift—Negative	0.276	0.337	0.679**	0.352	0.263	0.868***
	(1.07)	(1.20)	(2.13)	(1.09)	(0.85)	(2.64)
Active Size Drift—Positive	–0.031	0.059	0.030	0.035	–0.013	0.005
	(–0.33)	(0.56)	(0.24)	(0.29)	(–0.11)	(0.04)
Active Size Drift—Negative	0.063	0.076	0.130	0.141	0.154*	0.064
	(0.98)	(1.00)	(1.47)	(1.60)	(1.77)	(0.71)
Passive Momentum Drift—Positive	0.042	0.030	0.023	0.035	0.073	0.033
	(0.89)	(0.59)	(0.38)	(0.57)	(1.22)	(0.52)
Passive Momentum Drift—Negative	0.057	0.063	0.063	0.041	0.053	0.058
	(1.15)	(1.14)	(0.95)	(0.62)	(0.83)	(0.81)
Active Momentum Drift—Positive	0.051	0.029	0.092	0.123	0.137*	0.020
	(0.88)	(0.44)	(1.24)	(1.63)	(1.85)	(0.26)
Active Momentum Drift—Negative	0.014	0.075	0.048	0.037	0.048	–0.027
	(0.26)	(1.19)	(0.65)	(0.49)	(0.65)	(–0.34)
Adj. R^2	9.338	42.410	41.524	44.540	46.337	96.071
F-stat.	3.003***	15.323***	14.812***	16.62***	17.795***	476.587***
No. Obs.	1557	1557	1557	1557	1557	1557

Table 6 Continued

Independent Variables	FGL CS	DGTW CS	1-factor α	3-factor α	4-factor α	Excess Return
			Panel B: Quarterly			
Investor Flow	–0.816***	–0.843**	–1.042**	–0.826**	–0.952**	–0.838**
	(–2.68)	(–2.34)	(–2.51)	(–1.98)	(–2.31)	(–2.23)
Turnover	–1.362	–2.332**	–1.947*	–1.826*	–1.808*	–1.637
	(–1.54)	(–2.53)	(–1.85)	(–1.90)	(–1.96)	(–1.47)
Log(TNA)	–0.121***	–0.122**	–0.101*	–0.125**	–0.156**	–0.093
	(–2.67)	(–2.20)	(–1.68)	(–1.98)	(–2.28)	(–1.49)
Passive B/M Drift—Dummy	0.016	0.059	–0.028	–0.006	–0.023	–0.204
	(0.08)	(0.26)	(–0.09)	(–0.02)	(–0.08)	(–0.68)
Active B/M Drift—Dummy	–0.333*	–0.414**	–0.259	–0.068	–0.022	–0.223
	(–1.71)	(–2.03)	(–0.98)	(–0.28)	(–0.09)	(–0.86)
Passive Size Drift—Dummy	–0.043	–0.038	–0.128	–0.027	–0.044	–0.176
	(–0.21)	(–0.18)	(–0.46)	(–0.10)	(–0.18)	(–0.64)
Active Size Drift—Dummy	–0.319	–0.286	–0.100	–0.020	–0.008	–0.263
