Top Management Turnover: An Examination of Portfolio Holdings and Fund Performance*

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Abstract

We examine the performance and portfolio characteristics of actively managed equity funds impacted by top management turnover. Utilizing a unique database of monthly portfolio holdings, our study finds that post-replacement, previously poor performing funds experience improved returns. However this improved performance is not attributable to superior stock selection skill, but due to mean reversion in returns. We also find these new managers decrease their reliance on momentum strategies and decrease the portfolio's concentration, which then leads to a reduced tracking error volatility. Prior to the replacement event, underperforming investment managers exhibit preferences for larger, growth-oriented stocks, as well as riding momentum strategies and increasing portfolio turnover.

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Abstract

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I. Introduction

There is a significant amount of literature that has examined the performance of fund managers and more recently the factors that influence performance, such as investment style, fund flows, compensation arrangements and corporate governance mechanisms operating in the investment industry.[1] The volume of this literature reflects the increasing economic importance of delegated portfolio management. This can be observed directly through the substantial growth in assets under management, the increased availability of specialized investment arrangements and the increased demands for appropriate regulation and risk management.

The mutual fund industry gives a significant amount of attention and scrutiny to the performance and human capital management of fund organizations. Market participants including investors, pension fund trustees, asset consulting advisory firms, fund ratings firms (e.g. Morningstar), regulators and the media are all close observers of a fund management operation's ability to deliver valuable services to consumers. External analysts regularly assess the capability of top management to successfully implement the operation's investment process, as well as forming judgments on the likely impact of any changes which may arise in investment leadership. The financial press devotes priority coverage to top management events, including speculation as to the reasons behind the departure. Such attention to an individual in the media is also symptomatic of the celebrity status of some investment directors, where the more successful individuals have been dubbed as "stars" and "freaks".

Consistent with the interest by the mutual fund industry in the human capital management of fund organizations the academic literature has also given some attention to this issue. Khorana

(1996, 2001) investigated top management turnover in the U.S. mutual fund industry and found that the turnover event is predictable based on past performance, and that post-replacement, underperforming (outperforming) funds experience a significant improvement (deterioration) in risk-adjusted returns. Chevalier and Ellison (1999b) also examine the turnover of mutual fund managers on the basis of age, and find younger managers are more susceptible to replacement where fund risk deviates from the average portfolio according to investment objective.

The objective of this study is to provide an analysis of top management turnover in active equity fund management utilizing a unique database of the holdings and trades of active managers. Prior research investigating top management turnover has been restricted to an examination of performance at yearly intervals either side of the turnover event using net returns (see Khorana (2001)). We use a database of portfolio holdings at monthly intervals to examine the implications of top management turnover. The data and units of observation we employ are unique in several respects and allow us to make two main contributions to the literature.

Our first main contribution is an examination of the actions and performance consequences of management turnover in the *months* preceding and subsequent to the turnover event. Prior research has been restricted to an examination of performance implications at yearly intervals. Our second contribution is that we examine portfolio holdings as opposed to net returns. This approach has a number of advantages. Firstly, we are able to more precisely measure performance and thus understand the performance implications of turnover. Kothari and Warner (2001) and Pastor and Stambaugh (2002a, 2002b) identify possible biases in mutual fund performance measurement studies where returns-based measures are employed. Secondly, using monthly portfolio holdings, we are able to directly observe the individual

portfolio decisions executed by managers surrounding managerial replacement. We are therefore able to examine certain risk and portfolio characteristics surrounding top management turnover which cannot be examined using net return data. This enables a better understanding of dynamic portfolio management and the micro decision-making surrounding the pre-and-post replacement periods of key investment directors.

Specifically, using portfolio holdings data in both the pre-replacement period and the post replacement period, we examine the implications of a change in top management turnover, for portfolio turnover, risk, concentration, and stock characteristic preferences. The stock characteristics we examine include strategies based on momentum, book-to-market and size. This analysis enables the identification of important changes in the portfolio management process as a consequence of a change in investment director.

A final contribution of this study is that we provide the first out-of-sample evidence on performance and top management turnover. There has been a large volume of literature across a number of capital markets that examines the performance implications of CEO changes in publicly traded companies. In contrast, the evidence with respect to the performance implications of top management turnover for mutual funds is restricted to research by Khorana (2001). Out of sample evidence in the context of mutual funds is not unimportant because of the well documented noise and biases involved in studies in this area (see Kothari and Warner (2001) and Pastor and Stambaugh (2002a, 2002b).

Our study finds that prior to top management turnover, managers of poorly performing funds have an increasing preference for larger, growth-oriented stocks, and for momentum strategies. They also show an increasing tendency to increase portfolio concentration and tracking error volatility (i.e. underperforming managers took larger bets relative to the index.).

Subsequent to replacement of top management, we find that previously poor performing funds experience improved returns. However this improved performance is not attributable to superior stock selection skill but rather due to mean reversion in returns. We also find that new managers restructure the portfolio by decreasing their reliance on momentum strategies as well as decreasing the portfolio's concentration, which then leads to a reduced tracking error volatility (i.e. portfolio diversification increases). Finally, newly arriving managers of previously underperforming portfolios do not show any particular size preferences, however there is evidence they tilt their funds toward growth stocks.

The remainder of the paper is structured as follows. Section II provides a brief institutional comparison between the U.S. and Australia concerning the organizational structure of managed fund entities. Section III develops our hypotheses. Section IV contains a discussion of the data and elements of the research design. Section V presents the empirical results. Section VI concludes the research.

II. Institutional and Organizational Structure of Managed Funds: Comparison between U.S. and Australia

A. Size and Structure

Both the U.S. and Australian money management industries are substantial, where the total assets invested in U.S. mutual funds exceeds $5.5 trillion (see Chen et al. (2000) and for Australia around $A650 billion (Australian Bureau of Statistics). Mutual funds in the U.S. and managed funds in Australia are similar, in that public funds are offered to investors as open-end collective investments, typically in the form of unit trusts. Investors of these funds are allocated units by the manager, where each unit held represents an ownership interest in

the underlying assets of the fund. Investors in open-end funds can either redeem units at the exit price, or else acquire additional units at the prevailing entry price. Investment managers (or advisors) are remunerated on the basis of a fixed percentage levied on the average net assets of the fund.

B. Governance

In the U.S., mutual fund companies are governed by a board of directors, where the directors' responsibility concerns the overall activities of the fund. Khorana (1996) highlights that it is not uncommon for funds to have directors on the board who are also employees of the investment advisory entity. While the board is required to regularly review the performance of the investment advisor, Khorana (1996) identifies that where mutual funds have individuals serving as both a director and advisor, challenges arise in ensuring that appropriate governance mechanisms are operating in the interests of investors. Therefore, the performance monitoring of an advisor is critically important in ensuring that effective internal control mechanisms are in operation, such that the replacement of a mutual fund manager occurs in the event of poor performance.

In Australia, both the governance systems and remuneration characteristics of managed funds are similar to that operating in the U.S. The introduction of the *Managed Investment Act* (1998) ensures that each unit trust has a trust deed governing the operation of the fund, the investment strategy and types of securities in which the fund is permitted to invest. The trustee board performs essentially the same role as in the U.S., where the trustee has the responsibility of ensuring fund assets are safeguarded, and that fiduciary obligations are exercised on behalf of fund investors. The fund manager is responsible for the day-to-day activities of the fund, including investment decisions, compliance, risk management, performance reporting, and administering money flows between the fund and investors.

III. Hypotheses

The interaction between investors and investment management institutions represents a principal-agent relationship. Investors delegate assets to professional portfolio managers, for a fee, with the expectation performance will be commensurate with a fund's investment objectives (e.g. to outperform the market). While performance is important to the principal and agent, an investment firm's incentives are to maximize the total assets under management, as revenue is earned based on a percentage of fund assets. Although performance and asset size are interrelated, the principal objective for the investment manager is to maximize total assets under management.

