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Abstract

This paper examines the effect of institutional investors' investment duration on the efficiency of stock prices. Using a new duration measure based on quarterly institutional investors' portfolio holdings, the presence of short-term institutional investors can help explain many of the best-known stock return anomalies, possibly because these investors are affected by behavioral biases like overconfidence. Specifically, we find that both momentum returns and subsequent returns reversal are much stronger for stocks with greater proportions of short-term institutional investors. The accruals and share issuance anomalies are also stronger for stocks held primarily by short-term institutional investors. Finally, short-term institutional investors do not seem to recognize the benefits of significant R&D increases, as they tend to under-react to these increases.

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1. Introduction

Recent theoretical studies show that the behavioral biases of investors can affect stock prices and thus could provide an explanation for observed anomalous behavior of stock prices. For example, Barberis, Shleifer and Vishny (BSV, 1998) and Daniel, Hirshleifer and Subrahmanyam (DHS, 1998) develop a representative agent model in which the single investor in the economy is affected by a small number of behavioral biases well-documented in the Psychology literature.[3] These models propose a unifying explanation for the observed under-reaction of stock prices in the short to medium term and over-reaction in the long run. However, empirically it is challenging to identify behaviorally-biased investors. The most robust empirical finding regarding the effect of behavioral biases on investors' trading behavior seems that investor overconfidence leads to high turnover or a short investment horizon. For example, Odean(1999) and Barber and Odean (2000) show that the individual investors who trade often are overconfident. In a recent study, Grinblatt and Keloharju (2009) provide further evidence that overconfident investors are likely to trade more frequently.

In this paper, we introduce a direct measure of institutional investor investment horizons based on quarterly institutional investor portfolio holdings and examine the effect of the institutional investors' horizon on the efficiency of stock prices. Our stock-level proxy, the "average stock duration," is the weighted average of the duration the stock has been in the institutional portfolios, i.e., weighted by the total amounts invested in each institutional portfolio. However, we also employ existing measures such as turnover (shares traded over the number of shares outstanding) and the percentage of 'transient' investors (see Bushee 1998).

[3] BSV assume that the beliefs of the representative agent about the firm's earnings process are affected by conservatism and representativeness biases. In DHS, the investor is affected by overconfidence about the precision of private information and biased self-attribution which causes asymmetric shift in investors' confidence as a function of their investment outcomes.

Our two main competing hypotheses about the association between our proxy of institutional investors' investment horizon and market efficiency are 'smart money' and 'behavioral biases.' The 'smart money' hypothesis would predict that institutional investors with the shortest holding periods are those with the best information and trading skills, thus being better able to take advantage of any temporary pricing inefficiency (see e.g. Boehmer and Kelley 2009). The 'behavioral biases' hypothesis would predict that investors with shortest investment horizons are either overconfident about the precision of their private information (explaining their excessive trading) or they are prone to other behavioral bias like conservatism or representativeness (leading to too much focus on recent information and price patterns).

Therefore, the first hypothesis would hold that shorter average stock duration would be associated with greater efficiency, or lower (in absolute value) alphas, to the extent that the short-term institutions have taken advantage of and driven out any inefficiencies.[4] The second hypothesis would suggest that stocks dominated by shorter-term focused institutional investors are instead more subject to anomalous pricing, or with a greater presence of both positive and negative alphas. We test these hypotheses by examining the relationship between our new average stock horizon proxy and some of the best-known and most widely researched stock return anomalies.

We find that several of these anomalies are exclusively confined to, or much stronger in stocks with a greater proportion of short-term institutional investors, i.e. with short average stock horizons. For example, the stock returns momentum anomaly only occurs for stocks that are generally held by short-term institutional investors. Similarly, the accruals and share issuance

[4] To the extent such smart money would not have been able to driven out inefficiencies, we would expect asymmetric alphas, i.e. only positive alphas for a long strategy. As we do not observe short positions of institutional investors, our measures do not capture such activity or the importance of short sale constraints.

anomalies are much stronger for stocks with shorter investment horizons. Finally, short-term investors also under-react more to increases in R&D investment.

The association between these anomalies and investment horizon suggests that these are indeed anomalies (rather than driven by fundamental risk) and that short-term institutional investors may be affected by behavioral biases like overconfidence. We find no evidence for the 'smart money' hypotheses. E.g., shorter average stock duration is associated with both positive and negative price momentum, or generally with nonzero alphas in both directions of each of the various anomalies considered.

The empirical approach is as follows. First, we calculate the holding duration at the stock-institution level for all the stocks in the given institutional investors' portfolio. Holding duration gives the weighted number of years a given stock has been held in the last five years in the institutional investors' portfolio. For each stock, we then aggregate the stock-institution level duration measures for all the institutional investors holding that stock to yield the weighted holding duration measure at the stock-level. This is our "average stock duration" proxy for the horizon of institutional investors' in this paper.

Average stock duration is strongly negatively correlated with stock turnover, with a rank correlation of -58%. Indeed, in the paper that ours is most closely related to, Lee and Swaminathan (2000) already show that past trading volume predicts both the magnitude and persistence of future price momentum. However, turnover has not yet been considered in all of the other anomalies investigated in this paper. Further, turnover has been used as a proxy for several different and interesting concepts in the literature. This includes concepts that are behavioral in nature, such as investor underreaction (Lee and Swaminathan (2000)) but also concepts as liquidity (Amihud (2002)), disagreement (Hong and Stein (2007)) and speed of adjustment to market-wide information (Chordia and Swaminathan (2000)).

In order to support our interpretation of our proxy as measuring investor horizons and the behavioral biases hypothesis, it is thus important to understand its relationship with turnover. To that end, each quarter we regress the logarithm of average stock duration on a constant and the logarithm of stock turnover (plus other stock characteristics) and call the residual from these regressions the "residual average stock duration." We use both 'raw' and residual average stock duration as measures of institutional investor horizon in our analysis. In general, we find most of our results robust to whether we use raw or residual average stock duration. Finally, we also use both turnover and residual turnover (i.e., orthogonalized with respect to average stock duration) as alternative proxies for all the anomalies considered. We find that generally anomalies are stronger for stock with higher turnover but not for stocks with higher residual turnover. Apart from turnover's association with momentum, all of these results are also new to the literature.

To provide initial evidence in support of the hypothesis that short-term investors are affected by behavioral biases like overconfidence, we examine the effect of the average stock duration on stock volatility. Daniel, Hirshleifer and Subrahmanyam (1998) incorporate investor confidence into their model by assuming that overconfident investors use both public and private information, but overestimate the precision of the latter. They argue that overconfidence increases unconditional stock volatility, as overconfidence results in the initial overreaction of investors to private signals and hence greater need for price reversals when public signals are later revealed. We find that the average stock duration can indeed explain next quarter's stock idiosyncratic volatility after controlling for lagged volatility and other stock characteristics (including turnover) known to predict volatility. This is consistent with the idea that short-term focused investors exhibit greater overconfidence.

Next, we examine whether several of the best-known stock return anomalies are driven by short-term investors. For each anomaly, we sort stocks into groups based on a particular stock characteristic. The first anomaly considered is momentum, which involves sorting stocks based on their returns in the past 6 months, see Jegadeesh and Titman (1993). We present strong evidence that the momentum profits increase with decreasing average stock duration and are insignificant for the highest stock duration group. For example, the equal-weighted, long-short momentum returns, using the 3-factor (Fama-French) model and a six-month holding period, are a significant 0.75% per month (with a t-statistic of 3.34) *higher* for stocks in the lowest average holding duration group compared to stocks in the top average holding duration group. Conditioning on low average stock duration thus significantly strengthens momentum.[5]

Closely connected to the momentum anomaly, we next consider return reversals. Jegadeesh and Titman (2001) show that the returns of the long-short momentum portfolio is negative in the post-holding period and conclude that this evidence is consistent with a behavioral rather than a risk-based explanations for momentum. We find that momentum return reversal is limited to stocks held primarily by short-term investors. For example, the difference in return reversal between stocks in the lowest versus the highest average stock duration quintile is highly significant at 0.27% (t-statistic of 2.18).

The third anomaly that seems largely driven by short-term investors is the accrual anomaly. The equal-weighted, long-short 4-factor (Fama-French-Carhart) accrual returns for a three-month holding period are a significant 0.75% per month (with a t-statistic of 3.47) *higher* for stocks with the lowest average stock duration compared to stocks with the highest average

[5] This association between momentum and average stock duration is naturally related to the well-known relation between momentum and volume (Lee and Swaminathan (2000)), but it is robust to controlling for stock turnover, i.e., using residual average stock duration that is orthogonalized with respect to turnover. However, the effect of stock turnover on momentum returns is largely subsumed by the effect of stock duration. For example, 3-factor momentum alphas are 0.74% per month (with a t-statistic of 3.37) higher for stocks in the highest turnover group than in the lowest turnover group, but this difference shrinks to 0.32% per month (with a t-statistic of 1.89) using residual turnover that is orthogonalized with respect to average stock duration. However, momentum alphas are still significant 0.44% per month (with a t-statistic of 2.62) higher for stocks in the lowest relative to the highest residual average stock duration group (orthogonalized with respect to turnover).

stock duration. Much of the association between the accruals anomaly and average stock duration comes from that part of average stock duration that is common with turnover.

Fourth, Eberhart, Maxwell and Siddique (2004) show that R&D increases are beneficial for the firm and that the market tends to under-react to significant increases in R&D investments. We find that this under-reaction is much stronger for the firms held by short-term institutional investors. The abnormal 4-factor alpha for the firms with significant R&D increases is 0.78% per month *higher* for stocks in the lowest average stock duration quintile compared to stocks in the top average stock duration quintile. These results suggest that short-term investors do not recognize the benefits of R&D investments, which usually have a long-term nature. This is consistent with the findings of Bushee (1998), who shows that short-term institutional investors create incentives for corporate managers to reduce investment in R&D in order to meet short-term earnings goals.

