Do the trades and stockholdings of fund managers reveal private information?*

Matt Pinnuck
Department of Accounting
University of Melbourne
Parkville 3010 Australia
Fax (61 3) 8349 2397 Tel (61 3) 8344 7539
e-mail: m.pinnuck@ecomfac.unimelb.edu.au

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Abstract

This paper examines the performance of the stock holdings and trades of a sample of Australian fund managers over the period from 1990 to 1997. When stockholdings are observable, performance measures can be constructed that are much more precise than traditional performance measures that examine the net fund return. We find the stocks held by fund managers realise abnormal returns consistent with there being some stock-selection ability across fund managers. As a more powerful examination of the private information possessed by fund managers we also examine the performance of trades. We find that the stocks they buy realise abnormal returns and the precision of the information is greater for large buy trades relative to small buy trades. For sell trades we find no evidence of abnormal returns, which suggests that fund managers do not possess superior information in regard to bad news. Overall the results, in contrast to the general consensus from traditional performance studies that fund managers do not possess superior information, are consistent with fund managers possessing superior information.

I. Introduction

In this paper we examine the performance of both the *stock holdings* and *trades* of Australian fund managers using a unique data base of their monthly equity portfolio holdings over the period from 1990 to 1997. This approach to fund performance measurement stands in contrast to the traditional fund performance methodology of employing time-series factor regressions where the unit of observation is the actual bottom-line returns that investors realise from holding the mutual funds. The general consensus from traditional fund manager studies is that the net return of the active fund manager industry does not outperform a passive benchmark (see, e.g., Jensen (1968), Elton et al (1993) Malkiel (1995), Gruber (1996) and Carhart (1997)) [1]. This suggests the resources employed by fund managers are largely wasted. However, it is possible that traditional approaches that use the net returns of funds as the unit of observation are not sufficiently powerful to detect any superior information that fund managers may possess.

In contrast to traditional performance studies, recent studies by Daniel, Grinblatt, and Titman and Wermers (1997), hereafter DGTW (1997), and Wermers (2000) take a somewhat different approach and examine the performance of the individual stocks held in fund manager portfolios. They argue an examination of the performance of the stocks held by fund managers enables more powerful tests of the stock selection abilities of fund managers[2]. The few existing studies that employ this approach present results consistent with fund managers having the ability to choose stocks that

[1] The empirical evidence in this fund performance literature of negative average abnormal net return all use a CAPM or multi-factor benchmark and conclude that the average risk-adjusted net return is on the order of –150 to –300 basis points per year.

[2] A more extended discussion of the power of transaction data to measure performance appears in Section II

outperform their benchmarks before any expenses are deducted. These results from studies of the performance of stocks in a fund managers portfolio stand in direct contrast to the long-standing evidence from traditional performance studies which suggest fund managers do not possess superior information. As a consequence, as Wermers (2000) notes, the reported results are somewhat controversial.

In this paper, with a unique new database of monthly portfolio holdings, we provide further evidence in relation to the performance of *stocks held* by fund managers. The data is unique in several respects and allow us to contribute to this new emerging stream of research in several ways. First, as the few existing studies use the same US fund data set, we provide the first out of sample evidence of the performance of fund manager stock holdings. Second, we use monthly portfolio data in contrast to the few existing studies (DGTW (1997) and Wermers (2000)) that have only had available quarterly data to examine the performance of stocks held by funds. Third, we directly remove that component of the portfolio that is attributed to market timing decisions. These last two features of our study significantly increase the power over existing studies to detect superior information should it exist.

The final contribution of this paper is that in addition to examining the performance of *stock holdings* we also examine the performance of fund manager *trades*. Following Chen, Jegadeesh and Wermers (2000), an examination of trades, as distinct from holdings, is motivated as a more direct and powerful empirical test of the premise that fund managers are informed investors. Further, an examination of trades allows us to provide insights into the nature of private information possessed by fund managers; for example good versus bad news. Wermers et. al. examined the aggregate or

collective trades of all fund managers. In this study, however, we examine the individual trades of each fund manager which we argue is a more powerful metric to determine the existence of superior information by fund managers.

We find the following results in this paper. First, stocks held by fund managers on average realise abnormal returns. Second, when we examine fund manager trades we find stocks that are purchased by fund managers on average realise abnormal returns whereas stocks sold do not. Finally, when we classify trades by size we find it is only the large purchase trades that realize abnormal returns. The size of the abnormal returns are of a similar magnitude to those reported by DGTW (1997). Both the existence and magnitude of the abnormal returns give support to the conclusion from DGTW (1997) that fund managers do possess superior information.

The remainder of the paper is set out as follows. In the next section we set out the advantages of using portfolio stock holding data to examine the performance of fund managers over more convential approaches. In the third section we establish how we contribute to existing research that has examined the performance of fund manager stock holdings. In the fourth section we set out the performance evaluation methodology used in this study as a consequence of being able to observe portfolio stock holding. The construction of the database is discussed in section five. Empirical findings are presented in section six. The conclusion to the paper is section seven.

II. Motivating the Performance Measurement of Stock holdings

Following DGTW (1997) in this paper we assess the performance of fund managers through an examination of the abnormal return performance of the stocks they hold

and the stocks they trade. This approach stands in contrast to traditional methods which assess the performance of mutual funds by employing time-series factor regressions where the unit of observation is the actual bottom-line returns that investors realise from holding the mutual funds. As argued by DGTW (1997) and Metrick (2000) and discussed by Choi (2000) and others, this approach has several flaws. Firstly, the difficulty with interpreting the alpha's from factor-model regressions is the estimated alphas and betas are biased when factor loadings are correlated with factor realizations (see also Grinblatt and Titman (1995)). Secondly, 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. Thirdly, factor-model regressions restrict the relationship between expected returns and stock characteristics to be linear, which Lyon, Barber and Tsai (1998) argue is inappropriate. Fourthly, the methodology of factor regressions assumes no interaction between factors, an assumption which Loughran (1997) shows is inappropriate.

In contrast to the more traditional methods of evaluating portfolio performance that use as their unit of analysis the actual bottom-line returns of the funds, DGTW (1997) develop a methodology that examines the performance of the individual stocks held by funds. This approach addresses the flaws of the traditional factor regressions. Specifically, DGTW develop a characteristic-based measure which measures fund performance by comparing the actual return of each stock held against a expected return given by a benchmark portfolio matched to the stock on the basis of size, book-to-market ratio, and momentum characteristics. Each individual stock held by the fund is matched to a benchmark portfolio that is closest to it in terms of these

characteristics. DGTW matched on these characteristics because past research has shown that these are the best ex ante predictors of cross-sectional patterns in common stock returns[3]. The difference between the stock's actual return and the return of the matching benchmark portfolio is the stock's abnormal return.