In this section we develop hypotheses as to the effects of top management turnover on the performance and portfolio characteristics of active equity funds. We assume there are two types of turnover groups. The first represents that group where a head either leaves or is dismissed due to a prior history of poor performance ("the under performers"). The second is a turnover of a head for reasons unrelated to performance ("the non-performance group"). For each group we consider the impact of top management turnover on a portfolio's performance, risk and concentration, securities turnover and preferences for stock holdings in both the pre-replacement period and the post- replacement period.

A. Performance

Khorana (1996) finds that underperformance by funds in the two years prior to replacement represents a significant predictor of top management turnover. Chevalier and Ellison (1999b)

also examine the termination-performance relationship for U.S. mutual fund managers and find the probability of termination is significantly related to past performance. The dismissal of top management due to a history of poor performance leads to our first prediction, for the under performers, that the new head will lead to an improvement in performance.[2] For the group of funds with recent performance that is not poor we assume the change in top management is unrelated to performance and we therefore predict no change in performance for this group ("the non-performance group.")

Khorana (2001) examines the performance consequence of replacement, where performance was measured based on the single-factor CAPM and the Carhart four-factor model (1997). Khorana (2001) decomposes the sample into under-and-outperformers, based on whether they had negative or positive performance prior to replacement. Khorana finds for the sample of funds with a history of underperformance, the subsequent new fund managers exhibit dramatic performance improvements. However he also finds that for the group of funds which did not have a history of underperformance, the change in top management leads to a deterioration in performance. One explanation for these two findings could simply be the lack of precision, and possible biases, when performance is measured using time-series factor regressions. If performance is measured with a substantial amount of random error, then such an approach may implicitly assign to under and over-performers fund managers which experienced good or bad luck. As a result, the subsequent performance of such groups will not change due to the actions of the new head, but simply because performance is reverting to the mean.

[2] A caveat to this prediction is that top management could be dismissed due to a recent period of poor performance which in a noisy security market occurred due to chance.

As a consequence of the use of returns-based time-series factor regressions in measuring aggregate fund ability, it is unclear whether any change in performance is due to the change in top management or to simply measurement error and mean reversion in the data. In this study, while we also use these measures as a basis of comparison, we use the performance methodology developed by Daniel, Grinblatt, Titman and Wermers (1997), to measure the performance of both the *stock holdings* and *trades* of fund managers using a unique database of monthly equity portfolio holdings. This approach has two main advantages over the returns -based factor regressions in understanding the performance implications of management change.

One of the benefits of being able to observe stockholdings, as established by DGTW (1997), is that it allows a measurement of fund performance by comparing the actual return of each stock held against an expected return, given by a benchmark portfolio matched to the stock on the basis of size, book-to-market ratio, and momentum characteristics. The main advantage of this approach is that it allows a more precise characterisation of the style used by the fund manager at all times in choosing stocks, which in turn allows for the precise design of benchmarks[3]. This approach addresses the now well-documented flaws of the traditional factor regressions. When only the net return of a fund is available and time-series factor regressions have to be used, the factors the fund is exposed to have to be estimated, which result in biased and inefficient estimates of a fund's performance.[4] Recently, DGTW (1997),

[3] Specifically, as Metrick (2000) and Choi (2000) explain, under this approach if there is a time-varying aspect to expected factor returns, it will be accounted for by a corresponding shift in the matching reference portfolio return. In addition, the matching portfolio will account for any timing across different factor loadings. Finally, there is no restriction on the relationships between bin's returns.

[4] The reasons put forward in the literature (see DGTW (1997) and Choi (2000) for a concise summary) are as follows. First, the difficulty with interpreting the alpha's from factor-model regressions is that estimated alphas and betas are biased when factor loadings are correlated with factor realizations (see also Grinblatt and Titman (1995)). Second, when only the net fund return is available, the characterisation of the style used by the fund manager in choosing stocks is imprecise, resulting in imprecise benchmarks to control for that style. Third, factor-model regressions restrict the relationship between expected returns and stock characteristics to be linear, which Lyon, Barber and Tsai (1998) argue is inappropriate. Fourth, the methodology of factor regressions assumes no interaction between factors, an assumption which Loughran (1997) shows is inappropriate.

Wermers (2000) and Metrick (2000) provide evidence that the DGTW characteristic matching measure offers potential for significant gains in precision over the regression factor model. They thus conclude that a researcher who has transaction data should use the characteristic-matching model, as it is more powerful than a net return factor model.

The second advantage of our approach is that we also examine the subsequent abnormal performance of the stocks a fund manager trades. Specifically the stocks they buy or sell. This is motivated by Chen, Jegadeesh and Wermers (2000) who argue the trade of a stock is more likely to represent a signal of private information than the passive decision of holding the existing position in the stock. When there is a change in manager, the new manager may continue to hold a stock for reasons other than future abnormal performance because of the frictions involved in trading such as trading costs, as well as more implicit costs such as the triggering of a capital gains tax event through a sale. As a consequence of these frictions, the return on holdings may not reveal the true private information and change in performance of the new fund manager. Thus trades may provide more powerful evidence of the information fund managers possess about future returns.

B. Portfolio Risk and Concentration

When investment managers are faced with the prospect of dismissal (due to underperformance), one may expect managers to engage in activities which changes fund risk in the hope of reversing the fund's poor performance. The literature has documented empirical evidence concerning changes in risk attributes of mutual funds. Brown, Harlow and Starks (1996) tournament theory hypothesizes that poor performers will increase their level of risk in order to improve their year-end rankings. They find that on average, mid-year 'losers' actively increase their level of volatility in the second half of the year more than is the case for mid-year 'winners'. Chevalier and Ellison (1997) report similar findings, documenting

that funds which increase the level of portfolio risk as year-end approaches is most likely associated with funds underperforming the market.[5] We therefore predict that underperformers in the pre-replacement increase their risk and subsequent to turnover the risk of the portfolio is decreased. For the normal performers we predict no change in risk in either the pre-replacement period or after the change in head.

Khorana (2001) examines the level of systematic and total risk for pre-and-post replacement years, and finds for underperforming managers, a statistically significant increase in median fund risk (total risk) occurs in the pre-replacement period. In the post-replacement period he finds a significant decrease in risk. However, systematic risk levels remain constant pre-and-post replacement.

In this study, two measures of risk (portfolio concentration and tracking error), not previously employed in the turnover literature are employed in order to determine how portfolio risk is altered by top management pre-and-post replacement conditional on performance. Portfolio concentration measures the extent to which the portfolio weights of the fund differ from the underlying benchmark index weights, and the measure is directly related to the number of stocks held in the portfolio and the relative size of stocks accounted for in the benchmark. Kacperczyk, Sialm and Zheng (2003) also find that there is a direct relationship between concentration and the portfolio's volatility. Our measure of concentration is simply the number of stocks held by the portfolio each period-end, where higher concentrated portfolios are represented by funds with a small number of unique stock holdings. This proxy for concentration is motivated on the basis that tracking error volatility should decline as more

[5] However, Busse (2001) contradicts the findings of Brown *et al.* (1996), reporting that when unbiased monthly standard deviation estimates are employed, the increase in risk of poor performers compared to better performers no longer exists. Busse (2001) also finds that actual volatility at the end of the year is very close to its predicted volatility (using start-of-the-year predictions) and that changes in intra-year levels of volatility are not entirely indicative of conscious actions by the managers.

stocks are added to the portfolio, such that each stock's weighting differential to the index becomes smaller on average as more stocks are included in a fund.