Fifth and finally, we consider the share issuance anomaly or the long-run abnormal returns following corporate events like seasoned equity offerings, share repurchase announcements and stock mergers (see e.g. Loughran and Ritter (1995), Ikenberry, Lakonishok and Vermaelen (2005), Loughran and Vijh (1997) and Daniel and Titman (1996) and Pontiff and Woodgate (2008)). We find only very limited evidence that this anomaly is related to stock duration, though find a significant relationship with stock turnover, with the anomaly being stronger for stocks with higher turnover in the cross-sectional regressions.

Our paper makes two main contributions to the literature. First, it introduces a new and direct measure for the investment horizon of institutional investors. In a related paper, Bushee (1998) introduces a new clustering-based methodology for classifying investors into short-term/transient and long-term investors. The results in our paper are robust to controlling for the stocks' ownership by transient institutional investors.

Second, our results suggest that the short-term institutional investors are behaviorally biased and that their presence could help explain a number of stock return anomalies. These findings contribute broadly to the literature which studies the effect of stock turnover or investor horizon on stock returns. The first group of studies in this literature shows that the presence of short-term investors leads the stocks to be mispriced. Lee and Swaminathan (2000) show that momentum returns increase with stock's turnover. Peng and Xiong (2008) interpret turnover as a measure of investor attention and also show that price momentum profits are higher among high volume stocks. Bushee (2001) shows that the institutions with short investment horizon myopically price firms, overweighting short-term earnings potential and underweighting long-term earnings potential.

In contrast, the second set of studies claim that the short-term or transient investors are sophisticated arbitrageurs and therefore the stocks held by short-term investors are more efficiently priced. Collins, Gong and Hribar (2003) hypothesize that institutional investors, in particular transient institutions are sophisticated and show that accruals are priced correctly in stocks with high level of institutional ownership conditional on a minimum level of transient ownership. Similarly, Ke and Ramalingegowda (2005) show that the transient institutional investors trade to exploit the earnings announcement anomaly. Another paper documenting a negative association between an anomaly and institutional activity is Batov, Radhakrishnan, and Krinsky (2000) for the post-earnings announcement drift anomaly. Yan and Zhang (2009) argue that short-term institutions are informed and their trading forecasts future stock returns. Finally, Boehmer and Kelley (2009) argue that institutional holdings and trading activity lead to more efficient prices.

The remainder of this paper is organized as follows. In the next section, we discuss the construction of investment horizon measures used in this paper and briefly describe the data sample. We also examine the effect of institutional investors' horizon on future stock volatility. In section II, we test the effect of stock's average institutional investor horizon on momentum returns. In section III, we examine the impact of investment horizon on other stock return anomalies. Finally, in section IV, we conclude with a brief summary and discussion of the results.

2. Data and Methodology

A. Data

The institutional investor holdings data in this study comes from the Thompson Financial CDA/Spectrum database of SEC 13F filings. All institutional investors with greater than $100 million of securities under management are required to report their holdings to the SEC on form 13F. Holdings are reported quarterly; all common stock positions greater than 10,000 shares or $200,000 must be disclosed.

Stock returns data is obtained from monthly CRSP stock data files and accounting data is from COMPUSTAT. The analysis focuses only on US common stocks. The institutional investor data in this paper is from January 1980 to December 2007. Return forecasting and stock selection analysis is performed from January 1985 onwards, as at least five years of data is required to calculate the institutional holding duration measure. Each quarter, we sort the stocks into three groups by institutional ownership and eliminate the stocks in the bottom institutional ownership group. Our sample is thus limited to the stocks with relatively high institutional ownership. This significantly decreases the number of stocks in our sample, especially in the beginning of our sample. However, it also enables the average stock duration proxy to more accurately measure the average investment horizon of investors for the stocks in our sample, compared to, e.g. turnover (which may include added noise, such as the turnover of individual investors or day traders who are unlikely to be marginal investors for stocks in our sample). We also eliminate the stocks in the bottom NYSE size quintile from the sample. These data screens ensure that our sample only includes stocks where institutional investors are likely to be marginal investors or where institutional investor investment behavior is more likely to affect stock prices.

We require a stock to be present in CRSP for at least two years before it is included in the sample to make sure that IPO related anomalies do not affect the results. We also require an institutional investor to be present for two years before it is included in the sample to eliminate any bias in the sample, as new institutions by construction have a short past holding duration for each stock in their portfolio. Table 1 shows summary statistics for the stock sample used in this study. Panel A presents a summary of stock data over time. The number of stocks varies between 1,100 in year 2005 to 1,713 in the year 1995. The mean number of stocks across all the quarters is 1,367, which represents 33% of the CRSP common stocks but 89% of the CRSP market capitalization.

B. Methodology: Average Stock Duration Measure

We calculate the duration of ownership of each stock for every institutional investor by calculating a weighted-measure of buys and sells by an institutional investor, weighted by the duration for which the stock was held. For each stock in a given fund manager's portfolio, the holding duration measure is calculated by looking back to the time since which that particular stock has been held continuously in that fund's portfolio.

The calculation of the duration measure for stock i that is included in the institutional portfolio j at time T-1, for all stocks i = 1 … I and all institutional investors j = 1 … J, is given by:

$$Duration_{i,j,T-1} = d_{i,j,T-1} = \sum_{t=T-W}^{T-1} \left(\frac{(T-t-1)\alpha_{i,j,t}}{H_{i,j} + B_{i,j}} \right) + \frac{(W-1)H_{i,j}}{H_{i,j} + B_{i,j}} \quad (1)$$

where

$B_{i,j}$ = total percentage of shares of stock *i* bought by institution *j* between t = T-W and t = T-1; t,T are in quarters

$H_{i,j}$ = percentage of total shares outstanding of stock *i* held by institution *j* at time t = T-W.

$\alpha_{i,j,t}$ = percentage of total shares outstanding of stock *i* bought by institution *j* between time *t-1* and *t*

$\alpha_{i,j,t} > 0$ for buys and <0 for sells.

This measure for holding duration takes into account cases of tax selling and other kinds of temporary adjustments in the portfolio, because the intermediate sells are cancelled by immediate buybacks, with only a small effect on the duration of current holdings. The literature does not provide any guidance on the value of W. We choose W = 20 quarters, as beyond that any informational or behavioral effects would seem to be marginal. If stock *i* is not included in institutional portfolio *j* at time *T-1*, then $Duration_{i,j,T-1} = 0$.

We illustrate the construction of the holding duration measure with a simple example. Suppose the institutional portfolio of Fidelity owns two stocks: IBM and Ford. It owns 5% of total shares of IBM, 2% of which it bought 3 quarters back, with the remaining 3% shares bought 5 quarters back. The weighted age of IBM today in Fidelity's portfolio is (2×3+3×5)/5 = 4.2 quarters. Also, suppose it owns 1% shares of Ford, buying 5% shares 6 quarters back and selling

4% of them 1 quarter back. The weighted age of Ford is thus (5×6 – 4×1)/5 = 5.2 quarters. Similarly, we calculate this duration measure for every stock and institutional investor pair.

The measure represents the weighted duration of the holding experience the institutional investor had in past for a given stock currently in its portfolio. The question explored here is if institutional investors that have held a stock for a long time will behave differently when trading that stock than funds that have just bought it recently for the first time. This may be because of the information effect, i.e. long-term investors may face lower information collection costs due to familiarity with the firm's business, easier accessibility to firms' management, etc. An alternative behavioral story would be that fund managers holding a stock for shorter periods may be more overconfident about their own recent private signals about the valuation of that stock, as compared to managers who have held it for a longer period.[6]

Next, we compute the 'Average Stock Duration' proxy by averaging $Duration_{i,j,T-1}$ over all stocks and institutions currently holding the stock, using as weights the total current holdings of each institution. Similarly, we compute the 'Average Fund Duration' as follows. First, for each institutional fund j, we average $Duration_{i,j,T-1}$ over all stocks, computing each institution's weighted portfolio duration. Next, for each stock, we average the weighted portfolio duration of each institutional fund over all funds currently holding the stock, using as weights the total current holdings of each fund.

We report the summary statistics for the Average Stock Duration and other stock characteristics in Panel A of Table 1. The mean Average Stock Duration for the sample is 1.44

[6] We also considered an alternative proxy for calculate the average duration for all stocks in the last 5 years, not just the stocks currently in the institutional portfolio. The main motivation was to consider cases where funds go in and out of the same stock multiple times within the recent period, such that only considering stocks currently held may be misleading. However, this alternative proxy has a 98% correlation with the Average Stock Duration and results are unchanged if used instead.

years. In Panel B of Table 1, we report the rank correlations between the Average Stock Duration and other stock characteristics. Naturally, the Average Stock Duration is highly negatively correlated with stock turnover, with a correlation of -58%. In our sample, we only consider stocks that have very high institutional ownership, with an average institutional ownership of 43.8% in 1985 (the beginning of our sample) and of 75.4% in 2005. As a result, institutional investors are arguably more likely to be the marginal investors for stocks in our sample. Therefore, Average Stock Duration may more accurately measure the horizon of the marginal investors as compared to stock turnover, which also includes the trades of individual investors, day traders and other 'noise traders.' In addition, turnover has been used as a proxy for several different (from holding duration) and interesting concepts in the literature, such as liquidity, disagreement, attention and speed of information diffusion.