This methodology has a number of advantages. Firstly, it allows precise characterisation of the style used by the fund manager at all times in choosing stocks, which allows the precise design of benchmarks. 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 corresponding shift in the matching reference portfolio return. In addition, the matching portfolio will also account for any timing across different factor loadings. Finally, there is no restriction on the relationships between bin's returns. Recently, DGTW (1997), 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 a researcher who has transaction data should use the characteristic-matching model, as it is more powerful than a factor model.

Stockholding data also has a number of other advantages over net returns for performance evaluation in addition to those documented above. Portfolio holdings allow hypothetical returns to be generated that do not include the expenses, fees, and trading costs that reduce the actual mutual fund returns employed in traditional studies. As DGTW observe, although the hypothetical returns overestimate the returns from holding funds, they are appropriate in examining whether fund managers have

[3] See Fama and French (1993, 1996), Jegadeesh and Titman (1993), and Daniel and Titman (1997). Evidence consistent with Fama and French (1993) has been presented for the Australian equity market

any stock selection abilities, since they are compared to a benchmark that also ignores transaction costs. Secondly, it is possible to remove cash and bond holdings, and thus their contribution to the performance of the fund. Fund studies employing the net return include in the calculation of performance the performance of any non-stock holding during the sample period. As a consequence, the reported under performance of the average fund may in large part be due to the under performance of non-stock holding during the sample period.

III. Contribution to existing research

We make four main contributions to the existing research that has assessed the performance of fund manager stock holdings. First, we provide out-of-sample evidence. The existing research that has examined and reported the remarkable result[4] that fund manager stockholdings exhibit superior performance is restricted to a few papers that use the same single dataset of US fund managers purchased from an external vendor (Grinblatt and Titman (1993), Daniel, Grinblatt, Titman and Wermers (1997), Wermers (2000)). As Wermers (1997) notes, this dataset, as with any dataset, is not without the possibility of errors and biases. This is the first study to provide out of sample evidence on the performance of stock holdings employing a data set independent from existing studies in both fund manager population and construction.

The second contribution is in this study we use monthly data to examine the performance of fund manager holdings in contrast to the prior studies that have employed datasets in which the fund manager holding is only observed at quarterly

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Halliwell, Heaney and Sawicki (1999)

[4] It is remarkable in the sense it stands in contrast to the long-standing evidence from traditional performance studies which suggest fund managers do not possess superior information.

intervals. The prior studies have used the beginning of calender quarter holdings of a fund as a proxy for its holdings at each month end throughout the quarter (ie they use the March quarter holdings as a proxy for the funds unknown holdings holdings at April and May month end). The consequence of this is, as Wermers (1998) and Moskowitz (2000) note, the studies may be using quarterly holdings as opposed to the true holdings to measure performance. This has two effects.

First it adds noise to the true performance as the quarterly holdings proxy for the intervening months may have insufficient covariance with the fund managers true month by month holdings. This biases the measure towards detecting no evidence of performance. To see the effect of this simply consider a fund that revises its stock weight once within the quarter to achieve superior performance for the remainder of the quarter (period *m*). Therefore studies that use the stock holding at the commencement of quarter which may be uncorrelated with stock price performance over the period *m* bias the performance measure towards zero.

Secondly there may be a systematic difference between the characteristics of the stock holdings in quarter end portfolio and the portfolio holdings in the between quarter month ends, due to fund reporting biases. Moskowitz (2000) argues that fund reporting biases such as window dressing operations or tax motivated trading may result in quarter end reported portfolio holdings being systematically different from intervening monthly portfolio holdings not reported. Thus the returns attributable to quarter end portfolios may not be representative of the typical fund portfolio. As a consequence Moskowitz (2000) suggests the existing stock holding performance results may be spurious as they may be driven by agency phenomena (such as window

dressing) that are not being properly accounted for. This is the first study to examine the performance of monthly holdings and we thus address concerns associated with performance results that have only been able to examine the performance of stock holdings observed at quarterly intervals.

The third contribution is that we directly remove the component of the portfolio associated with market timing. Over the period under investigation there is no externally imposed restrictions prohibiting Australian fund managers from using derivatives and it is industry practice for Australian fund managers to use index futures to time the market. As a consequence of being able to observe the portfolio holdings of a sample of fund managers who time the market using index futures and cash we can directly remove the timing component of a fund's performance and the noise associated with it in examining stock selection ability[5]. The data set thus does not require an explicit control for the effects of market timing and we are able to directly examine the stock selection ability of fund managers without the measurement error associated with market timing activities. In contrast to Australian fund managers it appears US fund managers face restrictions in their use of derivatives and they thus they may time the market through physical equity and cash holdings. To the extent the equity stock holdings are used to time the market this may have added some noise to the examination of the US fund's stock selection abilities.

[5] It is well documented that performance metrics that do not take into account a fund's market timing activities yield negative biased inferences regarding fund managers ability to select mispriced stocks (see Jensen (1972), Grinblatt and Titman (1995)). Thus the distinction between timing and selectivity is important in that it is generally more difficult to evaluate performance when there is timing ability contributing to total performance. There are several procedures that have been proposed to correct for the bias induced by the effect of timing ability (Trenyor and Mazuy (1966) and Merton (1981)). However as Grinblatt and Titman (1995) discuss although adjustment for performance developed with these approaches provides a reasonable estimate of whether timing exists or not; the actual contribution of selectivity ability to portfolio returns will be estimated with bias.

The final contribution of this paper is that we examine the performance of the fund manager using two distinct units of observation: *fund stock holdings* and *fund trades*. An examination of the performance of stock holdings measures the performance return on the stocks held in the fund manager's portfolio as at each month end. This is the standard unit of observation employed in prior fund performance research. We also investigate the performance return to fund manager *trades*. Specifically we determine whether stocks that are bought by fund managers tend to outperform relevant benchmarks over a subsequent period and those that are sold tend to underperform.