We also measure risk using tracking error, defined as the standard deviation of fund returns in excess of the benchmark, where greater (lower) returns volatility implies higher (lower) portfolio concentration. Wermers (2003) evaluates the relationship between active fund returns and tracking error for a sample of U.S. mutual funds and his results show a positive relationship between risk (volatility) and performance, confirming that the cross-sectional variation in fund returns is explained by successful managers taking larger bets.

C. Investment Style and Portfolio Preferences

Chan, Chen and Lakonishok (2002) examine change in investment style as a consequence of manager career concerns. They hypothesise that a manager experiencing poor performance is more likely to shift their investment style to either other successful styles or by tilting their portfolios to mimic the styles implemented by the 'crowd'. Chan *et al.* (2002) document that fund managers with poor past period performance, are more likely to alter their investment style towards growth stocks and past period winners.

In this paper we examine the potential for top management turnover to have an impact on style drift and preferences for stocks with certain characteristics. We predict that in the pre-replacement period the group of funds with poor past period performance may significantly alter their portfolio preferences in an attempt to change their performance. Specifically we predict they are more likely to purchase past winners and growth stocks in an attempt to either window dress their portfolio or on the basis that they believe such stocks are likely to realize superior returns. We then examine in the post replacement period whether the newly arriving investment managers subsequently significantly change the inherited portfolio's

characteristics. We also examine whether for the superior performing portfolios in the pre-replacement period the new head alters the stock characteristics of the portfolio in the post replacement period. We follow the approach adopted by Chen, Jegadeesh and Wermers (2000) and examine three characteristics – size, book-to-market, and momentum.

D. Portfolio Turnover

A number of studies examine the relationship between performance and portfolio turnover and provide conflicting findings. Ippolito (1989) finds no correlation between fund performance and portfolio turnover. However, Grinblatt and Titman (1989) find a positive relationship between turnover and gross performance (i.e. before expenses) and Wermers (2000) finds that high turnover funds are able to select stocks that earn higher returns (and beat an appropriate benchmark net of fees) than low turnover funds, although their transaction costs and expenses are higher. On the other hand, Elton, Gruber, Das, Hlavka (1993) document using a three-index model that the cost of the increased turnover is not offset by excess return earned and that funds with lower turnover and thus lower fees outperform funds with higher turnover and higher fees. Carhart (1997) also finds a negative relation between turnover and net mutual fund returns.

Khorana (2001) examines the level of portfolio turnover contingent on performance and management turnover, arguing that underperforming fund managers, facing the threat of dismissal, will increase trading activity (and therefore fund turnover) by window dressing their portfolio's. Khorana finds empirical support for this hypothesis, where underperforming managers experience significantly higher levels of portfolio turnover prior to termination, and that this leads to a statistically larger increase in expenses.

In this study we also examine portfolio turnover surrounding managerial replacement and make similar predictions to Khorana (2001). We measure portfolio turnover using the standard definition of AIMR and CRSP, where for portfolio *p* during period *t*, turnover is measured as the minimum of purchases or sales, divided by the average total net assets of the fund in the period:

$$PortfolioTurnover_{pt} = \frac{\min\left(Purchases_{pt}, Sales_{pt}\right)}{average\,TNA_{pt}} \tag{9}$$

where $Purchases_{pt}$ is the total value of stock purchases by portfolio *p* during period *t*, $Sales_{pt}$ is the total value of stock sales by portfolio *p* during period *t*, and TNA_{pt} is the total average net assets of portfolio *p* during period *t*. Portfolio turnover is measured over monthly, quarterly, half-yearly and yearly periods.

IV. Data and Research Design

Our study examines active Australian equity fund manager turnover, fund performance and changes in portfolio holdings using monthly data in the period 2 January 1994 to 31 December 2001. The monthly portfolio holdings data is obtained from the Portfolio Analytics Database, which was constructed on an individual invitation basis to the largest investment management firms operating in Australia. The database contains portfolio holdings information for different securities types, namely equities, option securities, futures contracts, cash and other marketable securities such as convertible notes and warrants. The fund holdings data is supplemented with stock price data sourced from the Australian Stock Exchange (ASX) SEATS database, and options and futures price data from ASXD and

Sydney Futures Exchange. We acquired accounting information from the ASPECT Financial database in order to calculate a stock's book-to-market ratio across the sample period.

The portfolio holdings data was collected for the investment management firms' largest institutional active Australian equity funds, where the definition 'largest' was determined by the marked-to-market valuation of assets under management at 31 December 2001. Given the manual data collection procedure and that such data is not commonly available in the industry, data for the largest funds was requested as these provide the best representation of the investment management firms' management of active Australian equities. This process was followed for the following reasons; (1) in the institutional market, fund managers do not offer a large number of public funds, and in many cases one or two funds accounts for all products available in that investor class, (2) given that funds are managed on a team-oriented basis, and that funds are also managed in a consistent manner following the house investment process, acquiring all funds is not necessary, (3) in light of the previous two points and due to the substantial size of these funds, the revenue derived from these unit trusts represents the single largest contribution to overall firm revenue within the asset class, hence these vehicles are of substantial importance to the manager as they represent the firm's 'flagship' fund.

The construction of the *Portfolio Analytics Database* based on the invitation approach may result in the existence of selection and survivorship bias. Survivorship bias exists given that the sample period contains only surviving funds available for collection between 31 December 2001 and 30 June 2002. However, given that our study is concerned with managerial replacement of the head of Australian equities, rather than the long-run performance of actively managed funds, we argue that this bias is mitigated. However, Gallagher and Looi (2003) provide some evidence on the level of bias contained in the

Portfolio Analytics Database, and they report that the magnitude of bias is not problematic relative to the entire institutional equity fund market.

Our research also employs data of personnel changes in the role of Head of Australian Equities (Head AEQ).[6] Our top management turnover database includes the arrival and departure months of heads of equities. We then matched the top management turnover data with the funds contained in the Portfolio Analytics Database. To be included in the sample, our study also requires top management to be employed in their role for a period of at least 6 months prior to the turnover month. Accordingly, our sample contains a total of 22 turnover events in our sample period. The requirement of a minimum of 6 months prior to the turnover event is different to Khorana (2001), which required that a fund experiencing managerial replacement have at least three years of performance history prior to the managerial replacement month. Our use of a shorter window is important for two reasons. First, the average tenure period of top management in Australia is approximately three years (which is a unique feature of the Australian market) and therefore avoids us significantly reducing our sample. Second, the study mitigates against biasing results towards those managers who are better performers and who benefit from significantly greater longevity.

The sample of institutions experiencing top management turnover are representative of the Australian industry, and include five of the top 10 institutions (ranked by funds under management), three from institutions ranked 11-20, two from institutions ranked 21-30 and five with a ranking greater than 30.

[6] The sample of personnel changes in the role of Head of Australian equities (Head AEQ) was compiled using information contained in historical IFSA Investment Manager Questionnaires and data from Mercer Investment Consulting. For cross-checking purposes, the IFSA data was compared with the Mercer data, as well as relying on the financial press records to determine when the *actual* investment manager changes occurred. This data checking purpose is extremely important, as not all changes become effective at the announcement date. The IFSA and Mercer data was also used to identify the investment manager's arrival date to the investment management firm as a means of measuring tenure.