In order to support our interpretation of Average Stock Duration as indeed measuring investor horizons, it is thus important to distinguish it from turnover. To that end, each quarter we regress the logarithm of Average Stock Duration on a constant and the logarithm of stock turnover (plus other stock characteristics) and call the residual from these regressions the "Residual Average Stock Duration." We use both the 'raw' and the Residual Average Stock Duration as measures of institutional investor horizon in our analysis. Similarly, we calculate the "residual turnover" as the residual of a quarterly regression of the logarithm of turnover on a constant and the logarithm of average stock duration. Of course, which measure has the strongest association with the various anomalies considered in this paper is an empirical issue. Average Stock Duration is also highly correlated with Average Fund Duration, with a rank correlation of 70%. This shows that the short-horizon funds usually hold majority of their positions for short duration. Finally, Average Stock Duration is positively correlated with both market capitalization and the book-to-market ratio.

Another closely related measure is introduced by Bushee (1998, 2001), who uses a methodology based on factor analysis and clustering analysis approach to classify the institutional investors into three groups: 'transient' investors with high portfolio turnover and diversified portfolios, 'dedicated' institutions with low turnover and more concentrated portfolio holdings, and 'quasi-indexer' institutions with low turnover and diversified portfolio holdings. We obtain the institutional investor classification data from Brian Bushee's website and include the percentage of a firm's ownership by the transient institutional investors ("Transient") as an alternative measure for the level of ownership by short-horizon investors. The average rank correlation between the average stock duration measure and the percentage of ownership by transient investors is relatively low in absolute value at -21%, which shows that both measures are clearly distinct from each other.

In Panel C of Table 1, we present results of pooled panel regressions using the log of Average Stock Duration as the dependent variable. We cluster the robust standard errors in both firm and time (quarter) dimensions. In the first column, log turnover is the only regressor, resulting in a coefficient of -0.48 and an R^2 of 22.8%. Using log Transient as the only regressor in the second column, the coefficient equals -0.33 with an R^2 of 10.9%. Adding additional controls in columns 3 – 5 reduces their coefficients (especially for Transient), but both turnover and Transient remain economically and statistically quite important. In subsequent robustness checks, we will use the residuals from these regressions, i.e. Average Stock Duration orthogonalized with respect to these other stock characteristics.

C. Average Stock Duration and Stock Return Volatility

This section examines the impact of the investment horizon of institutional investors on future stock volatility. The main reason for considering this association is to show some evidence that Average Stock Duration may indeed capture investor overconfidence, or at very least, be related to changes in security prices in the short-term. The association between Average Stock Duration and stock return volatility is motivated by Daniel, Hirshleifer and Subrahmanyam (1998). Their model incorporates investor confidence by assuming that overconfident investors use both public and private information, but overestimate the precision of the latter. They argue that overconfidence increases unconditional stock volatility, as overconfidence results in the initial overreaction of investors to private signals and hence greater need for price reversals when public signals are later revealed. The more overconfident investors are, the more the price swings away from its true value, leading to a more severe adjustment later on and higher stock price volatility. If short-term investors are more likely to be overconfident, as shown by Barber and Odean (2000), we should expect stock volatility to be higher for stocks with greater proportion of short-horizon institutional investors.[7]

We test this hypothesis by examining the effect of Average Stock Duration on next period stock volatility after controlling for lagged volatility and other stock characteristics shown by the previous literature to predict volatility. Similar to Xu and Malkiel (2003), we calculate stock idiosyncratic volatility as the standard deviation of stock returns residuals from a Fama French 3-Factor model with market (MKT), size (SMB) and book-to-market (HML) factors. At the end of each quarter, we run the following three-factor regression separately for every stock using daily return data from that quarter:

$$R_{i,t} = \alpha_i + \beta_i^{MKT} R_t^{MKT} + \beta_i^{SMB} R_t^{SMB} + \beta_i^{HML} R_t^{HML} + \varepsilon_{i,t} \qquad (2)$$

We use a quarterly estimation window as the mutual fund holdings-based independent variables used to explain stock volatility are calculated at a quarterly frequency. Idiosyncratic volatility for

[7] In related empirical studies, Bennett, Sias and Starks (2003) and Xu and Malkiel (2003) show that the idiosyncratic volatility of individual stock increases with increase in institutional ownership. Moreover, they attribute the increase in average stock idiosyncratic risk in the economy to increases in institutional stock ownership over the same period.

a given stock is calculated as the standard deviation of residuals from regression (2) for that stock.

To estimate the cross-sectional effect of institutional investors' horizon on stock volatility, idiosyncratic stock volatility is regressed on Average Stock Duration plus other control variables, all as of the end of previous quarter. We pool the firm-time observations together and estimate the following panel regression:

$$\log(\sigma_{i,t}^{IDIO}) = \alpha + \beta \log(STOCK\_DUR_{i,t-1}) + \delta_j Control\_Variables_{j,t-1} + \varepsilon_{i,t}, \tag{3}$$

where $\sigma_{i,t}^{IDIO}$ is the idiosyncratic volatility of stock *i* at the end of quarter *t*, and $STOCK\_DUR_{i,t-1}$ is the Average Stock Duration of stock *i* at the end of quarter *t-1*. Following Petersen (2008), we cluster robust standard errors along both time and firm dimensions to control for correlation among observations over time and across firms. We use control variables which have been shown by the previous literature to predict future idiosyncratic risk, such as market cap, turnover, book-to-market ratio, institutional ownership, lagged idiosyncratic volatility, absolute value of past 6 month return and stock price. The results are presented in Table 2, where all variables (including the dependent variable) are standardized to allow for comparison between coefficients.

The results strongly confirm the hypothesis that stock volatility increases with Average Stock Duration. In the basic specification (column 1), we include only Average Stock Duration as an independent variable. A one standard deviation decrease in the Average Stock Duration measure (STOCK_DUR) is associated with a 0.22 standard deviation increase in idiosyncratic risk. The coefficient corresponding to Average Stock Duration remains significant and economically meaningful in all the regression specifications, even though it is much reduced by the inclusion of the other variables in column 2 (value of -0.063).

However, the other two measures for short-term focused investors show no such strong association. First, the percentage of transient investors is not significantly related to idiosyncratic risk in column 2 or any of the subsequent specifications. Second, once we control for lagged idiosyncratic risk in columns 3 and 4, the coefficient for turnover, positive in column 2, becomes negative and significant in these regressions, whereas the negative coefficient corresponding to stock duration remains robust and significant.

To ensure that the results are not driven by a small part of the sample, for instance by a few firms from the dot-com bubble period, we also divide the sample into two parts and estimate the regression in equation (2) separately for 1980 to 1995 and for 1996 to 2007. As shown in columns 5 and 6, Average Stock Duration remains strongly related to future idiosyncratic volatility in both subsamples.

3. Average Stock Duration and Momentum Returns

In this section, we consider stock return momentum strategies conditional on the Average Stock Duration of institutional investors. Table 3 reports the returns for unconditional momentum strategy and conditional momentum strategies based on past returns and investors horizon measures. Here as everywhere else in the paper, we use the sample as described in the previous section, i.e. only considering stocks with high institutional ownership. We further eliminate the stocks in the bottom NYSE size quintile and stocks with prices less than 5 dollars from our sample.

Each quarter, we sort the stocks into five equal groups based on their past six month returns and then calculate the returns of these portfolios for next 6 months or for the next 3 months (i.e., holding periods). We leave a gap of one month between the formation and holding periods to account for any microstructure issues. Both value-weighted and equal-weighted raw returns and Fama French 3-factor alphas are calculated. We also leave a gap of one quarter between the calculation of holding duration measure and return calculation to account for the delay in the disclosure of institutional investor portfolio holdings. As shown in the first column of Panel A of Table 3, the monthly equal-weighted long-short raw return for an unconditional momentum strategy is 0.67% for a holding period of six months, which is consistent with the return on momentum strategy for large cap stocks (Jegadeesh and Titman (2001)).

To examine the effect of investment horizon on momentum returns, at the beginning of each quarter we first sort stocks into quintiles based on past 6 month returns and then independently sort the stocks into three equal groups based on Average Stock Duration measured one quarter prior to the current quarter. Panel A and Panel B of Table 3 present the raw returns and Fama French 3- factor alphas for each of the 15 portfolios measured each month over the holding period of next 6 months. A long-short momentum strategy earns an equal-weighted 3-factor monthly alpha of 1.13% and a value-weighted monthly alpha of 1.48% for the bottom Average Stock Duration group and an equal-weighted monthly alpha of 0.38% and value-weighted monthly alpha of 0.29% for the top Average Stock Duration group. The difference in equal-weighted momentum returns between the top and bottom average stock duration groups is -0.75%, which is highly significant with a t-statistic of 3.34. The difference is even higher and more significant for the value-weighted portfolios. These results show that momentum returns are driven by short horizon of institutional investors. The momentum returns are insignificant for the stocks in the top average stock duration quintile, which are held in majority by long-term investors.

In Panel C, we present the results for momentum strategies conditional on past turnover and past fund duration. Stock's turnover for a given quarter is calculated as the average of the daily stock turnover (daily volume as a percentage of shares outstanding) over that quarter. For each institutional investor, we calculate their portfolio's average holding duration across all stocks included in the portfolio. Averaging the institutional investor portfolio's duration across all institutional investors holding a stock produces a stock's 'Average Fund Duration'. The negative relationship between Average Fund Duration and momentum returns follows from the negative relation between Average Stock Duration and momentum as Average Fund Duration has a high positive correlation of 0.70 with the Average Stock Duration.

As shown in Panel C of Table 3, momentum returns increase with increasing stock turnover, confirming Swaminathan and Lee (1998). If stock duration is a better measure of investor horizon, we should expect the negative relation between average stock duration and momentum returns to be robust to controlling for the effect of stock turnover on momentum returns. We control for the effect of stock turnover by making our stock duration proxy orthogonal to stock turnover. Each quarter, we regress the logarithm of stock duration on logarithm of stock turnover and call the residual from this regression "Residual Average Stock Duration" and use it as a proxy for average investor horizon (the results of this regression can be found in column 1 of Panel C of Table 1). In another specification, we also control for other stock characteristics like market cap, book-to-market ratio and institutional ownership shown to be correlated with stock duration (see column 3 of Panel C of Table 1). To determine whether the effect of stock turnover is subsumed by the effect of stock duration, we regress the log of stock turnover on log of stock duration and examine the effect of the residual from this regression ("residual turnover") on momentum returns.