Following Chen, Jegadeesh and Wermers (2000) we examine trades, as distinct from holdings, to understand the performance of fund managers because an analysis of trades is a more direct and powerful empirical test of the premise from that fund managers are informed. The main proposition from standard theoretical models of informed trade (ie Grossman and Stiglitz [1980]) is that investors will trade when the marginal benefit of doing so equal or exceeds the marginal cost of the trade (including the cost of gathering information). Consistent with the intuition that fund manager will only trade when there is a net marginal benefit to doing so, Chen, Jegadeesh and Wermers (2000), argue the trade of a stock by a fund likely represents a stronger manager opinion about the value of that stock than the passive decision of holding the existing position in the stock. They suggest a fund manager may continue to hold a stock for reasons other than future abnormal performance because of the frictions involved in trading stocks. These frictions include both explicit trading costs as well

as more implicit costs such as 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 possessed by fund managers and thus trades provide the more powerful evidence of the information fund managers possess about future returns.

Chen et al (2000) examine the performance of the trades in stocks executed by fund managers as a group and they find that stocks that are purchased by the fund managers as a group have significantly higher returns than stocks sold. However they focus on the aggregated trade in stock *i* by all fund managers taken together as a group. Specifically they measure trades, as the change in the fraction of total equity value in stock *i* held by all fund managers as a group from the beginning to the end of quarter *t*. This metric examines whether the consensus opinion of the entire fund management industry represents superior information about the value of a stock. This approach does not provide any evidence on the performance of the individual trades of each fund manager. Consequently they are unable to conclude on whether the individual trades of each fund manager, on average, perform well. This is the focus and contribution of our study.

It has been shown that multiple traders with identical private information (for example from conference calls), result in prices quickly incorporating private information (Holden and Subrahmanyam [1992] and Foster and Viswanathan [1996]). In contrast, as discussed by Ali et al (2000) information acquired by individual fund managers through either, private communications with company officials or internal research is likely to result in only one or a few fund managers possessing the private signal. In this situation, the private information is likely to be incorporated into prices more

slowly than for the private information known to all fund managers. As a consequence individual trades of each fund manager are likely to realise greater abnormal returns than collective trades of fund managers as a group in the same stock. We therefore expect the metric we employ in this study, the individual trades of each fund manager, to provide more powerful evidence of the information possessed by fund managers than the metric employed by Chen et al (2000).

IV. Performance Evaluation Methodology with Observable Portfolio Weights

We set out below how we construct the Daniel, Grinblatt, Titman and Wermers (DGTW) Characteristic-Matching Performance Measure for this study. In addition, to address concerns that any results are due to the benchmark employed and not superior information we also employ a performance evaluation methodology proposed by Grinblatt and Titman (1993) that does not require an arbitrary model of expected returns. This is also set out below.

A. Daniel, Grinblatt, Titman and Wermers (DGTW) Characteristic- Matching Performance Measure

In this paper two slightly modified DGTW benchmarks are constructed. One set of benchmark portfolios are constructed for the characteristic's size and book-to-market only. A second set of benchmark portfolios are constructed for the characteristic's size and book-to-market and momentum. The two benchmarks allows performance to be measured with and without an adjustment for momentum.

The size/book-to-market benchmark based portfolios are constructed as follows. Beginning in December 1989 and each following December 31, I place each stock in

the AGSM Price Relative File, that satisfied the data requirements[6], into size and book-to-market portfolios. The composition of each portfolio is determined as follows. Each December, the universe of stocks is first sorted into quintiles based on each firm's market value of equity as at each December month end. Then firms in each size quintile are further sorted into quartiles based on their book-to-market ratio. Size is computed at December month-end, and the book-to-market ratio is calculated as a stock's most recent fiscal year's book value of equity divided by December market value of equity[7]. Stocks that do not possess the required measures of bookequity are excluded. The returns of each of these 20 size/book-to-market portfolios are calculated by value-weighting the stocks in the portfolio.

The size/book-to-market/momentum benchmark based portfolios are constructed by including a momentum characteristic in the construction of the bins. We approach this by sorting firms in each of the 20 size/book to market portfolios constructed above into a further three portfolios based on their preceding twelve month return calculated through to the end of November. This gives a total of 60 size/book-to-market/momentum portfolios.

The two sets of constructed benchmark portfolios are then used to calculate two DGTW performance measures. Each stock held by the fund manager in each month is matched to a benchmark portfolio according to its size and book-to-market rank or its size, book-to-market and momentum rank. The abnormal return of a particular stock is calculated by subtracting the benchmark-matched portfolios return from the stock's

[6] The criteria for inclusion are similar to DGTW (1997). Book-to-market data and monthly returns had to be available for at least two years and six months respectively prior to portfolio formation date.

return. These differenced returns are then multiplied by the portfolio weights of the fund to obtain the abnormal or benchmark adjusted returns for each of the funds for each month. The month *t* component of the DGTW measure for fund manager *j* is defined as:

$$(1) \qquad DGTW_{jt} = \sum_{i=1}^{N} \tilde{w}_{i,t-1} (\tilde{R}_{i,t} - \tilde{R}_{t}^{bi,t-1})$$

where $w_{i,t-1}$ is the portfolio weight for stock *i* at the end of month *t-1*, $R_{i,t}$ is the month *t* return of stock *i* and $R_t^{bi,t-1}$ is the month *t* return of the characteristic based passive portfolio that is matched to stock *i* during month *t-1*.

The time-series average, over all the months that a fund exists, gives the DGTW measure for that fund, calculated as $DGTW_j = \frac{\sum_{t=1}^{T} DGTW_{j,t}}{T}$.

B. The Grinblatt and Titman (1993) Measure of Performance

The measure, developed by Grinblatt and Titman (1993) [hereafter the GT Measure) uses the past portfolio weights of a given mutual fund to calculate a benchmark return for the evaluation period. The advantage of the GT measure for the abnormal return calculation is that it does not adjust returns according to a particular asset-pricing model. With this measure the benchmark used to adjust the gross return of the portfolio of fund manager *j* for its risk in a given month *t* is the month *t*'s return earned by the portfolio holdings twelve-months prior to the month *t*'s holdings. More formally the Grinblatt and Titman portfolio performance measure we employ for month *t* can be expressed as

[7] For most Australian companies this will be as the end of June. This ensures a minimum lag of six months exists between the end of the accounting period (for June fiscal year ends) and the B/M based portfolio creation date.

$$(2)\quad GT_t = \sum_{t=1}^{T}\sum_{i=1}^{N}\left[R_{it}(W_{it} - W_{i,t-k})\right]/T$$

where:

R_{it} is the security return on *i* from date *t* to *t+1*
W_{it} is the portfolio weight of security *i* at date *t*
$W_{i,\,t-k}$ is the portfolio weight of security *i* at date *t-k*
T is the number of periods

Under the null hypothesis no superior information, the change in weights from the prior period are uncorrelated with current returns. In this case the measure converges to zero. Under the alternate hypothesis that a fund manager is informed, the measure converges to the average covariance. Expression (2) will be positive for informed investors and zero for uninformed.