	(–1.58)	(–1.46)	(–0.38)	(–0.08)	(–0.03)	(–0.98)
Passive Momentum Drift—Dummy	0.100	0.130	0.223	0.028	–0.055	0.226
	(0.44)	(0.54)	(0.73)	(0.10)	(–0.20)	(0.72)
Active Momentum Drift—Dummy	0.238	0.135	0.381	0.416	0.615**	0.513
	(1.20)	(0.65)	(1.30)	(1.48)	(2.24)	(1.65)
Passive B/M Drift—Positive	0.209	0.264*	0.324*	0.217	0.310*	0.316
	(1.38)	(1.81)	(1.68)	(1.18)	(1.96)	(1.57)
Passive B/M Drift—Negative	–0.064	–0.135	–0.062	0.066	0.006	0.021
	(–0.42)	(–0.88)	(–0.32)	(0.34)	(0.03)	(0.10)
Active B/M Drift—Positive	0.095	0.077	0.079	0.084	0.110	0.096
	(0.97)	(0.76)	(0.56)	(0.62)	(0.89)	(0.66)
Active B/M Drift—Negative	0.063	0.194*	0.153	0.100	0.117	0.141
	(0.59)	(1.79)	(1.11)	(0.79)	(0.93)	(1.00)
Passive Size Drift—Positive	–0.174	–0.159	–0.193	–0.100	–0.068	–0.227
	(–1.11)	(–1.02)	(–0.93)	(–0.52)	(–0.33)	(–0.97)
Passive Size Drift—Negative	0.800*	0.727*	1.242**	0.917*	0.995**	1.524***
	(1.86)	(1.90)	(2.31)	(1.65)	(2.16)	(2.66)
Active Size Drift—Positive	0.040	0.079	0.109	0.203	0.152	0.226
	(0.19)	(0.42)	(0.42)	(0.82)	(0.70)	(0.83)
Active Size Drift—Negative	0.071	0.115	0.065	–0.019	–0.038	0.129
	(0.52)	(0.82)	(0.35)	(–0.11)	(–0.23)	(0.68)
Passive Momentum Drift—Positive	0.085	–0.056	0.014	0.079	0.162*	0.057
	(1.06)	(–0.73)	(0.13)	(0.78)	(1.80)	(0.50)
Passive Momentum Drift–Negative	0.048	0.099	0.155	0.154	0.206*	0.143
	(0.55)	(1.12)	(1.31)	(1.37)	(1.92)	(1.15)
Active Momentum Drift–Positive	–0.032	0.073	0.080	0.067	0.031	0.017
	(–0.28)	(0.60)	(0.47)	(0.43)	(0.21)	(0.10)
Active Momentum Drift—Negative	–0.101	–0.138	–0.272**	–0.239*	–0.200*	–0.259*
	(–1.01)	(–1.47)	(–2.17)	(–1.91)	(–1.84)	(–1.92)
Adj. R^2	14.273	50.020	29.416	40.334	46.339	88.549
F-stat.	2.994***	12.985***	5.991***	9.095***	11.341***	93.597***
No. Obs.	480	480	480	480	480	480