The results are presented in Table 4. As shown in Panel A, the monthly equal-weighted long-short momentum 3-factor alpha for the top Residual Average Stock Duration group is 0.44% lower compared to the bottom residual duration group. This confirms that the effect of stock duration on momentum returns is robust to controlling for the previously documented effect of stock turnover on momentum returns. However, as reported in Panel B, the difference in long-short momentum returns between the top and bottom residual turnover groups is insignificant. This result shows that the effect of stock turnover on momentum returns is largely subsumed within the effect of stock duration on momentum.

In Panel C, we also control for the correlation of stock duration with other stock characteristics, orthogonalizing Average Stock Duration with respect to turnover, the percentage of transient investors, market capitalization, book-to-market and institutional ownership. The difference in the momentum returns between bottom and top residual duration groups equals to 0.46% per month and remains highly significant with a t-statistic of 2.96.

Next, we examine the effect of investor horizon on momentum returns using a multivariate regression setting. We use the Fama- MacBeth (1973) methodology and estimate predictive cross-sectional regressions of next 3 month or 6 month returns on past returns, past average stock duration and other stock characteristics likely to affect future returns. The regression analysis allows us to examine the incremental effect of Average Stock Duration on the relationship between past and future returns after controlling for the incremental effect of other variables, including stock turnover and the percentage of ownership by transient institutional investors. Results are presented in Table 5.

In general, the regression results are consistent with the portfolio results. The main coefficient of interest, on the interaction term between momentum and logarithm of Average Stock Duration, is negative and significant in all specifications in which it is included (even after controlling for turnover and the presence of transient investors, their interactions with past momentum, plus other stock characteristics). This confirms that momentum returns increase with decreasing Average Stock Duration.

Previous studies have shown that both turnover (Lee and Swaminathan (1999)) and analyst coverage (Hong, Lim and Stein (2000)) affect momentum returns. However, the effect of Average Stock Duration subsumes the effect of turnover and analyst coverage in our sample. As shown in column 5, the interaction terms between momentum and analyst coverage, and between momentum and turnover are both insignificant.

In column 6, we also include the interaction between logarithm of Average Fund Duration and past returns in the regression, which is negative and significant and thus consistent with the results in Panel C of Table 3. As the interaction between Average Stock Duration and past returns remains negative and significant, this suggests that both have a separate association with momentum.

4. Average Stock Duration and Other Anomalies

A. Return Reversal

The main empirical prediction which distinguishes behavioral theories (e.g., BSV, DHS and Hong and Stein (1999)) from the rational explanation (e.g., Conrad and Kaul (1998)) of momentum returns is the suggestion of post-holding period reversal. In the behavioral models, initial underreaction or overreaction in the prices is followed by further overreaction and subsequent reversal to the fundamental value. In contrast, the rational explanation by Conrad and Kaul (1998) predicts that momentum profits should remain positive in the post-ranking period. Jegadeesh and Titman (2001) provide the empirical evidence of post-holding period reversal in momentum returns, which lends strong empirical support to the behavioral explanations of momentum. They also find that the returns reversal is limited to the winner portfolio and within small stocks.

If the short-term investors are affected by the behavioral biases studied in BSV and DHS, we should thus expect the return reversal to be stronger for the stocks held by short-horizon investors. The results are presented in Table 6. Each quarter, we sort the stocks independently into quintiles based on past six month returns and Average Stock Duration and calculate the average monthly returns for two years (year+2 and year +3) following the portfolio formation. To account for overlapping portfolios, we follow the methodology in Jegadeesh and Titman (1993) such that the stocks ranked in each of the eight quarters form one-eighth of the portfolio. Each quarter, one-eighth of the portfolio ranked twelve quarters ago is replaced by the stocks ranked recently four quarters back. Returns from each of the eight sub-portfolios are equally weighted to calculate the monthly returns for the portfolio.

As shown in Panel A of Table 6, the momentum returns for the bottom Average Stock Duration quintile show a reversal of around 0.27% per month with a t-statistic of 1.97. The corresponding 3-factor alpha return is 0.18% but is statistically insignificant. The momentum returns for the top Average Stock Duration quintile show no reversal in year+2 and year+3 following the holding period. The difference in momentum returns from year+2 to year+3 between the top and bottom Average Stock Duration groups is 0.27%, which is positive as expected and is statistically significant. The results provide some support for the hypothesis that reversal is stronger for stocks with lower Average Stock Duration. In Panel B and Panel C of Table 6, we present the results for return reversal conditional on stock turnover, Average Fund duration, Residual Average Stock Duration and residual turnover.

B. Accrual Anomaly

Sloan (1996) first reported that investors seem to focus on total earnings and fail to distinguish between the different properties of accruals and cash flow components of earnings. Consequently, firms with positive (negative) accruals experience negative (positive) future abnormal returns. Since then, this anomalous pricing of accruals has become one of the most extensively studied and robust asset pricing anomalies in the accounting literature.

Although the evidence on mispricing of accruals is robust and well established in the literature now, but the explanations for the existence of this mispricing are varied. Most of the studies provide evidence in support of a behavioral explanation for the accrual anomaly. For example, Hirshleifer, Hou and Teoh (2006) reject a risk-based explanation and show that it is the accrual characteristic rather than the accrual factor loading that predicts return. Mashruwala, Rajgopal and Shevlin (2006) find that the accrual anomaly is concentrated in stocks with high idiosyncratic risk and high transaction costs, making it difficult for risk-averse arbitrageurs to exploit this mispricing. Kothari, Loutskina and Nikolaev (2006) argue that the agency theory of overvalued equity rather than the investor's fixation on the level of earnings explains the mispricing of accruals. The agency theory predicts that overvalued firms' managers are more likely to engage in earnings management to meet investors' expectation about firm earnings. The fixation hypothesis predicts a linear relation between accruals and future returns. In contrast, the agency theory predicts negative returns for high accrual stocks but does not predict the positive returns or undervaluation for the low accrual stocks.

In this paper, we propose a new explanation for the existence of mispricing of accruals. We hypothesize that mispricing of accruals arises because of the presence of short-term investors who are more likely to fixate on the level of short-run earnings. First, we calculate total accruals from the quarterly COMPUSTAT data using the standard methodology in Sloan (1996). The accrual component in earnings is given by:

$$Accruals = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STD - \Delta TP) - Dep \tag{4}$$

where ΔCA is the change in current assets, $\Delta Cash$ is the change in cash/cash equivalents, ΔCL is the change in current liabilities, ΔSTD is the change in debt included in current liabilities, ΔTP is the change in income tax payable, and Dep is the depreciation and amortization expense. Accruals are scaled by the average assets of the firm ((Assets(t-1)+Assets(t))/2) to calculate the value of "Total Accruals" used in the analysis. At the beginning of each quarter, stocks are first divided into five groups based on total accruals and then independently divided into three groups based on the average stock holding duration. A gap of one quarter is left between portfolio formation and return calculation to allow for accounting information and institutional holdings to become public.

The results are presented in Table 7. The returns for the unconditional portfolio strategy based only on total accruals are reported in the first column of Panel A of Table 7. We confirm the existence of accrual anomaly in our sample. A long-short portfolio with a long position in low accrual stocks and a short position in high accrual stocks earns a monthly equal-weighted 4-factor alpha of -0.56%, with a highly significant t-statistic of 4.79. In rest of the panel A, we present the average monthly raw returns and Fama-French 4-factor alphas for the 15 portfolios formed by independent sorts based on total accruals and Average Stock Duration. A long-short trading strategy with long position in high accrual stocks and short position in low accrual stocks earns an equal weighted 4-factor monthly alpha of -0.95% for the bottom Average Stock Duration group and an equal-weighted monthly alpha of -0.19% for the top Average Stock Duration group. The difference in equal-weighted high-low accrual returns between the top and bottom Average Stock Duration groups is 0.75%, which is highly significant (t-statistic of 3.47).

These results suggest that mispricing of accruals is driven by short horizon of institutional investors. The accrual anomaly is insignificant for the stocks in the top average stock duration quintile, which are held in majority by long-term investors. We also find no evidence for the agency theory based explanation for accrual as both the high and low accrual portfolios forecast future returns. Therefore, accrual anomaly can be explained by the naïve fixation of short-term investors on the level of short-run earnings.

Panel B presents the results of a portfolio strategy based on total accruals and average daily turnover. The difference in long-short accrual strategies between high and low turnover stocks is negative and highly significant. The difference in equal-weighted high-low accrual returns between the top and bottom average stock duration groups is -0.98%, which is negative and highly significant with a t-statistic of 4.53. Similarly, Panel C presents the results of portfolio strategies based on total accruals and either Residual Average Stock Duration (see column 1 of panel C of Table 1) or residual turnover (residual obtained from regressing log of turnover on log of Average Stock Duration). The difference in long-short accrual returns for the high and low residual duration groups is positive as expected, but insignificant with a t-statistic of 1.22, whereas the difference in long-short accruals returns between the high and low residual turnover groups is significant with a t-statistic of 2.60. Therefore, much of the association between the accruals anomaly and Average Stock Duration comes from that part of Average Stock Duration that is common with turnover.