V. Data

A. Construction of database

Our data consists of monthly observations on the equity portfolio holdings of 35 Australian active fund managers during the period from January 1990 through to December 1997. All the portfolios are fund products whose objective was to outperform the market with a growth orientation. The portfolios have between 24 and 72 months of data. The starting date for each portfolio corresponds to the first date for which the data was gathered. The monthly equity holdings data were obtained over the period from two sources. Firstly, data was sourced from a collaborative project between the University of Melbourne and the *Australian Investment Managers' Association* (AIMA). AIMA is an industry association, which represents Australian institutional investors. This project established a database of the equity portfolio holdings at each month end of the AIMA member organisations that agreed to provide

their portfolio data[8]. Secondly, portfolio-holding data was obtained from Frank Russell Company who maintain a database of portfolio holdings of Australian fund managers.

[PLACE TABLE 1 HERE]

Table 1 shows the number of fund managers in both the sample and population in each year from 1990 through to 1997. As the table shows the sample represents on average 72% of the population over the time period examined. Table 1 also summarises the aggregated dollar value of fund manager equity holdings over the sample period showing the sample represents a large fraction of the total value of equity holdings of the population of Australian funds. The sample therefore, notwithstanding what may appear to be a small number of funds relative to a typical US study, can be taken as representative of the Australian funds management industry.

B. Construction of weights and trades

The weight of security *i* in the portfolio of the fund manager *j* at time *t* and is measured as*:*

$$(3) \qquad W_{ijt} = \frac{P_{it} H_{ijt}}{\sum_{i=1}^{N} P_{it} H_{ijt}}$$

Where P_{it} is the price of stock *i* at time *t*, H_{ijt} is the number of shares held by fund manager j in stock *i* at time *t*.

In the US, only the ordinary share holdings of fund managers are available and therefore the computation of the above metrics is straightforward. However in

[8] While all fund managers agreed to participate in the project some fund managers did not have

Australia, some fund manager's in addition to obtaining exposure to the performance of a company through ordinary shares also occasionally employ traded options.

Therefore to compute the trade of a fund manager in company *i* we need to aggregate all the security types held at time *t* in company *i* into a single unit of measurement. To determine the effective holding in a company *i* we compute the delta for each option contract held to enable us to determine the number of ordinary shares that must be bought/sold in order to have the same exposure to a small movement in the share price as the option contracts held. We will thus replace each actual position for a company in portfolio (which may for example consist of several long and short positions in puts and calls) with an instaneouesly equilivent portfolio of the underlying ordinary shares. The details as to how we approached this are discussed in the Appendix.

We measure $Trades_{itj}$ as the change in the holding in stock *i* from the beginning to the end of month *t* in fund manager *j*'s portfolio. Thus our measure of trading by fund manager *j* is defined as:

(4) $$Trade_{ijt} = w_{ijt} - w^{pt}_{ijt-1}$$

where w_{ijt} is as defined by (3) and w^{pt}_{ijt-1} is defined as:

(5) $$W^{pt}_{ijt-1} = \frac{P_{it} H_{ijt-1}}{\sum_{i=1}^{N} P_{it} H_{ijt-1}}$$

where the weights at time t-1 given by (5) reflect the portfolio holdings at t-1 which are evaluated at the same end-of-month prices as weight $w_{ijt.}$ The *Trade* metric in

available accessible records of monthly equity holdings over the period.

equation (4) therefore measures the difference between two different portfolios (at t and t-1) which are evaluated at the same end-of-month prices. Therefore w_{ijt} differs from w_{ijt-1} only because of trading from *t-1* to *t*. Intuitively, the latter value is the value of the starting portfolio if no trading took place during the month. Both holdings w_{ijt} and w_{ijt-1} are evaluated at the same prices so that there are no spurious price change effects, allowing us to separate trades from price momentum effects.

We categorise these trades as either purchases (where "purchase" stocks are all stocks with a positive *Trade* measure) or sales and construct "purchase" and "sale" portfolios and analyse their returns with performance evaluation methods. To construct the purchase portfolio, we "buy" all fund manager purchases at the closing prices on the last day of the month. We then hold these shares in portfolios for six months and measure the performance of these trades using the DGTW performance measure documented in Section IV In addition we also decompose the purchase and sale portfolios along the size of the trade. We divide trade size into low, medium and high.

VI. Performance Evaluation: Results

This section discusses the results of each of the two performance evaluation methods set out in Section IV applied to the holdings and trades of fund managers. To determine the statistical significance of the benchmark-adjusted performance for the entire sample or a sub-sample, we follow DGTW and compute *t*-statistic's based on the time-series portfolio of funds in the sample. Specifically we calculate the value of any given portfolio return invested in funds at a point in time (or in regression tests the average value of any given coefficient) for each of the *t* months in the database.

We then compare the mean of the resulting *t* values to its time-series standard error to construct the *t*-test.

We present performance measures for the holdings and trades of the fund manager's as at each month end (Month+0) over the following six months. That is we estimate performance estimates for event months extending from Month+1 through to Month+6 for portfolios with weights based the Month+0 holdings or trades of that stock by the fund manager. The returns will therefore be equalivant to the returns of a buy and hold portfolios that mimic the holdings or trades of the fund managers as at the end of month+0.

The reason for constructing a six month event window for each fund manager is that is unclear over what time period the superior information possessed by the fund manager will be revealed to the market. If fund managers have superior information that gets revealed to the market within one month, the month+1 measure provides the most power. However if information gets incorporated into market prices more slowly, then month+3 to month+6 may have more power[9].

A. Performance Evaluation Results of Holdings

[PLACE TABLE 2 ABOUT HERE]

Table 2a presents performance results using the Grinblatt and Titman (1993) measure (GT) for an equally weighted portfolio of fund managers. The results for the entire

[9] Traditional studies implicitly assume fund managers trade with a one month horizon.

sample show that the average GT performance is significantly positive in each of the three months (months+1 through +3) after the holding measurement date (month +0). The magnitude of the results (2.45% in month+1) is slightly greater to those reported by Grinblatt and Titman (1993) and DGTW (1997) of 1.93% and 1.91% respectively for the sample of US mutual funds they analyzed. The slightly greater returns reported for the Australian funds can possibly be attributed to either the bias towards zero induced into the US studies as a consequence of employing quarterly data[10] or alternatively the Australian capital market being relatively less efficient than the US market. In the months subsequent to month+3, the abnormal returns are not reliably different from zero.