A. Measurement of Performance

1. Alphas Estimated from Factor Models

We examine risk-adjusted returns of funds experiencing managerial replacement consistent with previous studies including Carhart (1997), Chevalier and Ellison (1999b), and Khorana (2001). These studies include estimates of both one and four factor models using monthly returns. The one and four factor models, respectively, are estimated as follows:

$$R_{it} = \alpha_{1i} + \beta_i RMRF_t + \varepsilon_{it} \quad (1)$$

$$R_{it} = \alpha_{4i} + \beta_i RMRF_t + \beta_{SMBi} SMB_t + \beta_{HMLi} HML_t + \beta_{PRi} PR1YR_t + \varepsilon_{it} \quad (2)$$

where R_{it} is the fund return in excess of the risk-free rate in period t; $RMRF_t$ *is* the excess return of the market in period t, where the benchmark is either the S&P/ASX 300, S&P/ASX 200, or S&P/ASX 100 Accumulation Indices and the risk-free rate is the 30-day Treasury note yield[7], SMB_t accounts for stock size, measured as the difference between a portfolio of firms comprising the top and the bottom quintiles of stocks (ranked by market capitalization); HML_t is the difference between a portfolio of firms comprising the top and the bottom quintiles of stocks (ranked by book-to-market ratio); and $PR1YR_t$ proxies for past price momentum, measured as the difference between an equally weighted portfolio of firms comprising the S&P/ASX 300 Accumulation Index with the highest 25 percent 12-month return, lagged one month, and the lowest 25 percent 12-month return (lagged one month). The *SMB* and *HML* factor portfolios are constructed in a similar manner to Fama and French (1993), and for *PR1YR* this portfolio is similar to Carhart's (1997) methodology.

[7] On 3 April 2000, the ASX restructured its indices. Prior to April 2000 the All Ordinaries Accumulation Index existed. However due to the restructuring, after April 2000 there were three new indices known as the S&P/ASX 500, S&P/ASX 300 and S&P/ASX 200 Accumulation Indices which contained the top 500, 300 and 200 stocks (ranked by market capitalization) respectively.

2. Objective-Adjusted Performance Measure

Consistent with Khorana (2001), we also measure the objective-adjusted performance of funds, where the objective accounts for the portfolio's benchmark. OAR does not control for risk, and is therefore a measure of raw performance. The OAR enables a decomposition of investment manager changes into both positive (PP) and negative (NP) performance samples. The objective-adjusted return (OAR) of a fund is the 12-month holding period return in excess of the 12-month holding period return of the appropriate benchmark. The annual OAR is calculated as follows:

$$OAR = \left[\prod_{t=1}^{12}(1+R_{it})-1\right] - \left[\prod_{t=1}^{12}(1+R_{ot})-1\right] \quad (3)$$

where R_{it} represents the return of fund i in month t; R_{ot} is the benchmark fund for a particular objective in month t, where for Australian equity portfolios the benchmarks are either the S&P/ASX 300, S&P/ASX 200 or S&P/ASX 100. Our research also examines OARs employing monthly, quarterly and half-yearly intervals.

3. DGTW Performance Measure

The Daniel *et al.* (1997) (hereafter DGTW) performance measure has been adopted in a number of recent mutual fund studies examining portfolio holdings. The DGTW approach measures the extent to which a manager's selectivity ability yields abnormal returns relative to an appropriately defined benchmark-matched portfolio according to size, book-to-market and momentum factors. In our study of Australian stock holdings, the largest 500 stocks on the Australian Stock Exchange are partitioned into four size portfolios, which are then partitioned into three book-to-market portfolios, and then these are further partitioned into two momentum portfolios. This procedure is similar to DGTW (1997), and our study accounts for a total of 24 benchmark portfolios. Each stock's characteristic portfolio is then identified by

examining which characteristic portfolio the stock is in for the previous month, and the abnormal return is calculated by subtracting the actual return of the stock in month *t* with the benchmark return in month *t*. Because the holdings data is month-end, the weight of the previous month is taken in accordance with the abnormal return for the current month. The benchmark portfolios can be measured on either a value or equal-weighted basis. We examine both portfolio construction methods to assess managerial ability.

The DGTW measure for portfolio *p* at month *t* is calculated as:

$$DGTW_{pt} = \sum_{s=1}^{n} w_{sp,t-1}\left(R_{st} - R_t^{bs,t-1}\right) \tag{4}$$

where $w_{sp,t-1}$ is the weight of stock *s* in portfolio *p* at end of month *t-1*, R_{st} is the return on stock *s* during month *t*, and $R_t^{bs,t-1}$ represents the return during month *t* on the characteristic-based benchmark portfolio to which stock *s* is matched n month *t-1*. The portfolio weight held in stock *s* is defined as:

$$w_{spt} = \frac{P_{st}H_{spt}}{\sum_{t=1}^{N} P_{st}H_{spt}} \tag{5}$$

where w_{spt} is the weight of stock *s* in portfolio *p* at month *t*, P_{st} denotes the price of stock *s* in month *t*, and H_{spt} accounts for the number of shares in stock *s* of portfolio *p* in month *t*.

The DGTW measure permits an enhanced determination of whether a manager exhibits stock-picking ability. For the purposes of this study, we account for both options and equity holdings as a means of determining a fund's total effective exposure to a particular stock. The method adopted is consistent with Pinnuck (2003).

Our study also considers the trading ability of managers by inferring trades between each month- end. This measure has previously been adopted by Chen, Jegadeesh and Wermers

(2000) using quarter-end holdings, and Pinnuck (2003) using month-end intervals. This approach enables inferences on whether stocks purchased/sold are 'winner' or 'loser' stocks that contribute to or detract from aggregate fund returns. In order to measure the inferred trades of managers, we measure the weight of stock *s* at month *t* with the weight of stock *s* at month *t-1* using prices at month *t*. This permits a calculation of changes in weights due to net purchases and sales rather changes in weights due to fluctuations in the stock price. The trade measure for stock *s* in portfolio *p* during month *t* is calculated as:

$$Trade_{spt} = w_{spt} - w^{it}_{spt-1} \tag{6}$$

where w_{spt} is the weight of stock *s* in portfolio *p* at month *t*, w^{it}_{spt-1} represents the weight of stock *s* in portfolio *p* at month *t-1* using stock-prices from month *t.* As only inferred net trades between periods are calculated using month-end holdings, it is not possible to know the exact timing of these trades. Therefore two different DGTW monthly purchase and sale values are calculated. The first assumes the trade (i.e. purchase and/or sale) occurs at the beginning of the month, and therefore this measure is calculated based on abnormal returns for the current month (hereafter referred to as DGTW purchases (t) and DGTW sales (t)), whereas the second approach assumes the trade occurred at the end of the month, and is therefore calculated based on abnormal returns in the subsequent month (hereafter referred to as DGTW purchases (t+1) and DGTW sales (t+1)).

4. GT Performance Measure

The GT performance measure follows the approach devised by Grinblatt and Titman (1993). The GT approach measures performance relative to the portfolio's holdings one-year prior. The motivation and strength of the measure is that both past period, and current period, portfolio weights are uncorrelated with current market returns. The GT measure is calculated without reference to an asset pricing model, and accordingly, therefore does not account for risk in measures of abnormal returns, and is defined as

$$GT_{pt} = \sum_{s=1}^{N} \left(w_{s,t} - w_{s,t-12} \right) \times R_{st} \qquad (7)$$

where $w_{s,t}$ is the weight held by the fund in stock s at the end of month t, $w_{s,t-12}$ is the weight in stock s at the end of month t-12, and R_{st} represents the return on stock s during month t (i.e. change in stock-price for stock s during month t).

B. Classification of Funds

Our study follows Khorana's (2001) technique of classifying funds experiencing replacement into two sub-samples – a negative performance sample (NP) as a proxy for underperformance and a positive performance sample (PP) as a proxy for non-performance related. Performance for classification is measured using each fund's objective-adjusted return (OAR) in the period prior to replacement. This decomposition technique is adopted as a proxy for the motive explaining the replacement event. This leads to nine top management turnover events partitioned into the NP sample and thirteen in the PP sample.