The regression evidence corresponding to the association between institutional investors' investment horizon and accruals anomaly is presented in Panel D of Table 7. The regression specification in the first column of the table confirms the existence of accruals anomaly. The coefficient corresponding to total accruals is negative and highly significant. In column2 2 and 3, we examine the association between accruals anomaly and investors' horizon by including the interaction term between the average stock duration and total accruals. In column 2, the coefficient corresponding to the interaction term between holding duration and accruals is positive as expected but insignificant with a t-statistic of 1.36. In column 3, interaction term between accruals and turnover subsume the effect of Average Stock Duration on accruals (t-statistic for the interaction term drops to -0.07). The coefficient for interaction term between accruals and turnover is negative and significant with a t-statistic of 2.04.

In columns 4 and 5, we examine the effect of investment horizon on the returns of stocks in the extreme accrual quintiles. Each quarter, the stocks in the sample are sorted into five equal quintiles based on their total accruals calculated using the quarterly accounting data. ACCRUALS_Q1 and ACCRUALS_Q5 are dummy variables corresponding to the stocks in the first and the last accrual quintiles. The coefficient for ACCRUALS_Q1 is positive as the stocks in the lowest accrual quintile earn positive returns. Similarly, the coefficient corresponding to ACCRUALS_Q5 is negative and significant as stocks with high levels of accruals earn negative returns. We are interested in the coefficients corresponding to the interaction between these accrual dummy variables and the Average Stock Duration. In column 4, the coefficients corresponding to these interaction terms are highly significant. In column 5, we also include the terms for interaction between turnover and ACCRUALS_Q1 and ACCRUALS_Q5. The coefficient corresponding to these interaction terms are insignificant whereas the interaction term between ACCRUALS_Q5 and Average Stock Duration remains significant. Therefore, the effect of Average Stock Duration on returns of extreme accruals quintiles is stronger compared to the effect of stock turnover on the returns of these quintiles.

C. R&D Investment

Next, we examine the effect of investment horizon of institutional investors on underreaction to unexpected R&D increases. Eberhart, Maxwell and Siddique (2004) provide evidence of positive abnormal returns following significant and unexpected R&D increases by the firms. They attribute this to the underreaction by market or firm’s investors to the benefits of R&D investment, which are usually long-term in nature. In a related paper, Daniel and Titman (2001) show that investors misreact to intangible information like increase in R&D expenditures but not to tangible information like changes in PP&E expenditures. In this paper, we hypothesize that as the benefits of R&D expenses are likely to be more long-term in nature, it is more likely that short-term investors who plan to hold the stock for a shorter time underreact to these increases. In contrast, long-term investors may be more able to recognize and more accurately price these long-term benefits in the current stock price. Therefore, we predict that the underreaction to R&D increases should be stronger for stocks with higher proportion short-term investors or the stocks with lower Average Stock Duration compared to the stocks with higher Average Stock Duration.

Table 8 presents the Fama and French 4-factor alphas for a sample of 11,487 unexpected R&D increases by the firms from 1985 to 2007 conditional on the average holding duration of institutional investors. The following criteria were applied to determine economically significant R&D investment and unexpected R&D increases for a stock to be included in the sample:

1) Increase in R&D intensity (R&D/Assets) during the last fiscal year >=2.5%,

2) Percentage increase in dollar value of R&D during last year >=2.5%,

3) End of last year R&D Intensity (R&D/Assets and R&D/Sales) >=2.5%.

The holding period of the stocks is one quarter. A gap of one quarter is left between the calculation of R&D and duration variables and the return calculation to ensure that these variables are public information at the time of portfolio formation.

At the beginning of a quarter, the number of stocks in the sample with significant R&D increases varies between 82 and 206 (the average number of stocks is 125). The first row of panel A reports the Fama and French(1993) 4-factor value-weighed and equal-weighed alphas for all the stocks in the sample. The monthly equal-weighted and value-weighted Fama and French 4-factor alphas for the whole sample of stocks with significant R&D increases are 0.68% and 0.37% respectively. These results are consistent with the finding in Eberhart, Maxwell and Siddique (2004) that investors underreact to R&D increases.

Next, each quarter we sort the stocks in our sample into five groups based on their Average Stock Duration and calculate the monthly 4-factor alphas for each portfolio. The results are reported in the remaining rows of panel A of Table 8. The monthly equal-weighted Fama and French 4-factor alphas for the stocks in the top Average Stock Duration quintile and the bottom Average Stock Duration quintile are 1.29% (t-statistic=4.17) and 0.52% (t-statistic=3.92), respectively. The difference in monthly equal-weighted 4-factor alphas between the stocks in the high and low stock duration quintiles in our sample of stocks with significant R&D increases is -0.78% (t-statistic = -2.39). These results confirm our hypothesis that the underreaction to R&D increases is driven by the stocks with greater proportion of short-horizon investors.

In Panel B and Panel C of Table 8, we report the 4-factor alphas for portfolio strategies based on significant R&D increases and either one of the following: stock turnover, Residual Average Stock duration and residual turnover. As shown in Panel B, the difference in returns of equal-weighted portfolios of stocks with high and low Residual Average Stock Duration conditional on significant R&D increases is significant at the 90% level. The difference in returns of the portfolios with high and low turnover conditional on significant R&D increases is insignificant (Panel C). Finally, the difference in abnormal returns for portfolios with high and low residual turnover is also insignificant. Therefore, the effect of Average Stock Duration on the underreaction to R&D increase is robust to controlling for the effect of stock turnover.

D. Share Issuance Anomaly

A number of studies in the literature provide evidence of long-run abnormal returns following corporate events like seasoned equity offerings, share repurchase announcements and stock mergers (see e.g. Loughran and Ritter (1995); Ikenberry, Lakonishok and Vermaelen (2005); and Loughran and Vijh (1997)). In this paper, we use share issuance as a general term to refer to seasoned equity offerings, share repurchases and stock mergers. Using a stock-level annual share issuance measure which captures the corporate events corresponding to variation in number of outstanding shares over time, Pontiff and Woodgate (2008) show that the annual share issuance measure strongly predicts the cross-section of future stock returns. This annual share issuance measure was first introduced in Daniel and Titman (1996).

The behavioral explanation for abnormal returns following the SEOs, share repurchases and stock mergers is that firms issue equity when it is overvalued and retire equity when it is undervalued. If the stock is more likely to be undervalued or overvalued in the presence of short-term investors, we should expect the return predictability following share issuance to be much stronger for stocks held by short-term investors. Therefore, we hypothesize that the relation between future stock returns and lagged share issuance measure should be stronger for stocks with lower Average Stock Duration.

First, using the methodology in Pontiff and Woodgate (2008), we construct an annual share issuance measure for each stock. For each firm we obtain from monthly CRSP data the number of shares outstanding and the *Factor to Adjust Shares Outstanding*. We compute the number of real shares outstanding, which adjusts for distribution events such as splits and rights offerings, as follows. We first compute a total factor at the end of month t, which represents the cumulative product of the CRSP provided factor f up to month t inclusive:

$$TotalFactor_t = \prod_{i=1}^{t}(1+f_i) \tag{5}$$

We compute the number of shares outstanding adjusted for splits and other events as:

$$Adjusted\ Shares_t = Shares\ Outstanding_t / Total\ Factor_t. \tag{6}$$

We use this measure of adjusted shares to compute annual share issuance at the end of month t as:

$$ISSUE\_ANNUAL_{t,t-11} = Ln(AdjustedShares_t) - Ln(AdjustedShares_{t-11}) \tag{7}$$

We use the annual share issuance measure at the end of each quarter in further return predictability analysis. At the beginning of each quarter, stocks are first divided into five groups based on the annual share issuance measure and then independently divided into five groups based on the average stock holding duration. A gap of one quarter is left between portfolio formation and return calculation to allow for accounting information and institutional holdings to become public.

The results are presented in Table 9. The returns for the unconditional portfolio strategy based only on annual share issuance measure are reported in the first column of Panel A of Table 9. A long-short portfolio with a long position in high share issuance stocks and a short position in low share issuance stocks earns a monthly equal-weighted 4-factor alpha of -0.55%, with a highly significant t-statistic of 4.06.

In rest of the panel A, we present the average monthly raw returns and Fama-French 4-factor alphas for the 25 portfolios formed by independent double quintile sorts based on annual share issuance and Average Stock Duration. A long-short trading strategy with a long position in high share issuance stocks and a short position in low share issuance stocks earns an equal weighted 4-factor monthly alpha of -0.60% for the bottom Average Stock Duration group and an equal-weighted monthly alpha of -0.31% for the top Average Stock Duration group. The difference in equal-weighted low-high share issuance returns between the top and bottom Average Stock Duration groups is this 0.28% per month, which is positive but insignificant with a t-statistic of 1.14. These results provide some limited evidence that the returns following share issuance are driven by short horizon of institutional investors.

Panel B, presents the results of a portfolio strategy based on annual share issuance measure and Residual Average Stock Duration (residual obtained by regressing log of stock holding duration on log of average daily turnover, see column 1 of Panel C of Table 1). The difference in equal-weighted long-short share issuance returns for the high and low Residual Avereage Stock Duration groups is positive as before, but insignificant with a t-statistic of 0.76. The corresponding difference in value-weighted returns is 0.73% and is highly significant with a t-statistic of 2.48. Similarly, Panel C presents the results of portfolio strategies based on annual share issuance measure and turnover, residual turnover (residual obtained from regressing log of turnover on log of stock holding duration). The difference in long-short share issuance strategies between high and low turnover, residual turnover stocks is negative but insignificant.

In panel D, we present the results for multivariate regressions examining the association between investment horizon and the share issuance anomaly. The coefficient corresponding to the annual issuance variable is negative and highly significant which confirms the existence of share issuance anomaly in our sample. We find that the coefficient corresponding to the interaction term between the logarithm of Average Stock Duration and share issuance is insignificant in all specifications whereas the coefficient corresponding to the interaction between logarithm of turnover and annual share issuance variable is negative and highly significant in all regression specifications (t-statistic ranging from 3.22 to 3.66). The association between turnover and the annual share issuance variable thus suggests that the share issuance anomaly is stronger for the stocks held primarily by short-term investors. At the same time, we do not have an explanation why it is short-termism as measured by turnover rather than Average Stock Duration in this instance.