As pointed out by Grinblatt and Titman (1993) the key assumption underpinning the GT measure is that the mean returns of assets are constant over the sample period. As a consequence the GT measure may spuriously indicate positive performance for funds that select stocks in time periods in which their systematic risk is temporarily high. The DGTW (1997) measure addresses these potential concerns and the results are presented in Table 2b and Table 2c. As discussed in Section III, the DGTW measure eliminates performance due to the cross-sectional differences in stock returns attributable to size and book-to-market and momentum and should not be subject to the same biases as the GT measure. Table 2b presents results using the size/book-to-market portfolios as benchmarks. Table 2c presents results using the size/book-to-market/momentum portfolios as benchmarks. The results presented in Table 2b show that the average fund has a significant positive selectivity measure in each of the three months (months+1 and month+2) after the holding measurement date (month+0). The

[10] This is reflected in the lower abnormal return in month+3 of 2.01% relative to the earlier abnormal

magnitude of the results, 3.01% in month+1, is comparable to the GT measure. The results presented in Table 2c show that the average fund after adjusting its performance for the size, book-to-market and momentum characteristics of its stocks still has a significant positive selectivity measure in the first month (months+1) after the holding measurement date (month+0). The lower magnitude of the results in month+1 (2.04%) relative to the results presented in Table 2b , and the non-significance in month+2 and month+3, is consistent with fund managers benefiting from momentum in returns. Consistent with the US studies the GT measure has smaller standard errors than the DGTW measures. The reason for the lower precision of the DGTW measure is that the benchmark for the GT measure, the current returns of a fund's historical portfolio are more highly correlated with the returns of the current portfolio than any benchmark portfolio.

In summary the results from the two performance measures examine, the GT measure and the DGTW measure, provide evidence consistent with fund managers being able to outperform the market. The magnitudes of the average annual abnormal performance indicated by the GT and DGTW test are comparable in absolute size to a typical fund manager's expenses (which range from 1.5 to 2.5%). The significance and magnitude of these abnormal returns provides out-of sample evidence supporting the controversial findings of DGTW (1997) and Wermers (2000) and support the Grossman and Stiglitz (1980) view of an efficient market that fund managers as informed investors should be able to outperform the market just enough to compensate them for there time and effort.

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returns reported for the earlier months of month+1 and month+2

For comparative purposes and completeness we also present the results for the one-factor Jensen measure[11] are presented in Table 2d. The results show over the entire sample the Jensen measure of performance is positive but insignificant. The magnitude and lack of significance of the results for this measure are consistent with prior research (see DGTW 1997). The reasons for the lower magnitude and insignificance are as documented in Section II.

B. Performance Evaluation Results: Trades

[PLACE TABLE 3 ABOUT HERE]

This section presents the results of the performance evaluation of the trades of fund managers. Table 3a presents the gross returns of stocks traded by fund managers. The gross returns indicate that returns on the Buy stocks are higher and significantly different from the returns on the Sell stocks in Months+1 through to Month+3. The magnitude of the differences (2.4% in Month+1, 4.1% in Month+2 to 3.02% in Month+3) are broadly consistent with those reported by Chen, Jegadeesh and Wermers (2000) for US mutual funds. In the months subsequent to month+3 there is no statistically significant difference between the returns on the purchased and sold stocks. Consistent with whatever good and bad news the fund manager had being impounded into prices fairly quickly by the market.

Table 3b and Table 3c present respectively the DGTW size/book-to-market and the DGTW size/book-to-market/momentum adjusted returns for stock trades by fund managers. A comparison of the reported results of Table 3c to Table 3b is consistent

[11] Using the monthly equity portfolio holdings and the AGSM returns we construct a hypothtical monthly return series for each portfolio. The hypothetical returns assume abuy-and-hold strategy during the month.

with momentum contributing to a fund managers performance. The magnitude of the results in Table 3c being approximately 1% below the comparable DGTW size/book-to-market performance results. We now focus our discussion on the implications of the reported results in Table 3c for the performance of the fund manager. The Buy stocks have statistically significant positive abnormal returns in each of the three months (months+1 through +3) after the holding measurement date (month+0). The magnitude of the results for buy trades in Month+1 of 4.4% is larger than comparable DGTW performance result for holdings in Month+1 of 2.04%. This is consistent with fund managers holding stocks beyond the time horizon they provide positive abnormal returns. The reason for this may as suggested by Chen, Jegadeesh and Wermers (2000) be to avoid high transaction costs or capital gains tax event that could accompany a stock sale.

The Sell stocks have a positive return of 0.8% in Month+1 and then negative 1.24% in Month+2 and a negative abnormal return of -0.5% in Month+3. None of the reported returns are statistically significantly different from zero. The absence of statistically significant negative abnormal returns is consistent with fund managers not possessing superior information about poorly performing stocks. The positive return of 0.8% in Month+1 is consistent with the fund manager selling stocks in Month+0 that continued to perform positively in the following month (Month+1). This behaviour is consistent with recent theoretical behavioural models and empirical evidence that investors have a tendency to sell winning investments and hold onto losing investments (Odean 1998a). Overall the evidence is consistent with the fund managers possessing good but not bad news.

[PLACE TABLE 4 ABOUT HERE]

Table 4 presents the DGTW size/book-to-market/momentum adjusted returns for buy and sell trades of fund managers classified into large, medium and small[12]. Across all Buys and Sells trade size categories fund managers only earn statistically significant superior performance in the buy large and buy medium trade size category. The stocks purchased with a larged-sized trade have positive and statistically significant abnormal returns of 4.53% in Month+1, 4.22% in Month+2 and 2.64% in Month+3. Relative to the large trades the medium size buy trades have slightly smaller statistically significant abnormal returns and larger standard errors. For the small trade size categories while the reported abnormal returns are positive and of a economically large magnitude the hypothesis of zero abnormal performance cannot be rejected at convential levels of significance as a consequence of the large standard errors. The observed approximately declining standard errors and increasing abnormal returns as the trade size increases is consistent with a central premise from standard model of informed trade that the position acquired in an information motivated trade is proportional to the precision of that information.

Across all sell trade size categories the fund managers do not realize statistically significant abnormal returns consistent with the fund managers not possessing any private bad news information.