Table 6 Continued

Independent Variables	FGL CS	DGTW CS	1-factor α	3-factor α	4-factor α	Excess Return
			Panel C: Semi-Annual			
Investor Flow	–0.487*	–0.436	–0.867**	–0.572	–0.941**	–1.023***
	(–1.95)	(–1.21)	(–2.25)	(–1.33)	(–2.19)	(–2.70)
Turnover	–0.259	–1.658*	–1.764	–1.452	–1.499	–1.843
	(–0.28)	(–1.88)	(–1.64)	(–1.45)	(–1.48)	(–1.38)
Log(TNA)	–0.178***	–0.164**	–0.157	–0.219**	–0.247*	–0.104
	(–2.77)	(–2.24)	(–1.60)	(–2.07)	(–1.81)	(–0.97)
Passive B/M Drift—Dummy	0.520	0.523	0.811*	0.507	0.778	0.516
	(1.52)	(1.41)	(1.68)	(1.02)	(1.41)	(0.94)
Active B/M Drift—Dummy	–0.903*	–1.129**	–1.193*	–1.287**	–0.922	–0.830
	(–1.71)	(–2.06)	(–1.68)	(–2.13)	(–1.24)	(–1.14)
Passive Size Drift—Dummy	0.147	0.392	0.506	0.392	0.805	0.954
	(0.36)	(0.88)	(0.92)	(0.79)	(1.54)	(1.60)
Active Size Drift—Dummy	–0.267	–0.024	–0.348	–0.577	–0.128	–0.800
	(–0.68)	(–0.06)	(–0.63)	(–1.07)	(–0.27)	(–1.40)
Passive Momentum Drift—Dummy	0.882	1.172*	1.922**	1.387**	1.518**	1.938***
	(1.56)	(1.94)	(2.58)	(2.10)	(2.13)	(2.68)
Active Momentum Drift—Dummy	0.213	–0.063	0.234	0.636	0.862	0.554
	(0.53)	(–0.13)	(0.38)	(1.15)	(1.55)	(0.88)
Passive B/M Drift—Positive	–0.103	0.007	0.091	0.079	0.070	0.022
	(–0.59)	(0.04)	(0.40)	(0.37)	(0.32)	(0.09)
Passive B/M Drift—Negative	–0.417**	–0.372*	–0.359	–0.203	–0.407	–0.179
	(–2.38)	(–1.84)	(–1.43)	(–0.82)	(–1.63)	(–0.67)
Active B/M Drift—Positive	0.106	0.263	0.280	0.318	0.203	0.110
	(0.63)	(1.46)	(1.18)	(1.35)	(0.83)	(0.44)
Active B/M Drift—Negative	0.197	0.299*	0.328	0.288*	0.285	0.291
	(1.12)	(1.80)	(1.55)	(1.69)	(1.42)	(1.22)
Passive Size Drift—Positive	–0.291	–0.300	–0.086	–0.139	–0.430*	–0.190
	(–1.51)	(–1.32)	(–0.33)	(–0.58)	(–1.74)	(–0.65)
Passive Size Drift—Negative	0.428	–0.084	0.120	0.189	0.277	–0.113
	(0.81)	(–0.15)	(0.16)	(0.27)	(0.46)	(–0.14)
Active Size Drift—Positive	0.367	0.264	0.526	0.748**	0.627**	0.593
	(1.26)	(0.84)	(1.48)	(2.24)	(2.00)	(1.48)
Active Size Drift—Negative	–0.227	–0.175	0.072	0.075	–0.174	0.158
	(–1.11)	(–0.84)	(0.26)	(0.32)	(–0.68)	(0.52)
Passive Momentum Drift—Positive	0.002	–0.022	0.024	0.071	0.111	0.045
	(0.02)	(–0.22)	(0.18)	(0.56)	(0.93)	(0.31)
Passive Momentum Drift—Negativ	0.033	0.130	0.152	0.243	0.164	0.088
	(0.25)	(0.92)	(0.78)	(1.37)	(0.88)	(0.44)
Active Momentum Drift—Positive	–0.025	0.257	0.060	0.063	–0.045	–0.050
	(–0.14)	(1.19)	(0.21)	(0.25)	(–0.17)	(–0.17)
Active Momentum Drift—Negative	0.133	0.215	0.250	0.084	0.146	0.265
	(1.00)	(1.58)	(1.34)	(0.48)	(0.92)	(1.26)
Adj. R^2	10.852	37.181	36.671	43.858	46.692	74.553
F-stat.	1.872***	5.242***	5.150***	6.599***	7.277***	21.997***
No. Obs.	216	216	216	216	216	216

5.5 Drift and Risk: Tracking Error

Given the absence of a relationship between style drift and performance, the effects of drift may manifest itself in other ways, namely, through fund risk. To test this hypothesis we run a panel regression similar to that used for performance, though at an annual frequency. The regression specification is:

$$\begin{aligned} TrackingError_{j,t} = {} & \beta_{0t} + \beta_1 Flow_{j,t-1} + \beta_2 Turnover_{j,t-1} + \beta_3 lTNA_{j,t-1} + \sum_{k=1}^{3}\gamma_k D_{j,t-1}^{ASD,k} \\ & + \sum_{k=1}^{3}\delta_k D_{j,t-1}^{PSD,k} + \sum_{k=1}^{3}\lambda_k (D_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\theta_k (D_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) \quad (11) \\ & + \sum_{k=1}^{3}\phi_k (S_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\omega_k (S_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \varepsilon_{j,t} \end{aligned}$$

where:

- $TrackingError_{j,t}$ = annual, calendar year-end standard deviation of monthly fund returns in excess of the S&P/ASX300 Index;
- $Flow_{j,t-1}$ = dollar value of fund inflows/outflows as a percent of the fund total net assets for fund *j* during year *t*–1;
- $Turnover_{j,t-1}$ = minimum dollar value of purchases and sales over average total net assets for fund *j* during year *t*–1;
- $lTNA_{j,t-1}$ = natural logarithm of fund *j*'s total net assets in year *t*–1;
- $ASD_{j,t-1}^{k}$ = net active style drift for fund *j* in year *t*–1 across characteristic *k*;
- $PSD_{j,t-1}^{k}$ = net passive style drift for fund *j* in year *t*–1 across characteristic *k*;
- $D_{j,t-1}^{ASD,k}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is positive for characteristic *k* in year *t*–1;
- $D_{j,t-1}^{PSD,k}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is positive for characteristic *k* in year *t*–1;
- $S_{j,t-1}^{ASD,k}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is negative for characteristic *k* in year *t*–1;
- $S_{j,t-1}^{PSD,k}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is negative for characteristic *k* in year *t*–1;
- k = stock characteristic—B/M, size or momentum; and,
- $\varepsilon_{j,t}$ = error term of fund *j* in year *t*;

Table 7 reports the coefficient estimates for equation 7. Interestingly, higher drift does not necessarily imply higher tracking error. The only significant variable is the passive B/M drift dummy variable, which indicates that funds with positive

B/M drift have a tracking error that is substantially lower than those with negative B/M drift. A large proportion of the cross-sectional differences are captured via the time-varying intercepts. Thus, style drift is again of limited use in assisting fund-of-fund managers to identify funds with high return variability ex ante.

Table 7

Tracking Error and Net Style Drift

This table reports the results of the tracking error and net style drift panel regression with time fixed effects:

$$TE_{j,t} = \beta_{0t} + \beta_1 Flow_{j,t-1} + \beta_2 Turnover_{j,t-1} + \beta_3 lTNA_{j,t-1} + \sum_{k=1}^{3}\gamma_k D_{j,t-1}^{ASD,k} + \sum_{k=1}^{3}\delta_k D_{j,t-1}^{PSD,k} + \sum_{k=1}^{3}\lambda_k (D_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k})$$

$$+ \sum_{k=1}^{3}\theta_k (D_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \sum_{k=1}^{3}\phi_k (S_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) + \sum_{k=1}^{3}\omega_k (S_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \varepsilon_{j,t}.$$

$TE_{j,t}$ is fund *j*'s tracking error and is defined as the 12-month standard deviation of each fund's return in excess of the S&P/ASX300 index and is measured in December. $Flow_{j,t-1}$ is the dollar value of fund inflows/outflows as a percent of the fund total net assets for fund *j*. $Turnover_{j,t-1}$ is the minimum dollar value of purchases and sales over average total net assets for fund *j* during time *t*–1. $lTNA_{j,t-1}$ is the natural logarithm of fund *j*'s average total net assets over time *t*–1. $ASD_{j,t}^{k}$ measures fund *j*'s net active style drift from time *t*–1 to *t* for characteristic *k* and is defined as

$$ASD_{j,t}^{k} = \sum_{i=1}^{N}\left(\frac{H_{ijt}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{ijt}P_{it}} - \frac{H_{ijt-1}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{ijt-1}P_{it}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{i,Index,t}P_{it}} - \frac{H_{i,Index,t-1}P_{it}C_{it}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-1}P_{it}}\right).$$

$ASD_{j,t-1}^{k}$ is the one period lagged value of $ASD_{j,t}^{k}$. $PSD_{j,t-1}^{k}$ measures the net passive style drift for fund *j* between *t*–2 and *t*–1 for characteristic *k* and is measured as

$$PSD_{j,t-1}^{k} = \sum_{i=1}^{N}\left(\frac{H_{ijt-2}P_{it-1}C_{it-1}^{k}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-1}} - \frac{H_{ijt-2}P_{it-2}C_{it-2}^{k}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t-2}P_{it-1}C_{it-1}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-1}} - \frac{H_{i,Index,t-2}P_{it-2}C_{it-2}^{k}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}}\right).$$

H_{ijt} is fund *j*'s (index) holding of stock *i* at the end of month *t*, P_{it} is the price of stock *i* at the end month *t* and C_{it}^{k} is the percentile rank of stock *i* at the end of month *t* based upon characteristic *k* (B/M, size or past one year momentum). This is divided by the dollar value of fund *j*'s (index) portfolio captured by the *N* stocks in our sample at the end of month *t*. $D_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund *j*'s net active style drift is positive for characteristic *k* in period *t*–1. $D_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is positive for characteristic *k* in period *t*–1. $S_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund *j*'s net active style drift is negative for characteristic *k* in period *t*–1. $S_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is negative for characteristic *k* in period *t*–1. Characteristics are indexed by *k*, where *k*=1 for B/M, *k*=2 for size and *k*=3 for momentum. Results for monthly, quarterly and semi-annual frequencies are presented. The data is annual from January 1997 to December 2001. *t*-statistics based on panel corrected standard errors are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively. ^Coefficients are multiplied by 10^2.