5. Conclusion

In this paper, we aim to investigate whether behaviorally-biased investors can be identified and linked to asset pricing anomalies. To do this, we introduce a new measure of institutional investor's investment horizons based on quarterly institutional investor portfolio holdings. The main motivation for this measure is given by the most robust empirical finding regarding the effect of behavioral biases on investors' trading behavior, namely that investor overconfidence leads to high turnover or a short investment horizon (see e.g., Odean(1999), Barber and Odean (2000), and Grinblatt and Keloharju (2009)). Our new stock-level proxy, the

"Average Stock Duration," is the weighted average of the duration the stock has been in the institutional portfolios, i.e., weighted by the total amounts invested in each institutional portfolio. The other proxy considered is stock turnover as in Lee and Swaminathan (2000).

We consider two competing hypotheses about the association between our proxies of investment duration and market efficiency, 'smart money' and 'behavioral biases.' The 'smart money' hypothesis would predict that investors with shorter holding periods have better information and trading skills, and are thus better able to take advantage of temporary pricing inefficiencies. The 'behavioral biases' hypothesis predicts that investors with shorter investment horizons are instead either overconfident about the precision of their private information (explaining their excessive trading) or are prone to other behavioral bias like conservatism or representativeness (leading to too much focus on recent information and price patterns). As a result, the first 'smart money' hypothesis would hold that shorter duration is associated with greater efficiency, while the 'behavioral biases' hypothesis would suggest that stocks dominated by shorter-term focused investors are instead more subject to anomalous pricing.

Initial evidence in support of the hypothesis that short-term investors are affected by behavioral biases like overconfidence is given by the effect of Average Stock Duration on stock volatility. Daniel, Hirshleifer and Subrahmanyam (1998) argue that overconfidence, leading first to the initial overreaction to private signals and hence to subsequent price reversals, will increase stock volatility. Average Stock Duration is indeed negatively related to next quarter's stock idiosyncratic volatility, even after controlling for lagged volatility and other stock characteristics (including turnover) known to predict volatility. This negative predictive relationship is consistent with the idea that short-term focused investors exhibit greater overconfidence and overreliance on their private signals.

Next, we find strong support for the behavioral biases hypothesis, as several of the best-known anomalies are exclusively confined to, or much stronger in stocks with a greater proportion of short-term investors, i.e. with short average stock horizons and/or higher turnover. For example, the stock returns momentum anomaly only occurs for stocks that are generally held by short-term institutional investors. Similarly, the accruals and share issuance anomalies are much stronger for stocks with shorter investment horizons. Finally, short-term investors also under-react more to increases in R&D investment.

However, for each of the anomalies, we find that a greater association of short-term focused institutional investors is associated with greater anomalous returns in both directions. For example, for stocks with lower Average Stock Duration, we find both more positive and negative momentum, and both more positive alpha after low accruals and negative alpha after high returns.

We thus make two contributions to the literature. First, we introduce a new and direct measure for the investment horizon of institutional investors, Average Stock Duration. Second, our results suggest that short-term investors may be behaviorally biased and that their presence could help explain a number of the best-known stock return anomalies. Our results further suggest that these anomalies are indeed anomalies as they are strongly linked to the presence of institutional investors with short holding durations and/or the most frequent overall trading.

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Table 1. Summary Statistics

Panel A reports the summary statistics for the sample used in this paper. For stock characteristics, the mean value is reported at the end of the given year, and for "all data" is calculated as the time series average of all quarterly means. The sample period is from 1985 to 2007. Average Stock Duration is the weighted average of the holding durations across all institutional investors holding that stock and is calculated according to equation (1) in the text. Average Fund Duration is calculated by averaging the institutional investor portfolio's duration across all institutional investors holding a stock. An institutional investor portfolio's average holding duration is calculated by averaging duration across all stocks included in the portfolio. Daily stock turnover is the average of the daily percentage turnover of a stock in the previous quarter. Market cap is the market capitalization of the stock at the beginning of the quarter. BK/MKT ratio is measured by the ratio of book value of the firm from the end of the last year and market capitalization of the firm at the end of the most recent quarter. Panel B reports the spearman rank correlations of Average Stock Duration (STOCK_DUR), Average Fund Duration (FUND_DUR), stock turnover (TURNOVER), percentage ownership of transient institutions (TRANSIENT), market capitalization (MCAP), book-to-market ratio (BMRATIO), past 6 month return (MOM6) and the percentage ownership of all institutional investors (IO). In Panel C, we present results of pooled panel regressions using the Average Stock Duration as the dependent variable. Additional controls are the stock price (PRC), idiosyncratic volatility (IDIORISK), and the number of analysts (NUMANALYSTS). In this panel, the t-statistics are based on robust standard errors clustered in both the firm and time (quarter) dimensions.

Panel A

	Year					
	1985	1990	1995	2000	2005	All data
Number of Stocks	1,118	1,368	1,713	1,591	1,100	1,367
Percentage of CRSP Stocks	30.1	36.9	32.1	35.0	33.8	33.2
Percentage of CRSP Market Cap	82.5	93.0	90.4	93.8	89.1	89.8
Average Stock Duration (years)	1.25	1.54	1.47	1.35	1.60	1.44
Daily Stock Turnover (%)	0.35	0.31	0.56	0.79	0.86	0.60
MCAP ($ million)	1,339	1,584	2,801	6,687	9,189	4,502
Market Cap (NYSE quintile)	3.37	3.18	3.19	3.28	3.42	3.30
BMRATIO	0.60	0.75	0.41	0.44	0.38	0.48
BK/MKT (NYSE quintile)	1.86	2.79	1.88	2.07	2.11	2.1
Past 6 Months Return (%)	10.10	-15.08	20.57	8.40	13.15	11.5
Institutional Ownership (%)	43.8	46.8	53.4	59.6	75.4	57.3
Fund Duration (years)	1.49	1.72	1.65	1.61	1.84	1.65
TRANSIENT (%)	9.5	6.8	8.2	19.0	10.9	13.3

Panel B

Variable	STOCK_DUR	FUND_DUR	TURNOVER	TRANSIENT	MCAP	BMRATIO	MOM6	IO
STOCK_DUR	1.00							
FUND_DUR	0.70	1.00						
TURNOVER	-0.58	-0.50	1.00					
TRANSIENT	-0.45	-0.63	0.54	1.00				
MCAP	0.27	0.27	-0.02	0.05	1.00			
BMRATIO	0.18	0.18	-0.22	-0.24	-0.18	1.00		
MOM6	-0.07	-0.15	0.05	0.16	0.04	-0.24	1.00	
IO	-0.07	-0.18	0.32	0.57	0.18	-0.07	0.03	1.00

Panel C

	Dependent Variable: log(STOCK_DUR)				
	1	2	3	4	5
Independent Variable					
log(TURNOVER)	**-0.478** **(-22.53)**		**-0.540** **(-38.39)**	**-0.451** **(-29.77)**	**-0.401** **(-25.07)**
log(TRANSIENT)		**-0.331** **(-16.59)**		**-0.240** **(-12.35)**	**-0.232** **(-12.38)**
log(MCAP)			**0.335** **(32.81)**	**0.324** **(36.45)**	**0.284** **(23.87)**
log(IO)			**0.153** **(10.30)**	**0.252** **(15.36)**	**0.237** **(14.84)**
log(BMRATIO)			**0.154** **(14.84)**	**0.134** **(12.98)**	**0.111** **(10.55)**
log(PRC)					0.004 (0.35)
MOM6					**-0.044** **(-4.24)**
log(IDIORISK)					**-0.092** **(-6.90)**
Log(1+NUMANALYST)					-0.001 (-0.12)
R-Square (%)	22.8	10.9	38.5	41.6	42.3
Clustered(Firm,Qtr)	Yes	Yes	Yes	Yes	Yes
N	112,450	112,450	112,450	112,450	112,450

Table 2. Average Stock Duration and Idiosyncratic Volatility

This table reports coefficients corresponding to the following panel regression estimated using the data from March 1985 to December 2007:

$$\log(\sigma_{i,t}^{IDIO}) = \alpha + \beta \log(STOCK\_DUR_{i,t-1}) + \delta_j Control\_Variables_{j,t-1} + \varepsilon_{i,t}$$

The dependent variable is the natural logarithm of stock idiosyncratic risk (measured as the standard deviation of residuals from a 3-factor Fama and French model). Idiosyncratic risk at the end of a given quarter is estimated using daily returns data from that quarter. The independent variables are from the end of previous quarter and include: Average Stock Duration (STOCK_DUR), Average Fund Duration (FUND_DUR), percentage ownership of transient institutional investors (TRANSIENT), market capitalization (MCAP), book-to-market ratio (BMRATIO), turnover (TURNOVER), institutional ownership (IO), stock price (PRC), the absolute value of the past 6 month return (Abs(MOM6)), lagged idiosyncratic risk (LAGIDIORISK) and the number of analysts (NUMANALYST). The independent and dependent variables are standardized to allow for comparison across variables and across specifications. The t-statistics (reported in parentheses) are based on robust standard errors clustered along stock and quarter dimensions (Petersen (2008)). The coefficients significant at the 5% level are denoted in bold.