VII. CONCLUSION AND LIMITATIONS

This paper examined the performance of the stockholdings and trades of a sample of Australian fund managers over the period from 1990 to 1997. The reported results are

consistent with the stockholdings realising abnormal performance consistent with their being some stock-selection ability across fund managers. As a more powerful examination of the private information possessed by fund managers we also examine the performance of trades. We find that the stocks they buy realise abnormal returns and the precision of the information is greater for large buy trades relative to small buy trades. For sell trades we find no evidence of abnormal returns, which suggests that fund managers do not possess superior information in regard to bad news.

While the overall results are consistent with the fund managers possessing private information and thus adding value there are two caveats to this conclusion. Firstly, in any study of performance survival bias is potentially a concern (e.g Brown et al [1992]) Brown and Goetzman [1995]). However, survivorship bias is not likely to affect the results in this paper for two reasons. Firstly, as Wermers (1997) notes the most recent studies have found survivorship bias is of a relatively small concern. Grinblatt and Titman (1989a) estimated that survivorship bias in risk adjusted returns was less than 50 basis points per year from 1975 to 1984. Wermers (1997) also finds that survivorship bias has consistently had a minimal impact on the average pre-expense performance of mutual funds. Funds surviving until 1994 exhibited an average performance only 23 basis points per year above that of all funds (surviving or not). Secondly, the magnitude of survivorship bias is a direct function of the length of the time period being examined. The time period we have examined is relatively short thus limiting the effect of any survivorship bias.

The second caveat is that care needs to be taken to take note of the possible biases in performance measures produced in samples such as ours that possess a relatively

[12] The reported results for returns adjusted only for size and book-to-market are similar in all respects to the results reported in Table 4 except to be of slightly greater magnitude reflecting the contribution

small time-series dimension. As our sample period 1990 to 1997 may not fairly represent a longer historical record it is possible our results are driven by a short sample period. However at this point in time this is the longest available time-series of monthly portfolio holding data that exists. In addition as Ferson and Khang (2000) discuss unlike returns based measures, our GT weight based measures should not be subject to biases due to long swings in the relative performance of different investment styles. This is because benchmark returns are not constructed from style indexes, but from manager's lagged weights.

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of momentum to a fund managers performance.

Appendix Computation of equalivant amount of ordinary shares for option contracts held.

As fund managers use option contracts to alter there effective ownership position in a stock, to compute the true holding in company *i* by a fund manager we need to aggregate both the ordinary share and option positions held at time *t* in company *i* into a single unit of measurement of a fund manager's holding in company *i*. The single unit of measurement should measure the fund manager's exposure to a change in wealth from a change in value of the company held. To determine the effective holding in a company *i* the holdings of all the fund managers in option contracts are expressed as the equalivant amount of ordinary shares. That is, option contract "exposure" to a company is measured on a "ordinary share equalivant" basis

To replace, in portfolio *j*, each option position with an equilivant position in ordinary shares we begin by estimating the delta of each option contract in company *I* defined as:[13]

(1) $$d_{itj} = \frac{\partial C_{i1}}{\partial S_i}$$

where

d_{ijt} is the delta of company *i* at time *t* in portfolio *j*
ΔS_i is a small change in the price of the ordinary share in company *i*
ΔC_i is the change in price of the call options in company *i*

The equilivant number of ordinary shares is then simply computed as $n_{ijt} * d_{ijt.}$ Where n_{ijt} is the number of each specific option contract shares held for company *i* at time *t*. The sign of *n* is positive if the options are owned and negative if the options have been written.

For call options, as a closed form valuation model exists, the delta is computed using the partial derivative of the Black-Scholes model modified for dividends and early exercise. For put options as there is no closed form valuation solution we numerically compute each options delta using the numerical procedures of the Cox-Rubinstien binomial pricing model. More formally for American Call Options (taking the partial derivative of the call price (C) with respect to the current stock price) the option delta is equal to $N(d_1)$. Where

(3) $$C = S_o N(d_1) - \frac{E}{e^{rT}} N(d_2)$$

(4) $$d_1 = \frac{\ln(S_o / E) + (r + 1/2\sigma^2)T}{\sigma T^{\frac{1}{2}}}$$

r = the continuously compounded riskless rate of interest per annum estimated using the rate on a 90-day Treasury Bill.
C = the current value of the option
S_o = the current price of the stock
E = the exercise price of the option
e = 2.7183
T = the time remaining before the expiration date expressed as a fraction of the year
σ = the standard deviation of the continuously compounded annual rate of return. Estimated historically using closing prices over the most recent 180 days from time *t*, the date the option contract is being valued.
$\ln(S_o/E)$ = natural logarithm of S_o/E
N(d) the value of the cumulative normal distribution evaluated at *d*

For each option contract held by the fund managers we compute the d_1 and determine the value of the cumulative normal distribution evaluated at d_1

The replacing, in portfolio *j*, each option position with an equilivant position in ordinary shares gives rise to two concerns in regard to an examination of the private information possessed by the fund manager. Firstly, while the delta is effectively a measure of the exposure to the share that is provided by the option it only applies for a *small* change in share price. This exposure will change with respect to change in time and price. Therefore if a fund manager has a information in regard to a large

[13] See Hull (1993) pp 307 for discussion of the delta of a portfolio.

change in price an establishes a share/option strategy to capture this then the delta exposed metric set out above will measure this exposure with a bias.

The second concern is that if the option pricing model we use to compute the delta is misspecified then so is the delta[14]. While we acknowledge these limitations, we assume that misspecification of the option pricing model introduces a small error into the analysis of performance relative to the errors in current asset pricing models. We adopt this view for two reasons. First, in spite of the various problems with the Black-Scholes model, from discussions with fund managers in the sample it remains widely used in practice. If we wish to obtain insight to their private information it makes sense to start with a trading model they actually use in their trading decisions. Secondly, the use of options by fund managers in the sample does not appear extensive enough to form a significant part of their returns. This suggests incorporating different option models will not qualitatively affect our results[15].

To provide some insight into the use of options by Australian fund managers we provide the following. Of the 35 fund managers in the sample only 13 use options. For these 13 fund managers Table A summarises the average number of individual stock option contracts each fund manager had over the period under examination.

[14] Even assuming the specified option model is correct there may also be inaccuracies introduced from estimation of the paramaters in the model (ie the choice of the risk-free rate proxy and the dividend adjustment [see Figlewski (1997)]

[15] In the US, as a comparison, Koski and Pontiff (1999) find that only 20% of the mutual funds in their sample of 675 equity mutual funds invest in derivatives. Further they find that the risk return characteristics of the mutual funds using derivatives are similar to the ones that do not use derivatives.