C. Classification of Event Periods

Performance and portfolio characteristics are measured over yearly, half-yearly and quarterly intervals pre and post-replacement. Specifically, we identify the replacement month as month 0. The pre-replacement year is the 12 months over the interval up to an including the month prior to the month of replacement (Year-1). The post-replacement year is the 12 months over the interval from the month immediate subsequent to the month of top management change (Year +1). The pre-replacement year is attributed into two half intervals which we label HY_{-12m} and HY_{-6m}. HY_{-12m} represents the first six month period in the 12 months prior to the replacement month. HY_{-6m} represent the second six month period in the 12 months prior to the replacement month. HY_{+6m} represent the first six month period in the 12 months subsequent to the replacement month. HY_{+12m} represent the second six month period in the 12 months

subsequent to the replacement month. The pre and post replacement years are also attributed to quarterly intervals. QTR_{-12m} represents the first three month period in the 12 months prior to the replacement month. QTR_{-9m}, QTR_{-6m}, QTR_{-3m} represent the second, third and final three month periods in the 12 months prior to the replacement month. Likewise in the post replacement period QTR_{+3m}, QTR_{+6m}, QTR_{+9m}, and QTR_{+}12m represent the first, second, third and final three month periods, respectively, in the 12 months subsequent to replacement.

V. Empirical Results

A. Portfolio performance in the pre and post-replacement years

This section provides evidence on the relationship between performance and top management turnover in the pre-and-post replacement years. Performance is measured using a number of different methods over yearly, half-yearly and quarterly intervals. Annual performance is measured using 1-factor and 4-factor alphas, OARs, DGTW performance measures (holdings and trades) and the GT performance measure. Half-yearly and quarterly performance is measured using OARs, DGTW performance measures (holdings and trades) and the GT performance measure.

INSERT TABLE 1 HERE

Table 1 examines mean and median performance and changes in performance over the given years for the NP and PP samples, respectively. The performance results for year 0 are consistent with the way in which the replacement sample is partitioned i.e. poor performance of the NP sample and superior performance of the PP sample. It is however the change in performance after management turnover that provides the most interesting results. For the NP sample the performance results show significant increases from Year -1 to Year +1 in the mean and median 1-factor and 4-factor alphas, OARs, and DGTW purchases (t) and GT

measures. One interpretation of these results is the arrival of the new head of equities provides good news to investors as there is a significant improvement in the performance of their portfolios.

However a significant caveat to this interpretation is that the result could simply be driven by mean reversion in the performance data. To provide a more reliable estimate of the difference between the old and the new head we use the DGTW performance measures. The results for DGTW-holdings, DGTW purchases t+1 and DGTW sales t+1 show there is no significant difference in performance between the old and new heads. This is consistent with there being no immediate clear difference in the stock selection ability between the old and the new head.

INSERT TABLE 2 HERE

To provide a more comprehensive understanding of changes in performance we examine performance changes over half-yearly periods for the NP and PP samples. The results are in Table 2. The results for performance measurement changes of half-yearly intervals are qualitatively similar to the annual interval. The OAR measure shows positive improvement for the NP sample and a negative change in performance for the PP sample. For the DGTW measures (with one exception) there appears to be no significant difference in skill between old and new over whatever interval performance is measured. The exception is for the period from HY_{-12m} to HY_{+12m} for DGTW holding measure. In subsequent sections we examine if this result is due to chance or due to a systematic change in portfolio management implemented by the new manager.

In summary the results from the simple time-series factor regressions performance measures are consistent with Khorana (1996, 2001) who finds that in the case where there is

underperformance and turnover, this leads to statistically significant improvements in performance post-replacement. Khorana (2001) also identifies that funds experiencing positive abnormal performance in the period prior to replacement subsequently experience deterioration in performance post departure. However, the performance results from the DGTW measure are less clear as to whether the new investment manager has improved performance. One explanation for the difference between results is that the results for the time-series factor regressions could simply be driven by mean reversion in performance data.

B. Risk and Portfolio Concentration

This section examines the link between risk and top management turnover in the pre-and-post-replacement periods across yearly half-yearly and quarterly intervals. We measure risk in two ways, portfolio concentration and tracking error. Portfolio concentration is the number of securities in a portfolio at any given time. Table 3 reports the mean and median levels of portfolio concentration and changes in portfolio concentration over yearly intervals for the NP and PP samples. Panel A and B of Table 4 report the mean and median levels of portfolio concentration and changes in portfolio concentration over half-yearly intervals.

INSERT TABLE 3 and 4 HERE

Tracking error is a returns-based measure, and determines by how much the returns of a portfolio deviate from the returns of the benchmark. The higher the tracking error, the larger the deviation of portfolio returns from benchmark returns. On the other hand, examining the number of securities essentially examines the size of bets taken by an investment manager. Therefore, the smaller the number of securities, the larger the bets on each particular stock, the higher the concentration.

The results in Table 3 show no significant change in mean and median tracking error from Year -1 to Year +1 for the NP. However the results show a significant increase in the number of securities. The results are consistent with the idea that the new investment manager is decreasing the concentration of the portfolio for the NP sample. The half-yearly results support this conclusion. There is a significant decrease in mean tracking error from HY_{-6m} to HY_{+6m} and a significant increase in the mean and median number of securities from HY_{-12m} to HY_{+6m} and HY_{-12m} to HY_{+12m}. To provide further understanding of the changes in concentration from a change in top management we also examine mean and median levels of portfolio concentration and changes in portfolio concentration over the given quarters for the NP sample. The quarterly results, not reported, also show significant decreases in mean tracking error from QTR_{-3m} to QTR_{+3m}.

The results for the changes in portfolio concentration for the NP sample across the pre-replacement period indicate a significant increase in mean and median tracking error from HY_{-12m} to HY_{-6m}. There is also a decrease in the median number of securities for this interval but the decrease is not significant. The quarterly results also show significant increases in mean and median tracking error from QTR_{-9m} to QTR_{-3m} and a significant decrease in the mean number of securities. These results suggest that the old investment manager is increasing the concentration of the portfolio by taking larger bets and deviating from the index in order to turnaround the portfolio's poor performance.

The results for the PP sample show that while there is a significant increase in the average number of securities from Year -1 to Year+1 there is however no significant change in tracking error across any of the intervals. This suggests that with the arrival of the new investment manager, there is an increase in the number of securities held but no significant impact on tracking error. This result is consistent with the new investment manager

attempting to replicate the departing head's superior performance by not significantly changing the tracking error of the portfolios.

C. Portfolio Turnover

This section reports the results from an examination of the relationship between portfolio turnover and top management turnover in the pre-and-post replacement years. Portfolio turnover is measured across three the different intervals; yearly, half-yearly and quarterly. Table 5 reports the mean and median levels of portfolio turnover and changes in portfolio turnover across yearly intervals. Panel A and B of Table 6 report mean and median levels of portfolio turnover and changes in portfolio turnover across half-yearly intervals.

INSERT TABLE 5 AND 6 HERE

The annual results show no significant change in mean and median levels of portfolio turnover for both the PP and NP sample. The half-yearly and quarterly results present a different picture. For the NP sample there is a significant increase in portfolio turnover in the pre-replacement periods, from HY_{-12m} to HY_{-6m}. In unreported results there is also increase in turnover across quarterly intervals from QTR_{-12m} to QTR_{-6m} and QTR_{-9m} to QTR_{-6m}. These results suggest that as replacement approaches, an investment manager increases the level of turnover perhaps to sell of some of the 'loser' stocks or an attempt to select 'winners' in the hope of turning around the portfolio's poor performance to delay his possible termination.

Comparing pre-and-post-replacement portfolio turnover activity for the NP sample shows significant increases in portfolio turnover activity for both half-yearly and quarterly intervals. These increases in portfolio turnover are larger in magnitude than the increases in only the pre-replacement periods. There are significant increases in mean values from HY_{-12m} to HY_{+6m}

and HY_{-12m} to HY_{+12m}. These results are consistent with hypothesis that the new investment manager has to come in and restructure and therefore will increase the level of portfolio turnover. This result is inconsistent with Khorana (2001) who finds that underperformers post-replacement experience significant decreases in portfolio turnover. A possible explanation for this inconsistency is that Khorana (2001) only examines portfolio turnover at an annual level and therefore will not capture intra-year variation.