Independent Variables	Coefficient^	*t*-stat
Investor Flow	0.051	(1.48)
Log(TNA)	0.019	(0.75)
Turnover	–0.027	(–0.23)
Passive B/M Drift—Dummy	–0.230**	(–2.24)
Active B/M Drift—Dummy	–0.143	(–1.27)
Passive Size Drift—Dummy	–0.070	(–0.87)
Active Size Drift—Dummy	0.059	(0.44)
Passive Momentum Drift—Dummy	0.081	(0.59)

Table 7 Continued

Independent Variables	Coefficient^	*t*-stat
Active Momentum Drift—Dummy	0.189	(1.65)
Passive B/M Drift—Positive	–0.046	(–1.20)
Passive B/M Drift—Negative	0.055	(1.32)
Active B/M Drift—Positive	0.035	(0.94)
Active B/M Drift—Negative	–0.009	(–0.39)
Passive Size Drift—Positive	–0.012	(–0.23)
Passive Size Drift—Negative	–0.016	(–0.40
Active Size Drift—Positive	–0.014	(–0.52)
Active Size Drift—Negative	0.012	(0.46)
Passive Momentum Drift—Positive	–0.023	(–0.95)
Passive Momentum Drift—Negative	–0.016	(–0.63)
Active Momentum Drift—Positive	0.008	(0.28)
Active Momentum Drift—Negative	–0.022	(–1.17)
Adj. R^2	92.039	
F-stat.	36.145***	
No. Obs.	77	

5.6 Drift and Turnover

Fund turnover is also an important attribute that fund-of-fund managers need to consider in formulating their fund allocations due to transaction costs. As high drift funds correct for shifts in their style tilt, this would imply that funds that drift more have higher turnover. The panel regression model utilises fixed fund effects to account for persistence in individual fund turnover:

$$\begin{aligned} Turnover_{j,t} &= \beta_{0j} + \sum_{k=1}^{3}\gamma_k D_{j,t-1}^{ASD,k} + \sum_{k=1}^{3}\delta_k D_{j,t-1}^{PSD,k} + \sum_{k=1}^{3}\lambda_k (D_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) \\ &+ \sum_{k=1}^{3}\theta_k (D_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \sum_{k=1}^{3}\phi_k (S_{j,t-1}^{ASD,k} * ASD_{j,t-1}^{k}) \\ &+ \sum_{k=1}^{3}\omega_k (S_{j,t-1}^{PSD,k} * PSD_{j,t-1}^{k}) + \varepsilon_{j,t} \end{aligned} \tag{12}$$

where: $Turnover_{j,t}$ = minimum dollar value of purchases and sales over average total net assets for fund *j* during period *t*–1;

$ASD_{j,t-1}^{k}$ = net active style drift for fund *j* in period *t*–1 across characteristic *k*;

$PSD_{j,t-1}^{k}$ = net passive style drift for fund *j* in period *t*–1 across characteristic *k*;

$D_{j,t-1}^{ASD,k}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is positive for characteristic *k* in period *t*–1;

$D^{PSD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is positive for characteristic *k* in period *t*–1;

$S^{ASD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net active style drift is negative for characteristic *k* in period *t*–1;

$S^{PSD,k}_{j,t-1}$ = a dummy variable which takes a value of 1 if fund *j*'s net passive style drift is negative for characteristic *k* in period *t*–1;

k = stock characteristic—B/M, size or momentum; and,

$\varepsilon_{j,t}$ = error term of fund *j* in period *t*.