	Dependent Variable: log(IDIORISK)					
					1980-1995	1996-2006
Independent Variable	1	2	3	4	5	6
log(STOCK_DUR)	**-0.220**	**-0.063**	**-0.035**	**-0.031**	**-0.035**	**-0.035**
	(-23.66)	**(-7.39)**	**(-5.87)**	**(-5.35)**	**(-6.09)**	**(-3.42)**
log(FUND_DUR)				-0.008		
				(-0.94)		
log(TRANSIENT)		0.027	0.019	0.015	0.017	0.014
		(1.51)	(1.77)	(1.25)	(1.29)	(0.94)
log(MCAP)		**-0.097**	**-0.017**	**-0.029**	**-0.042**	**-0.028**
		(-9.04)	**(-2.49)**	**(-4.77)**	**(-4.95)**	**(-3.99)**
log(PCTIO)		**0.028**	**0.045**	**0.043**	**0.054**	**0.032**
		(2.06)	**(5.27)**	**(5.25)**	**(4.74)**	**(3.03)**
log(BMRATIO)		**-0.111**	**-0.048**	**-0.047**	**-0.049**	**-0.043**
		(-13.19)	**(-9.70)**	**(-9.40)**	**(-7.64)**	**(-7.14)**
log(PRC)		**-0.184**	**-0.072**	**-0.070**	**-0.116**	**-0.047**
		(-17.53)	**(-9.92)**	**(-9.95)**	**(-11.49)**	**(-6.28)**
Abs(MOM6)		**0.058**	0.008	0.009	0.014	0.007
		(4.51)	(1.32)	(1.60)	(1.52)	(0.95)
log(TURNOVER)		**0.091**	**-0.048**	**-0.055**	**-0.023**	**-0.066**
		(6.81)	**(-4.50)**	**(-4.92)**	**(-1.43)**	**(-5.04)**
log(LAGIDIORISK)			**0.375**	**0.375**	**0.280**	**0.418**
			(24.80)	**(24.78)**	**(12.51)**	**(23.57)**
log(1+NUMANALYST)				**0.031**	**0.028**	**0.038**
				(5.34)	**(3.50)**	**(4.51)**
R-Square (%)	4.9	11.1	18.4	18.4	15.3	20.3
Clustered(Firm,Qtr)	Yes	Yes	Yes	Yes	Yes	Yes
N	111,438	111,438	111,438	111,438	50,804	60,634

Table 3. Average Stock Duration and Momentum Returns

This table presents the results corresponding to the effect of the institutional investors' Average Stock Duration on future momentum profits. In Panel A and Panel B, stocks are first sorted into three equal groups based on the average of holding duration across institutional investors holding that stock. Average Stock Duration is calculated according to equation (1). A gap of one quarter is left between the calculation of holding duration measure and return calculation to account for the delay in the disclosure of institutional investor portfolio holdings. Stocks are then independently sorted into five groups based on the past six month returns. The returns for an unconditional momentum strategy based on past six month returns is reported in the first column of Panel A and Panel B. In Panel A, we report the Fama French 3-factor value-weighted and equal-weighted returns for the 15 portfolios. Fama-French alphas are estimated as the intercept of the time-series regression of monthly portfolio returns on monthly Fama French factors. Panel B reports the equal-weighted and value-weighted monthly raw returns along with the corresponding t-statistics. Panel C, reports the equal-weighted Fama-French 3-factor returns for the portfolios formed by independently sorting the stocks on past six month returns and either of the stock's average daily turnover or the average fund duration. All the returns are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

	Equal Weighted Raw Returns					Value Weighted Raw Returns				
		Average Stock Duration					Average Stock Duration			
Momentum	Uncond.	D1	D2	D3	D3-D1	Uncond.	D1	D2	D3	D3-D1
R1	**0.86**	0.68	**0.85**	**1.12**	0.44	**0.78**	**0.47**	**0.63**	**0.99**	**0.52**
	(2.08)	(1.38)	**(2.26)**	**(3.63)**	(1.60)	**(2.24)**	**(1.07)**	**(1.66)**	**(3.12)**	**(1.99)**
R2	**1.13**	**0.83**	**1.24**	**1.22**	**0.39**	**1.02**	**0.70**	**1.06**	**1.07**	0.37
	(4.03)	**(2.34)**	**(4.32)**	**(5.01)**	**(2.15)**	**(3.97)**	**(1.91)**	**(3.56)**	**(4.26)**	(1.54)
R3	**1.19**	**1.06**	**1.24**	**1.22**	0.17	**1.02**	**0.95**	**1.07**	**1.03**	0.08
	(4.50)	**(3.10)**	**(4.54)**	**(5.28)**	(0.91)	**(4.04)**	**(2.92)**	**(3.77)**	**(4.21)**	(0.40)
R4	**1.23**	**1.20**	**1.23**	**1.25**	0.04	**0.99**	**1.03**	**1.06**	**0.97**	-0.05
	(4.60)	**(3.50)**	**(4.56)**	**(5.26)**	(0.23)	**(3.79)**	**(2.91)**	**(3.68)**	**(3.78)**	(-0.24)
R5	**1.52**	**1.63**	**1.49**	**1.37**	-0.26	**1.38**	**1.72**	**1.36**	**1.27**	-0.45
	(4.30)	**(3.84)**	**(4.61)**	**(4.97)**	(-1.14)	**(4.27)**	**(3.94)**	**(3.99)**	**(4.38)**	(-1.52)
R5-R1	**0.67**	**0.96**	**0.63**	0.26	**-0.70**	**0.61**	**1.25**	**0.73**	0.28	**-0.97**
	(2.38)	**(3.13)**	**(2.41)**	(1.18)	**(-3.22)**	**(2.07)**	**(4.09)**	**(2.23)**	(0.94)	**(-3.89)**

Panel B

	Equal Weighted 3-Factor Alpha					Value Weighted 3-Factor Alpha				
		Average Stock Duration					Average Stock Duration			
Momentum	Uncond.	D1	D2	D3	D3-D1	Uncond.	D1	D2	D3	D3-D1
R1	**-0.47**	**-0.66**	**-0.48**	-0.16	**0.50**	**-0.38**	**-0.79**	**-0.62**	-0.09	**0.70**
	(-2.15)	**(-2.57)**	**(-2.42)**	(-0.98)	**(2.71)**	**(-1.97)**	**(-3.66)**	**(-2.81)**	(-0.41)	**(3.74)**
R2	-0.10	**-0.43**	-0.03	0.05	**0.48**	-0.07	**-0.49**	-0.12	0.02	**0.52**
	(-0.95)	**(-3.22)**	(-0.27)	(0.45)	**(4.61)**	(-0.72)	**(-2.99)**	(-0.96)	(0.20)	**(2.69)**
R3	-0.02	-0.20	-0.01	0.08	**0.28**	-0.06	-0.19	-0.12	-0.02	0.17
	(-0.22)	(-1.69)	(-0.09)	(0.90)	**(2.53)**	(-0.87)	(-1.59)	(-1.16)	(-0.21)	(1.24)
R4	0.06	0.01	0.02	0.12	0.11	-0.06	-0.07	-0.05	-0.06	0.01
	(0.81)	(0.15)	(0.27)	(1.32)	(1.02)	(-0.81)	(-0.53)	(-0.51)	(-0.59)	(0.06)
R5	**0.37**	**0.46**	**0.31**	**0.22**	-0.25	**0.33**	**0.69**	0.27	0.21	**-0.49**
	(3.15)	**(3.25)**	**(2.56)**	**(2.02)**	(-1.76)	**(2.51)**	**(3.86)**	(1.64)	(1.38)	**(-2.37)**
R5-R1	**0.83**	**1.13**	**0.79**	0.38	**-0.75**	**0.71**	**1.48**	**0.88**	0.29	**-1.19**
	(2.93)	**(3.58)**	**(2.94)**	(1.71)	**(-3.34)**	**(2.39)**	**(4.83)**	**(2.65)**	(0.96)	**(-4.74)**

Panel C

	Equal Weighted 3-Factor Alpha Turnover				Equal Weighted 3-Factor Alpha Average Fund Duration			
Momentum	D1	D2	D3	D3-D1	D1	D2	D3	D3-D1
R1	-0.16	**-0.43**	**-0.66**	**-0.50**	**-0.71**	-0.39	-0.26	**0.45**
	(-0.98)	**(-2.34)**	**(-2.60)**	**(-2.52)**	**(-2.89)**	(-1.79)	(-1.36)	**(3.11)**
R2	0.07	-0.11	**-0.38**	**-0.45**	**-0.26**	-0.10	0.02	**0.28**
	(0.66)	(-0.93)	**(-2.77)**	**(-3.30)**	**(-2.02)**	(-0.86)	(0.18)	**(2.84)**
R3	0.12	-0.10	-0.15	**-0.27**	-0.13	-0.02	0.06	0.19
	(1.20)	(-1.01)	(-1.16)	**(-1.97)**	(-1.07)	(-0.18)	(0.63)	(1.67)
R4	0.12	0.01	0.03	-0.10	0.03	0.06	0.09	0.06
	(1.30)	(0.15)	(0.26)	(-0.75)	(0.31)	(0.66)	(1.06)	(0.64)
R5	0.20	**0.26**	**0.44**	0.24	**0.42**	**0.41**	**0.26**	-0.16
	(1.55)	**(2.18)**	**(3.07)**	(1.47)	**(2.89)**	**(3.65)**	**(2.25)**	(-1.13)
R5-R1	0.36	**0.69**	**1.10**	**0.74**	**1.13**	**0.81**	**0.52**	**-0.61**
	(1.73)	**(2.82)**	**(3.64)**	**(3.37)**	**(3.66)**	**(2.87)**	**(1.99)**	**(-3.30)**

Table 4. Residual Duration measures and Momentum Returns

This table presents monthly momentum returns from portfolio strategies based on past six month returns and either Residual Average Stock Duration or residual turnover. In panel A, residual duration is defined as the residual obtained from regressing the log of stock's average holding duration (STOCK_DUR) at the end of that quarter on the log of stock's average daily turnover during the given quarter (TURNOVER). Similarly, in panel B residual turnover is defined as the residual obtained from regressing the log of stock's average daily turnover (TURNOVER) on the log of stock's average holding duration (STOCK_DUR). In panel C, residual duration is defined as the residual from the regression of the log of stock's average holding duration (STOCK_DUR) on log of following stock characteristics: average daily turnover (TURNOVER), market capitalization (MCAP), book-to-market ratio (BMRATIO) and stock's institutional ownership (IO). Equal-weighted Fama-French 3-factor alphas and raw returns are calculated. All the returns are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