Examining the half-yearly differences between the pre-and-post-replacement levels of portfolio turnover for the PP sample, there are significant increases in median values from HY_{-12m} to HY_{+6m} and HY_{-6m} to HY_{+6m} and a significant increases in mean from HY_{-12m} to HY_{+12m}. The quarterly results indicate significant increases in mean and median values for QTR_{-12m} to QTR_{+6m}, QTR_{-12m} to QTR_{+9m}, QTR_{-12m} to QTR_{+12m} and QTR_{-6m} to QTR_{+6m}.

The significant increases in turnover for both the PP and the NP sample provide one potential explanation for the insignificant difference in performance between the old and the new head. When the new head arrives he or she may simply be trading to restructure the portfolio rather trading on the basis of any new private information. As a consequence in the period immediate subsequent to change there is unlikely to be any immediate change in performance.

D. Portfolio Preferences

This section reports the results from an examination of investment managers' stock preferences in the pre-and-post replacement periods. Stock preferences are examined in terms of size, book-to-market and momentum. Table 7 reports mean and median stock preference rankings and changes in stock preferences over yearly intervals. Panel A and B of Table 8 report mean and median stock preference rankings and changes in stock preferences over half-yearly intervals.

INSERT TABLE 7 and 8 HERE

The results for the size rankings of the NP sample indicate no significant difference across the yearly intervals. The half-yearly and quarterly results provide a more precise understanding of investment manager's size preferences in the pre-replacement period. There is a significant increase in the mean size ranking from HY_{-12m} to HY_{-6m}. This result suggests that as replacement approaches, poor performers tend to invest in larger stocks. This is supported by the quarterly results which show significant decreases from QTR_{-9m} to QTR_{-6m} and QTR_{-9m} to QTR_{-3m}. However, when comparing pre-and-post-replacement periods there is no evidence as to the size preferences of the new investment manager being different from the old manager.

The book-to-market rankings of the NP sample also indicate no significant change when examining yearly results. Examining the half-yearly results there is a significant decrease in the average ranking from HY_{-12m} to HY_{-6m} but a significant increase in the median ranking for the same interval. The quarterly results show a significant decrease in the mean book-to-market ranking from QTR_{-9m} to QTR_{-6m} and a significant decrease in mean and median rankings from QTR_{-6m} to QTR_{-3m} suggesting that the trend as replacement approaches is towards lower book-to-market or growth stocks. Comparing the rankings in the pre-and-post replacement periods, there is a significant decrease in the mean and median book-to-market rankings from HY_{-12m} to HY_{+12m}. This suggests that again the trend is toward lower book-to-market or growth stocks with the arrival of the new investment manager. This is supported by the quarterly results.

Examining the results of the NP sample in Table 8 indicates significant decreases in only the mean and median momentum rankings from Year-1 to Year +1. This suggests that the

departing manager is more likely to have held stocks which were past winners whilst the new manager is unlikely to select stocks based on past out-performance. This is further emphasized when examining half-yearly and quarterly results. There are significant decreases in the mean momentum ranking from HY_{-6m} to HY_{+6m}. There are also significant decreases in mean and median momentum rankings from QTR_{-6m} to QTR_{+6m} and QTR_{-3m} to QTR_{+6m}.

The analysis now turns to the examination of the stock preferences for investment managers in the PP sample. In terms of size, the results indicate no significant change in size rankings when comparing pre-and-post replacement periods. In terms of book-to-market rankings, there is a significant increase in the average book-to-market ranking for the PP sample from year 0 to year 1indicating the new investment managers' preference towards higher book-to-market or value stocks. This result is also consistent when examining the average book-to-market rankings of the half-yearly results with significant increases from HY_{-12m} to HY_{+6m}, HY_{-12m} to HY_{+12m}, HY_{-6m} to HY_{+12m} and significant increases in mean and median book-to-market rankings from HY_{+6m} to HY_{+12m}.

In terms of momentum rankings the yearly results do not indicate a particular preference. The half-yearly results on the other hand indicate significant decreases in mean and median values when comparing pre-and-post replacement periods i.e. from HY_{-12m} to HY_{+6m}, HY_{-6m} to HY_{+6m} and a significant decrease in mean ranking from HY_{-12m} to HY_{+12m}. This suggests that the new investment manager is less reliant on momentum strategies.

The results of the PP sample in terms of stock preferences are inconsistent with hypothesis that the new investment managers of superior performing funds would tend to invest in stocks with similar characteristics to that of the departing manager. The above results indicate that when comparing pre-and-post replacement periods, there are significant decreases in size and

momentum rankings. However, this change in preferences has resulted in no change in performance. Overall the results suggest the departing investment managers in the NP sample have a preference towards larger, growth stocks and a preference towards momentum strategies but are unable to select and exploit momentum stocks whilst the incoming investment managers do not show any particular size preferences, again prefer growth stocks, do not rely on momentum strategies.

VI. Conclusion

This study examines the relationship between top management turnover (i.e. the head of equities) and fund performance utilising a unique database of monthly portfolio holdings of active Australian equity funds. Our study extends the important work of Khorana (2001) by providing a finer unit of observation in understanding how managers alter the portfolio's design surrounding managerial replacement in the period 1994 to 2002.

We find that poorly performing active managers in the pre-replacement period have a preference toward larger, growth-oriented stocks, as well as securities with past period price momentum. Prior to replacement, underperforming managers also hold more concentrated portfolios and engage in significant higher portfolio turnover, suggesting these managers position their portfolios to take larger bets relative to the benchmark in the hope of reversing the portfolio's poor performance. Subsequent to replacement of top management we find that previously poor performing funds experience improved returns. However this improved performance is not attributable to superior stock selection skill but rather due to mean reversion in returns. While there is no evidence of improved stock-selection ability, there is evidence of differences in portfolio characteristics between the newly arriving and departing

fund manager**.** The new manager decreases the portfolio's concentration and is significantly less reliant on the execution of momentum strategies.

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TABLE 1

Performance in the pre-and-post managerial replacement years

		Year-1	Year+1	Change
1-Factor Alpha	NP	-0.315	0.134	0.499**
(in % per month)		*-0.293*	*0.225*	*0.514*
	PP	0.475	0.055	-0.369
		0.478	*-0.066*	*-0.379*
4-Factor Alpha	NP	-0.367	0.100	0.506**
(in % per month)		*-0.319*	*0.211*	*0.419**
	PP	0.404	0.034	-0.324**
		0.371	*0.055*	*-0.167*
Objective Adjusted Return	NP	-4.703	1.461	7.369**
(in % p.a.)		*-3.572*	*2.859*	*8.367**
	PP	6.383	0.530	-5.519
		6.471	*-1.207*	*-6.116*
DGTW - holdings	NP	-0.147	0.096	0.137
(in % per month)		*-0.151*	*0.368*	*0.419*
	PP	0.496	-0.202	-0.686
		0.388	*-0.318*	*-0.706****
DGTW – purchases (t)	NP	0.004	0.065	0.059*
(in % per month)		*0.002*	*0.028*	*0.012**
	PP	0.085	-0.033	-0.124
		0.050	*-0.008*	*-0.059*
DGTW – purchases (t+1)	NP	-0.057	-0.127	-0.092
(in % per month)		*-0.044*	*-0.030*	*0.014*
	PP	-0.071	-0.122	-0.067
		0.038	*-0.064*	*-0.175*
DGTW – sales (t)	NP	0.029	0.044	0.021
(in % per month)		*0.006*	*-0.034*	*-0.031*
	PP	0.013	-0.003	-0.009
		0.001	*0.013*	*0.029*
DGTW – sales (t+1)	NP	-0.072	-0.074	0.012