The results of this regression for monthly, quarterly and semi-annual frequencies are contained in table 8. Contrary to expectation, higher drift does not necessarily imply higher turnover. At the monthly frequency, there is little relationship between drift and turnover, other than the marginally significant coefficient on negative passive momentum drift. This indicates that more negative drift leads to lower turnover. More extreme values of active B/M drift are associated with about a one percentage point higher rate of turnover higher at a quarterly frequency. Interestingly, larger positive values of both active and passive momentum drift correlate with lower turnover. Similarly at a semi-annual frequency, larger negative values of passive momentum drift lead to lower turnover. However, larger positive values of both active and passive B/M drift tend to increase turnover by two and three percentage points, although the positive coefficient on the passive B/M dummy negates the passive drift influence on turnover. The importance of these results from a blending perspective is that although some drift, and hence turnover, is unavoidable, fund-of-funds may be able to reduce transaction costs by directing funds to managers exhibiting more disciplined style consistency across the B/M spectrum while paying less attention to the size and momentum drift.

Table 8

Turnover and Net Style Drift

This table reports the results of the turnover and drift panel regression with fund fixed effects:

$$Turnover_{j,t} = \beta_{0j} + \sum_{k=1}^{3}\gamma_k D^{ASD,k}_{j,t-1} + \sum_{k=1}^{3}\delta_k D^{PSD,k}_{j,t-1} + \sum_{k=1}^{3}\lambda_k (D^{ASD,k}_{j,t-1} * ASD^k_{j,t-1}) + \sum_{k=1}^{3}\theta_k (D^{PSD,k}_{j,t-1} * PSD^k_{j,t-1}) + \sum_{k=1}^{3}\phi_k (S^{ASD,k}_{j,t-1} * ASD^k_{j,t-1}) + \sum_{k=1}^{3}\omega_k (S^{PSD,k}_{j,t-1} * PSD^k_{j,t-1}) + \varepsilon_{j,t}.$$

$Turnover_{j,t}$ is defined as the minimum value of purchases or sales over period *t* divided by the average total net assets over period *t*. $ASD^k_{j,t}$ measures fund *j*'s net active style drift from time *t*–1 to t for characteristic *k* and is defined as

$$ASD^k_{j,t} = \sum_{i=1}^{N}\left(\frac{H_{ijt}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{ijt}P_{it}} - \frac{H_{ijt-1}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{ijt-1}P_{it}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{i,Index,t}P_{it}} - \frac{H_{i,Index,t-1}P_{it}C^k_{it}}{\sum_{i=1}^{N}H_{i,Index,t-1}P_{it}}\right).$$

$ASD^k_{j,t-1}$ is the one period lagged value of $ASD^k_{j,t}$. $PSD^k_{j,t-1}$ measures the net passive style drift for fund *j* between *t*–2 and *t*–1 for characteristic *k* and is measured as

$$PSD^k_{j,t-1} = \sum_{i=1}^{N}\left(\frac{H_{ijt-2}P_{it-1}C^k_{it-1}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-1}} - \frac{H_{ijt-2}P_{it-2}C^k_{it-2}}{\sum_{i=1}^{N}H_{ijt-2}P_{it-2}}\right) - \sum_{i=1}^{N}\left(\frac{H_{i,Index,t-2}P_{it-1}C^k_{it-1}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-1}} - \frac{H_{i,Index,t-2}P_{it-2}C^k_{it-2}}{\sum_{i=1}^{N}H_{i,Index,t-2}P_{it-2}}\right).$$

Table 8 Continued

H_{ijt} is fund j's (index) holding of stock i at the end of month t, P_{it} is the price of stock i at the end month t and C_{it}^{k} is the percentile rank of stock i at the end of month t based upon characteristic k (B/M, size or past one year momentum). This is divided by the dollar value of fund j's (index) portfolio captured by the N stocks in our sample at the end of month t. $D_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund j's net active style drift is positive for characteristic k in period t–1. $D_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund j's net passive style drift is positive for characteristic k in period t–1. $S_{j,t-1}^{ASD,k}$ is a dummy variable which takes a value of 1 if fund j's net active style drift is negative for characteristic k in period t–1. $S_{j,t-1}^{PSD,k}$ is a dummy variable which takes a value of 1 if fund j's net passive style drift is negative for characteristic k in period t–1. Characteristics are indexed by k, where k=1 for B/M, k=2 for size and k=3 for momentum. Results for monthly, quarterly and semi-annual frequencies are presented. The data is annual from January 1997 to December 2001. t-statistics based on panel corrected standard errors are in parentheses. ***,**,* indicate significance at 1, 5 and 10%, respectively. ^Coefficients are multiplied by 10^2.