Table A Average Number of Individual Stock Options use by Australian fund managers

The table below shows both the average number of individual stock option contracts and stock in the portfolios of equity funds the sample and population over the period from 1990 to 1997.

Fund	Number of Options	Number of Stocks in Portfolio	Option contracts as a percentage of the stocks
Fund A	8	76	0.10
Fund B	2	36	0.05
Fund C	7	109	0.06
Fund D	6	39	0.15
Fund E	7	91	0.07
Fund F	16	96	0.16
Fund G	5	45	0.11
Fund H	5	53	0.09
Fund I	13	49	0.26
Fund J	5	76	0.06
Fund K	4	84	0.04
Fund L	6	122	0.04
Fund M	6	62	0.09

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Table 1 Sample and Population of Equity Fund Managers in Australia

The table below shows the number of equity funds in both the sample and population over the period from 1990 to 1997 as at 31 January each year. The population is active Australian equity fund managers. The table also contains the dollar amount of funds under management (in $AUS million)

Year	Number of Funds in the Population	Amount of Funds under Management in the population ($Mill)	Number of Funds in Sample	Amount of Funds under Management in Sample ($Mill)	Sample Number of Funds as % of Population	Samples Funds Under Management ($Mill) as % of Population ($Mill)
1990	22	760	14	507	63	67
1991	23	1,258	15	898	65	71
1992	24	1,394	17	1002	71	71
1993	28	2,350	19	1873	68	79
1994	37	2,598	32	2154	86	82
1995	40	3,053	35	2745	87	89
1996	43	4,435	35	3853	81	86
1997	48	4,401	28	2904	58	66

Table 2 Performance Estimates for Fund Managers StockHoldings (in % return per year)

Table2a GT Performance Estimates for Fund Managers (in % return per year)

In the table below we present the GT performance measure for the equally weighted time-series portfolio of funds in the sample. The GT measure is calculated by subtracting the time *t* return of the portfolio held at month *t*-13 from the time *t* return of the portfolio held at *t*-1. We report the GT performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 holdings of that stock by the fund manager. The t-statistic is based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Mean GT Return	8.6	2.45	2.52	2.01	1.10	1.32	1.42
t-stat	(8.2)**	(3.11)**	(3.08)**	(2.24)*	(1.20)	(1.43)	(1.57)
Wilcoxon-Rank z-statistic	7.7***	3.05***	2.58***	1.65*	0.44	0.06	-0.3

t-statistics are in parentheses
** indicates significance at the 1% level (one tail)
* indicates significance at the 5% level (one tail)

Table 2b DGTW Value Weighted Performance Estimates for Fund Managers (in % return per year)

In the table below we present the DGTW performance measure for the equally weighted time-series portfolio of funds in the sample. To compute the DGTW benchmark-adjusted return for a given stock during a given month, the buy-and-hold return on a value-weighted Portfolio of stocks having the same size, book-value to market-value of equity characteristics as the stock is subtracted from the stock's buy-and-hold return during the month. Each fund manager's DGTW measure, for a given month, is then computed as the portfolio-weighted benchmark adjusted return of the individual stocks in the funds portfolio (normalizing so that the weights of all stocks add to one). We report the DGTW performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 holdings of that stock by the fund manager. The t-statistics are based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
DGTW alpha	7.45	3.01	2.2	1.5	1.0	0.90	1.30
t-statistic	(7.3)**	(3.1)**	(1.87)*	(1.28)	(0.94)	(0.70)	(1.01)
Wilcoxon Rank z-statistic	6.1***	2.82	2.38	1.78	1.21	1.35	1.89

t-statistics are in parentheses

** indicates significance at the 1% level (one tail)

* indicates significance at the 5% level (one tail)

Table 2c DGTW Value Weighted Performance Estimates for Fund Managers (in % return per year)

In the table below we present the DGTW performance measure for the equally weighted time-series portfolio of funds in the sample. To compute the DGTW benchmark-adjusted return for a given stock during a given month, the buy-and-hold return on a value-weighted Portfolio of stocks having the same size, book-value to market-value of equity and momentum characteristics as the stock is subtracted from the stock's buy-and-hold return during the month. Each fund manager's DGTW measure, for a given month, is then computed as the portfolio-weighted benchmark adjusted return of the individual stocks in the funds portfolio (normalizing so that the weights of all stocks add to one). We report the DGTW performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 holdings of that stock by the fund manager. The t-statistics are based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
DGTW alpha	6.33	2.04	1.14	0.9	0.114	0.014	-0.4
t-statistic	(7.07)**	(2.25)*	(1.05)	0.79	-0.09	0.011	-0.35
Wilcoxon Rank z-statistic	6.1***	2.82	2.38	1.78	1.21	1.35	1.89

t-statistics are in parentheses
** indicates significance at the 1% level (one tail)
* indicates significance at the 5% level (one tail)

Table 2d Jensen Performance Estimates for Fund Managers (in % return per year)

In the table below we present the Jensen performance measure for the equally weighted time-series portfolio of funds in the sample. For the one-factor Jensen measure, the monthly buy and hold excess return of the funds was regressed on the time-series of monthly returns associated with a value-weighted market proxy portfolio minus T-Bills. The t-statistic is based on the time-series standard deviation.

	Event Month					
	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Jensen alpha	1.35	0.09	-0.30	-1.40	-1.20	- 0.70
t-statistic	1.06	-0.08	-0.35	-1.18	-1.00	-0.70

Table 3 Performance Estimates for Fund Manager Trades (in % return per year)

Table3a Raw Returns for Fund Manager Trades (in % return per year)

At the end of each calender month for each fund manager for each stock we compute the Trade as the change in holdings. We classify all stocks traded for each fund manager into two group "buy" and "sells" (where buy stocks are all stocks with a positive trade measure. In the table below we present the time-series weighted average raw returns for fund manager buy and sell trades. We report the raw returns for event months from Month+1 through to Month+6 for trades with weights based the Month+0 trade size of that stock by the fund manager. The raw returns are computed as the equally weighted time-series portfolio of fund trades in the sample. The t-statistic is based on the time-series standard deviation.