(in % per month)		*-0.068*	*-0.043*	*0.031*
	PP	0.017	0.015	-0.009
		0.018	*0.020*	*-0.006*
GT	NP	0.086	0.206	0.371*
(in % per month)		*0.063*	*0.106*	*0.231**
	PP	0.264	0.204	-0.090
		0.160	*0.123*	*-0.297*

This table presents the mean and median (represented in italics) performance of actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. The nine performance measures used are the 1-factor alpha, the 4-factor alpha based on Carhart's 4-Factor model, and the Objective-Adjusted return (performance of the fund relative to its benchmark) as defined by Khorana (2001), the DGTW holdings measure based on value-weighted characteristic-based benchmarks (DGTW, 1997), the two DGTW purchases measures (the first using the current month returns and the second using the subsequent month's returns), the two DGTW sales measures (the first using the current month returns and the second using the subsequent month's returns) and the GT measure based on Grinblatt and Titman (1993). NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. The 1-factor and 4-factor alphas, the DGTW measures and the GT measure are reported on a monthly basis while the OAR is reported in annual terms. Year-1 is the 12 month period prior to the managerial replacement month. Year+1 is the 12 month period after the replacement month. The change (i.e. difference) in mean and median levels of performance over different years is given in the last column. In order to test the significance of the changes in performance at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively.

TABLE 2

Changes in Performance and Managerial Replacement (half-yearly)

		HY_{-12m} to HY_{-6m}	HY_{-12m} to HY_{+6m}	HY_{-12m} to HY_{+12m}	HY_{-6m} to HY_{+6m}	HY_{-6m} to HY_{+12m}	HY_{+6m} to HY_{+12m}
DGTW - holdings	NP	0.551	0.035	1.180 **	-0.516	0.014	0.541
(in % per month)		*0.341*	*0.204*	*1.752* **	*-0.137*	*0.473*	*0.991*
	PP	-0.488	-1.197 ***	-0.882 **	-0.503	-1.026 **	-0.077
		-0.652	*-0.811* ***	*-0.344* **	*-0.122*	*-0.949* **	*-0.055*
DGTW – purchases (t)	NP	0.047	0.023	0.157 **	-0.032	0.087 *	0.133 **
(in % per month)		*0.021*	*0.000*	*0.110* ***	*-0.033*	*0.060* ***	*0.097* **
	PP	0.002	-0.240 *	0.003	-0.197	-0.076	0.184
		-0.046	*-0.099* ***	*-0.064*	*-0.027*	*-0.043*	*-0.014*
DGTW – purchases (t+1)	NP	-0.005	-0.036	-0.123	-0.002	-0.190	-0.223
(in % per month)		*-0.027*	*-0.028*	*0.015*	*-0.003*	*0.040*	*-0.014*
	PP	-0.193	-0.185	-0.125 **	0.036	0.128	-0.018
		-0.008	*-0.091*	*-0.068* **	*-0.013*	*-0.075*	*-0.106*
DGTW – sales (t)	NP	-0.059	-0.029	0.011	0.030	0.111	0.040
(in % per month)		*-0.070*	*-0.044*	*-0.124*	*0.026*	*0.006*	*-0.087*
	PP	-0.007	-0.147	0.065	-0.108	0.097	0.297
		-0.001	*-0.029*	*-0.055*	*-0.025*	*-0.003*	*0.015*
	NP	-0.050	0.011	-0.056	0.062	0.014	-0.052

DGTW – sales (t+1)												
(in % per month)		*-0.025*		*-0.033*		*-0.021*	*-0.008*	*	*0.013*	*0.005*		
	PP	0.036		0.045		-0.034	0.005		-0.014	-0.018		
		0.023		*0.020*		*-0.043*	*-0.013*		*-0.027*	*0.020*		
GT	NP	0.328	**	0.384	*	0.579	-0.087		-0.149	-0.216		
(in % per month)		*0.303*	*	*0.166*		*0.033*	*-0.237*		*-0.178*	*-0.171*		
	PP	0.236		-0.374	*	0.590	-0.610	*	0.219	0.796	*	
		-0.048		*-0.431*		*0.149*	*-0.383*		*-0.327*	*0.485*		

This table presents the changes in mean and median (represented in italics) performance of actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. The seven performance measures used are the Objective-Adjusted return (performance of the fund relative to its benchmark) as defined by Khorana (2001), the DGTW holdings measure based on value-weighted characteristic-based benchmarks (DGTW, 1997), the two DGTW purchases measures (the first using the current month returns and the second using the subsequent month's returns), the two DGTW sales measures (the first using the current month returns and the second using the subsequent month's returns) and the GT measure based on Grinblatt and Titman (1993). NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. The DGTW measures and the GT measure are reported on a monthly basis while the OAR is reported in six-monthly terms. HY_{-12m} is the first six-month period in the 12 months prior to the replacement month. HY_{-6m} is the second six-month period in the 12 months prior to the replacement month. HY_{+6m} is the first six-month period in the 12 months after the replacement month. HY_{+12m} is the second six-month period in the 12 months after the replacement month

TABLE 3

Portfolio Risk and Concentration in the pre-and-post managerial replacement years

		Year-1	Year+1	Change
Tracking Error	NP	4.999	4.557	-1.359
(in % p.a.)		*3.534*	*3.169*	*-2.374*
	PP	3.677	3.930	0.104
		3.686	*3.846*	*0.042*
Number of Securities	NP	53	59	3*
(per month)		*47*	*56*	*7*
	PP	51	60	4*
		46	*48*	*0*

The table presents the mean and median (represented in italics) portfolio concentration measures for actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. Portfolio concentration is measured in two ways i.e. tracking error and number of securities. Tracking error is the standard deviation of portfolio returns in excess of the portfolio's relevant benchmark. NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. Year-1 is the 12 month period prior to the managerial replacement month. Year+11 is the 12 month period after the replacement month. The table also presents the changes (i.e. difference) in mean and median concentration measures between years. In order to test the significance of the changes in portfolio concentration at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively.

TABLE 4

Panel A: Portfolio Concentration in the pre-and-post managerial replacement half-years

		HY_{-12m}	HY_{-6m}	HY_{+6m}	HY_{+12m}
Tracking Error	NP	2.870	3.868	2.437	3.928
(in % per six months)		*1.831*	*2.999*	*2.046*	*2.109*
	PP	2.668	2.649	2.497	2.640
		2.754	*2.496*	*2.420*	*2.882*
Number of Securities	NP	52	53	54	60
(per month)		*49*	*45*	*51*	*59*
	PP	51	59	61	60
		48	*53*	*48*	*47*

Panel A in this table presents the mean and median (represented in italics) portfolio concentration measures for actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. Portfolio concentration is measured in two ways i.e. tracking error and number of securities. Tracking error is the standard deviation of portfolio returns in excess of the portfolio's relevant benchmark. NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred.
HY-6m is the second six-month period in the 12 months prior to the replacement month.
HY+6m is the first six-month period in the 12 months after the replacement month.
HY+12m is the second six-month period in the 12 months after the replacement month.