Independent Variables	Coefficient^ (Monthly)	t-stat	Coefficient^ (Quarterly)	t-stat	Coefficient^ (Semi-Annual)	t-stat
Passive B/M Drift—Dummy	0.088	(0.39)	0.070	(0.09)	–5.005**	(–2.46)
Active B/M Drift—Dummy	0.171	(0.82)	0.791	(1.03)	–0.840	(–0.42)
Passive Size Drift—Dummy	–0.241	(–1.02)	0.136	(0.17)	1.834	(0.64)
Active Size Drift—Dummy	0.098	(0.49)	–0.295	(–0.37)	–4.074**	(–1.98)
Passive Momentum Drift—Dummy	–0.249	(–0.99)	–0.520	(–0.65)	–3.372	(–1.62)
Active Momentum Drift—Dummy	0.159	(0.72)	0.871	(1.01)	–1.622	(–0.72)
Passive B/M Drift—Positive	0.045	(0.17)	0.419	(0.77)	2.868***	(2.80)
Passive B/M Drift—Negative	–0.167	(–0.61)	0.223	(0.41)	1.045	(1.07)
Active B/M Drift—Positive	0.189	(0.74)	0.832**	(2.38)	1.88**	(1.99)
Active B/M Drift—Negative	–0.070	(–0.65)	–1.298**	(–2.46)	–0.879	(–1.22)
Passive Size Drift—Positive	0.539	(1.22)	0.794	(1.24)	–1.168	(–0.99)
Passive Size Drift—Negative	1.040	(1.32)	0.416	(0.29)	–1.045	(–0.41)
Active Size Drift—Positive	–0.084	(–0.26)	0.812	(1.16)	–0.169	(–0.11)
Active Size Drift—Negative	0.095	(0.40)	–0.282	(–0.53)	1.997*	(1.96)
Passive Momentum Drift—Positive	–0.183	(–1.38)	–0.468**	(–2.10)	–0.188	(–0.49)
Passive Momentum Drift—Negative	0.268*	(1.79)	0.159	(0.50)	1.283**	(2.04)
Active Momentum Drift—Positive	0.074	(0.39)	–0.995**	(–2.25)	1.518	(1.50)
Active Momentum Drift—Negative	–0.014	(–0.07)	0.283	(0.76)	–0.493	(–0.72)
Adj. R^2	25.048		60.223		70.228	
No. Obs.	1557		480		216	

6. Conclusion

Using monthly data on Australian equity portfolio holdings, we are able to accurately capture the style-related behaviour of fund managers and to identify types of drift that are within, and out of, the fund manager's control. This drift is captured across common investment styles discussed in the literature. Style drift is of significant interest to investors utilising multiple-manager structures, such that the ex ante risk-return investment objectives of the blended portfolio exhibit reliable consistency with respect to ex-post outcomes.

Our results provide important insights with respect to style drift. We find that fund managers generally remain committed to their self-stated investment style, and indeed initiate style tilts that differentiate themselves from both the underlying index and funds with different investment objectives. Funds also offset passive drift in the book-to-market and momentum dimensions by actively adjusting their holdings to re-position their portfolio to a style-bias consistent with their investment objective. They do not react as strongly to drift in the portfolio's tilt on market capitalisation. We also identify that there are no consistent performance implications related to fund drift. However, we do find that there are adverse effects of funds exhibiting higher values of certain style drift measures. Namely, funds that drift excessively across the value-growth spectrum generally have higher turnover and thus, likely to have higher transaction costs Therefore, in a blended portfolio it is necessary to limit exposure to funds with excessive levels of active book-to-market drift as the adverse effect on turnover outweighs the performance benefit.

(Date of receipt of final transcript: May 4, 2007.
Accepted by Phil Dolan & Tom Smith, Special Issue Editors.)

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