	Event Month						
	Mnth+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Buys (Trades>0)	18.5	16.0	15.3	15.8	12.6	14.8	11.0
t-stat	(3.3)**	(2.99)**	(3.05)**	(2.9)**	(2.65)**	(2.83)**	(2.20)*
Sells (Trades<0)	22.4	12.2	11.4	12.4	12.6	12.6	11.7
t-stat	(4.2)**	(2.42)**	(2.2)*	(2.46)**	(2.5)**	(2.56)**	(2.5)**
Buys less Sells	-4.9	2.4	4.1	3.02	0.6	1.8	-0.6
t-stat	(2.5)**	(1.75)*	(2.55)**	(1.38)	(0.35)	(0.92)	(0.32)

t-statistics are in parentheses
** indicates significance at the 1% level (one tail)
* indicates significance at the 5% level (one tail)

Table 3b DGTW Performance Estimates for Fund Manager Trades (in % return per year)

At the end of each calender month for each fund manager for each stock we compute the Trade as the change in holdings. We classify all stocks traded for each fund manager into two group "buy" and "sells" (where buy stocks are all stocks with a positive trade measure). In the table below we present the DGTW performance measure for the equally weighted time-series portfolio of fund buy and sell trades in the sample. To compute the DGTW benchmark-adjusted return for a given stock trade during a given month, the buy-and-hold return on a value-weighted portfolio of stocks having the same size, book-value to market-value of equity characteristics as the stock is subtracted from the stock's buy-and-hold return during the month. Each fund manager's DGTW measure, for a given month, is then computed as the portfolio-weighted benchmark adjusted return of the individual stock trades in the funds portfolio (normalizing so that the weights of all stocks add to one). We report the DGTW performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 trade size of that stock by the fund manager. The t-statistics are based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Buys (Trades>0)	8.03	5.4	4.3	3.0	0.4	1.6	0.54
t-statistic	(4.3)**	(3.2)**	(2.9)**	(1.6)	(0.31)	(.95)	(0.42)
Sells (Trades<0)	12.2	1.91	0.14	-0.90	0.82	0.85	0.86
t-statistic	(7.8)**	(1.11)	(0.09)	(-0.54)	(0.47)	(0.55)	(0.79)
Buys less Sells	-3.9	3.6	3.9	3.92	-0.4	0.59	-0.28
t-statistic	(2.04)*	(1.9)*	(2.57)**	(1.79)*	(0.23)	(0.32)	(0.12)

t-statistics are in parentheses

** indicates significance at the 1% level (one tail)

* indicates significance at the 5% level (one tail)

Table 3c DGTW Performance Estimates for Fund Manager Trades (in % return per year)

At the end of each calender month for each fund manager for each stock we compute the Trade as the change in holdings. We classify all stocks traded for each fund manager into two group "buy" and "sells" (where buy stocks are all stocks with a positive trade measure). In the table below we present the DGTW performance measure for the equally weighted time-series portfolio of fund buy and sell trades in the sample. To compute the DGTW benchmark-adjusted return for a given stock trade during a given month, the buy-and-hold return on a value-weighted portfolio of stocks having the same size, book-value to market-value and momentum of equity characteristics as the stock is subtracted from the stock's buy-and-hold return during the month. Each fund manager's DGTW measure, for a given month, is then computed as the portfolio-weighted benchmark adjusted return of the individual stock trades in the funds portfolio (normalizing so that the weights of all stocks add to one). We report the DGTW performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 trade size of that stock by the fund manager. The t-statistics are based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Buys (Trades>0)	7.388	4.4	3.7	2.5	0.9	0.63	0.45
t-statistic	4.172	2.608	2.65	1.45	0.632	0.3944	-0.307
Sells (Trades<0)	15.09	0.8	-1.24	-0.5	-0.2	-0.4	1.01
t-statistic	3.37	0.47	-0.79	-0.26	0.122	-0.26	0.72
Buys less Sells							
t-statistic							

t-statistics are in parentheses

** indicates significance at the 1% level (one tail)

* indicates significance at the 5% level (one tail)

Table 4 DGTW Performance Estimates for Fund Manager Trades classified by size of trade (in % return per year and value weighted)

At the end of each calender month for each fund manager for each stock we compute the Trade as the change in holdings. We classify all stocks traded for each fund manager into two group "buy" and "sells" (where buy stocks are all stocks with a positive trade measure). Each group we further classify as small medium or large based on the size of the trade. The stocks in each trade size portfolio are value weighted. In the table below we present the DGTW performance measure for the equally weighted time-series portfolio of fund buy and sell trades in the sample. To compute the DGTW benchmark-adjusted return for a given stock trade during a given month, the buy-and-hold return on a value-weighted portfolio of stocks having the same size, book-value to market-value of equity and momentum characteristics as the stock is subtracted from the stock's buy-and-hold return during the month. Each fund manager's DGTW measure, for a given month, is then computed as the portfolio-weighted benchmark adjusted return of the individual stock trades in the funds portfolio (normalizing so that the weights of all stocks add to one). We report the DGTW performance estimates for event months from Month+1 through to Month+6 for portfolios with weights based the Month+0 trade size of that stock by the fund manager. The t-statistics are based on the time-series standard deviation.

	Event Month						
	Month+0	Month+1	Month+2	Month+3	Month+4	Month+5	Month+6
Sells							
Small	-1.66	-1.99	1.51	-0.54	1.16	5.28	-2.25
t-statistic	(0.68)	(0.83)	(0.49)	(0.21)	(0.52)	(1.35)	(1.02)
Medium	2.39	-0.30	-6.76	-1.06	-3.3	-2.91	1.19
t-statistic	(0.79)	(0.13)	(0.79)	(0.42)	(0.99)	(.87)	(0.53)
Large	13.3	0.99	-1.01	-0.54	0.34	-.123	1.72
t-statistic	(6.42)**	(0.49)	(0.59)	(0.21)	(0.16)	(0.06)	(0.97)
Buys							
Small	-4.59	-0.51	2.46	3.09	3.11	-0.56	2.24
t-statistic	(1.67)*	(0.21)	(0.81)	(1.16)	(1.10)	(0.23)	(0.94)
Medium	-1.05	3.65	0.33	2.38	-4.28	1.80	0.918
t-statistic	(0.56)	(2.00)*	(0.15)	(1.25)	(1.72)*	(0.71)	(0.46)
Large	9.68	4.53	4.22	2.64	-.56	0.00	-0.79
t-statistic	(4.47)**	(2.34)*	(2.54)**	(1.25)	(.32)	(0.00)	(0.44)
Large Buys less Large Sells							
Return	-3.3	3.5	5.3	3.2	-0.99	0.12	-2.22
t-statistic	(1.39)	(1.59)	(2.6)**	(1.16)	(0.39)	(0.05)	(1.13)

t-statistics are in parentheses
** indicates significance at the 1% level (one tail)
* indicates significance at the 5% level (one tail)