Panel B: Changes in Concentration and Managerial Replacement (half-yearly)

		HY_{-12m} to HY_{-6m}		HY_{-12m} to HY_{+6m}		HY_{-12m} to HY_{+12m}		HY_{-6m} to HY_{+6m}		HY_{-6m} to HY_{+12m}	HY_{+6m} to HY_{+12m}
Tracking Error	NP	0.997	**	-0.592		0.707		-1.670	**	-0.709	1.756
(in % per six months)		*1.168*	*	*0.164*		*0.226*		*-1.952*		*-2.970*	*0.117*
	PP	-0.103		0.028		0.104		-0.111		-0.265	-0.291
		-0.396		*-0.247*		*0.128*		*-0.050*		*0.386*	*0.148*
Number of Securities	NP	0		2	**	4	**	2		4	2
(per month)		*-4*		*2*	**	*7*	**	*6*		*12*	*5*
	PP	0		2		5	**	0		0	0
		-3		*-4*		*0*		*-6*		*-2*	*-1*

Panel B of Table 4 presents the changes in mean and median concentration measures over different periods. In order to test the significance of the changes in portfolio concentration at the mean and median levels, a paired t-test and the Wilcoxon signed rank test are used respectively.
*, **, *** represent statistically significant differences at the 10%, 5%, and 1% levels respectively

TABLE 5

Portfolio Turnover and Managerial Replacement (yearly)

		Year-1	Year+1	Change
Turnover	NP	0.745	0.907	0.127
		0.666	*0.860*	*0.071*
	PP	0.625	0.753	0.182
		0.667	*0.637*	*0.044*

NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. Year-1 is the 12 month period prior to the managerial replacement month. Year+1 is the 12 month period after the replacement month. The table presents the levels and changes of portfolio turnover for the given years surrounding top management replacement. In order to test the significance of the changes in portfolio turnover at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively. *, **, *** represent statistically significant differences at the 10%, 5%, and 1% levels respectively

TABLE 6

Panel A: Portfolio Turnover in the pre-and-post managerial replacement half-years

		HY_{-12m}	HY_{-6m}	HY_{+6m}	HY_{+12m}
Turnover	NP	0.338	0.391	0.418	0.474
		0.318	*0.362*	*0.430*	*0.445*
	PP	0.331	0.357	0.429	0.311
		0.312	*0.339*	*0.357*	*0.292*

Panel B: Changes in Portfolio Turnover and Managerial Replacement (half-yearly)

		HY_{-12m} to HY_{-6m}		HY_{-12m} to HY_{+6m}		HY_{-12m} to HY_{+12m}		HY_{-6m} to HY_{+6m}		HY_{-6m} to HY_{+12m}	HY_{+6m} to HY_{+12m}	
Turnover	NP	0.053	*	0.080	*	0.132	*	0.027		0.056	0.034	
		0.044		*0.112*		*0.147*		*0.068*		*0.074*	*0.010*	
	PP	0.037	**	0.110		0.061	**	0.066		-0.005	-0.124	*
		0.036	*	*0.077*	**	*0.031*		*0.017*	*	*-0.056*	*-0.057*	

The table presents the mean and median (represented in italics) portfolio turnover for actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. HY_{-12m} is the first six-month period in the 12 months prior to replacement. HY_{-6m} is the second six-month period in the 12 months prior to the replacement month. HY_{+6m} is the first six-month period in the 12 months after the replacement month. HY_{+12m} is the second six-month period in the 12 months after the replacement month. Panel A presents the levels of portfolio turnover for the given periods surrounding top management replacement. Panel B presents the changes (i.e. difference) in mean and median levels of portfolio turnover over different periods. In order to test the significance of the changes in portfolio turnover at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively. **, *** represent statistically significant differences at the 10%, 5%, and 1% levels respectively

TABLE 7

Stock preferences in the pre-and-post managerial replacement years

		Year-1	Year+1	Change
Size	NP	0.826	0.802	-0.010
		0.840	*0.803*	*-0.014*
	PP	0.814	0.809	0.000
		0.838	*0.820*	*-0.009*
Book-to-Market	NP	0.476	0.475	-0.009
		0.465	*0.451*	*-0.018*
	PP	0.435	0.469	0.031**
		0.454	*0.449*	*-0.006*
Momentum	NP	0.618	0.578	-0.048**
		0.622	*0.591*	*-0.071*
	PP	0.616	0.583	-0.023
		0.630	*0.603*	*0.016*

The table presents the mean and median (represented in italics) stock preference rankings for actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. The stock preferences examined are size, book-to-market, momentum and volatility. NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. Year-1 is the 12 month period prior to the managerial replacement month. Year+1 is the 12 month period after the replacement month. The table presents the level of the stock preference rankings for the given years surrounding top management replacement and the changes (i.e. difference) in mean and median stock preference rankings over different years. In order to test the significance of the changes in stock preferences at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively.

TABLE 8

Panel A: Stock preferences in the pre-and-post managerial replacement half-years

		HY_{-12m}	HY_{-6m}	HY_{+6m}	HY_{+12m}
Size	NP	0.807	0.826	0.815	0.802
		0.856	*0.840*	*0.826*	*0.803*
	PP	0.846	0.819	0.822	0.808
		0.856	*0.842*	*0.824*	*0.825*
Book-to-Market	NP	0.500	0.476	0.475	0.475
		0.463	*0.465*	*0.473*	*0.451*
	PP	0.424	0.433	0.442	0.465
		0.438	*0.453*	*0.426*	*0.446*
Momentum	NP	0.617	0.618	0.589	0.578
		0.653	*0.622*	*0.625*	*0.591*
	PP	0.677	0.616	0.570	0.599
		0.697	*0.630*	*0.556*	*0.605*

Panel B: Changes in Portfolio Preferences and Managerial Replacement (half-yearly)

		HY_{-12m} to HY_{-6m}		HY_{-12m} to HY_{+6m}		HY_{-12m} to HY_{+12m}		HY_{-6m} to HY_{+6m}		HY_{-6m} to HY_{+12m}		HY_{+6m} to HY_{+12m}	
Size	NP	0.019	**	0.008		0.019		-0.012		-0.010		0.001	
		-0.016		*-0.030*		*0.004*		*-0.014*		*-0.014*		*-0.004*	
	PP	-0.014		-0.012		-0.011		-0.002		-0.001		-0.005	
		-0.006		*-0.021*		*-0.022*		*-0.021*		*-0.008*		*0.005*	
Book-to-Market	NP	-0.023	**	-0.025		-0.044	*	-0.002		-0.009		0.008	
		0.002	*	*0.010*		*-0.048*	**	*0.008*		*-0.018*		*0.020*	
	PP	0.005		0.022	**	0.031	**	0.012		0.028	**	0.019	**
		0.011	*	*-0.014*	**	*-0.008*	*	*-0.026*		*-0.009*	*	*0.007*	*
Momentum	NP	0.001		-0.028		-0.016		-0.030	*	-0.048	**	-0.049	***
		-0.031		*-0.029*		*-0.037*		*0.002*		*-0.071*	*	*-0.039*	**
	PP	-0.059	**	-0.106	***	-0.069	**	-0.043	*	-0.009		0.014	
		-0.055	***	*-0.153*	***	*-0.028*		*-0.065*	*	*0.023*		*0.018*	
Volatility	NP	0.001		0.010		0.021		0.009		0.008		0.004	
		-0.028		*-0.033*		*0.009*		*-0.006*		*0.018*		*-0.002*	
	PP	0.025		0.023	**	0.044	**	0.001		0.000		0.001	
		0.000		*0.032*	*	*0.064*	**	*0.043*		*0.057*		*0.024*	

The table presents the mean and median (represented in italics) stock preference rankings for actively managed Australian equity funds that experienced managerial replacement in the period January 1994 to June 2002. The stock preferences examined are size, book-to-market, momentum and volatility. NP (PP) refers to funds that experienced negative (positive) objective-adjusted returns in the 12-month period prior to the month in which replacement occurred. HY_{-6m} is the second six-month period in the 12 months prior to the replacement month. HY_{+6m} is the first six-month period in the 12 months after the replacement month. HY_{+12m} is the second six-month period in the 12 months after the replacement month. Panel A presents the stock preference rankings for the given periods surrounding top management replacement. Panel B presents the changes (i.e. difference) in mean and median stock preference rankings over different periods. In order to test the significance of the changes in stock preferences at the mean and median levels, a paired *t*-test and the Wilcoxon signed rank test are used respectively. *, **, *** represent statistically significant differences at the 10%, 5%, and 1% levels respectively.