	Residual Average Stock Duration: log(Duration)=log(Turnover)							
	Equal Weighted 3-Factor Alpha				Equal Weighted Raw Returns			
Momentum	RD1	RD2	RD3	RD3-RD1	RD1	RD2	RD3	RD3-RD1
R1	**-0.70**	-0.38	-0.29	**0.41**	0.66	**0.93**	**0.99**	**0.33**
	(-2.90)	(-1.84)	(-1.31)	**(3.44)**	(1.49)	**(2.32)**	**(2.53)**	**(2.45)**
R5	**0.39**	**0.35**	**0.37**	-0.03	**1.58**	**1.52**	**1.46**	-0.12
	(2.78)	**(2.71)**	**(3.07)**	(-0.21)	**(4.06)**	**(4.44)**	**(4.38)**	(-0.92)
R5-R1	**1.09**	**0.74**	**0.65**	**-0.44**	**0.92**	**0.59**	0.47	**-0.45**
	(3.52)	**(2.59)**	**(2.25)**	**(-2.62)**	**(3.03)**	**(2.12)**	(1.63)	**(-2.71)**

Panel B

	Residual Turnover: log(Turnover)=log(Duration)							
	Equal Weighted 3-Factor Alpha				Equal Weighted Raw Returns			
Momentum	RD1	RD2	RD3	RD3-RD1	RD1	RD2	RD3	RD3-RD1
R1	**-0.36**	**-0.44**	**-0.58**	-0.22	**0.93**	**0.88**	0.79	-0.14
	(-1.81)	**(-1.97)**	**(-2.42)**	(-1.54)	**(2.60)**	**(2.21)**	(1.70)	(-0.77)
R5	**0.33**	**0.30**	**0.43**	0.10	**1.50**	**1.49**	**1.57**	0.07
	(2.80)	**(2.40)**	**(2.98)**	(0.74)	**(4.75)**	**(4.41)**	**(3.86)**	(0.43)
R5-R1	**0.69**	**0.73**	**1.01**	0.32	**0.57**	**0.61**	**0.78**	0.22
	(2.59)	**(2.55)**	**(3.35)**	(1.89)	**(2.18)**	**(2.19)**	**(2.61)**	(1.29)

Panel C

	Residual Average Stock Duration: log(Duration)=log(Turnover), log(TRANSIENT), log(MCAP), log(BMRATIO), log(IO)							
	Equal Weighted 3-Factor Alpha				Equal Weighted Raw Returns			
Momentum	RD1	RD2	RD3	RD3-RD1	RD1	RD2	RD3	RD3-RD1
R1	**-0.52**	-0.33	-0.10	**0.42**	**0.87**	**0.99**	**1.14**	**0.28**
	(-2.12)	(-1.57)	(-0.48)	**(3.64)**	**(1.99)**	**(2.51)**	**(2.91)**	**(2.33)**
R5	**0.40**	**0.36**	**0.37**	-0.03	**1.59**	**1.51**	**1.50**	-0.08
	(2.85)	**(2.78)**	**(2.97)**	(-0.32)	**(4.20)**	**(4.45)**	**(4.22)**	(-0.77)
R5-R1	**0.92**	**0.68**	0.47	**-0.46**	**0.72**	**0.52**	0.36	**-0.36**
	(2.94)	**(2.42)**	(1.71)	**(-2.96)**	**(2.32)**	**(1.90)**	(1.33)	**(-2.33)**

Table 5. Momentum Returns: Regression Evidence

This table presents results of quarterly Fama-MacBeth regressions of future six month stock returns (RET6MONTH, columns 1 – 6) or future three month stock returns (RET3MONTH, column 7) on past 6 months returns (MOM6), Average Stock Duration (STOCK_DUR), and their interaction plus controls. Firm characteristics of book to market ratio (BMRATIO), size (MCAP), past quarter average daily turnover (TURNOVER), stock price (PRC), the number of analysts (NUMANALYST), percentage ownership by transient institutional investors (TRANSIENT) and institutional ownership (IO) are included as control variables. The table presents regression evidence on interaction of momentum returns and stock-level investor horizon measures. 5% significance level is denoted in bold and t-statistics are given in parentheses.

	1	2	3	4	5	6	7
Independent Variable			RET6MONTH				RET3MONTH
MOM6	**0.114**	-0.019	**0.112**	0.045	-0.070	0.144	-0.012
	(6.00)	(-0.68)	**(2.99)**	(0.81)	(-0.70)	(1.06)	(-0.18)
MOM6*LOG(STOCK_DUR)	**-0.040**		**-0.048**	**-0.045**	**-0.056**	**-0.036**	**-0.030**
	(-3.30)		**(-3.40)**	**(-3.22)**	**(-3.55)**	**(-2.00)**	**(-2.07)**
LOG(STOCK_DUR)	0.004		**0.012**	**0.012**	**0.013**	**0.017**	0.006
	(0.43)		**(2.89)**	**(2.96)**	**(2.97)**	**(3.91)**	(1.90)
MOM6*LOG(FUND_DUR)						**-0.134**	
						(-2.40)	
LOG(FUNDDURATION)						**-0.025**	
						(-2.05)	
MOM6*LOG(TURNOVER)			-0.003	-0.007	-0.009	-0.009	-0.006
			(-0.39)	(-0.80)	(-0.97)	(-0.93)	(-1.02)
LOG(TURNOVER)			0.005	0.006	0.004	0.004	0.001
			(1.06)	(1.04)	(0.76)	(0.75)	(0.23)
MOM6*LOG(IO)					**0.038**	**0.041**	**0.030**
					(2.08)	**(2.09)**	**(2.56)**
LOG(IO)					-0.005	-0.004	0.000
					(-1.04)	(-0.77)	(-0.75)
MOM6*LOG(1+NUMANALYST)					-0.003	-0.002	0.002
					(-0.38)	(-0.31)	(0.31)
LOG(1+NUMANALYST)					**0.009**	**0.009**	**0.004**
					(3.74)	**(3.84)**	**(2.42)**
MOM6*LOGMCAP					0.001	0.003	-0.005
					(0.19)	(0.57)	(-1.35)
MOM6*LOG(TRANSIENT)		**0.030**		0.018	0.003	-0.010	-0.005
		(3.20)		(1.95)	(0.26)	(-0.81)	(-0.68)
LOG(TRANSIENT)		0.000		-0.002	-0.002	-0.005	0.000
		(-0.06)		(-0.54)	(-0.55)	(-1.40)	(0.18)
LOG(BMRATIO)	0.009	0.010	**0.010**	**0.010**	**0.009**	**0.009**	0.004
	(1.81)	(1.87)	**(2.06)**	**(2.08)**	**(2.06)**	**(2.09)**	(1.38)
LOG(MCAP)	0.000	0.000	-0.001	0.000	-0.003	-0.003	-0.001
	(-0.24)	(0.18)	(-0.27)	(-0.14)	(-1.25)	(-1.17)	(-0.82)
Average Rsquare (%)	5.7	5.5	7.1	7.6	8.6	8.9	8.3
N	89	89	89	89	89	89	89

Table 6. Average Stock Duration and Momentum Reversal

This table reports the Fama and French (1993) equal weighted 3-factor alphas for momentum strategies based on past returns and Average Stock Duration for a period of up to 3 years after the portfolio formation. At the beginning of each quarter, stocks are independently sorted into five groups each based on past six month returns and Average Stock Duration (calculated according to equation (1)). To account for overlapping portfolios, stocks ranked in each of the past twelve quarters form one-twelfth of the portfolio. Each quarter, one-twelfth of the portfolio ranked twelve quarters back is replaced by the stocks ranked most recently. Returns from each of the twelve sub-portfolios are equally weighted to calculate the monthly returns for the portfolio. Average monthly portfolio raw returns for the twenty five portfolios are then regressed on Fama-French three factors to estimate the 3-factor alphas. The results are reported in panel A. Similarly, Panel B presents the results for portfolio strategy based on past returns and either of stock turnover or average fund duration .Panel C reports the results for portfolio strategy based on past returns and either of residual holding duration (residual obtained from the cross-sectional regression of log of Average Stock Duration on log of average daily turnover) of residual turnover (residual obtained from regressing log of average daily turnover on the log of average stock duration). All the alphas are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

	Equal Weighted Raw Returns Average Stock Duration							Equal Weighted 3-Factor Alpha Average Stock Duration						
Momentum	Uncond.	D1	D2	D3	D4	D5	D5-D1	Uncond.	D1	D2	D3	D4	D5	D5-D1
R1	**1.28**	**1.32**	**1.26**	**1.23**	**1.27**	**1.21**	-0.11	-0.02	0.00	-0.07	-0.09	0.02	0.02	0.02
	(3.53)	**(2.94)**	**(3.25)**	**(3.56)**	**(4.17)**	**(4.31)**	(-0.42)	(-0.12)	(0.01)	(-0.54)	(-0.75)	(0.15)	(0.20)	(0.12)
R2	**1.15**	**1.14**	**1.12**	**1.18**	**1.19**	**1.13**	-0.01	-0.07	-0.13	-0.15	-0.07	-0.03	0.01	0.14
	(4.00)	**(2.91)**	**(3.38)**	**(3.98)**	**(4.37)**	**(4.66)**	(-0.04)	(-0.74)	(-0.92)	(-1.24)	(-0.68)	(-0.26)	(0.11)	(0.95)
R3	**1.15**	**1.09**	**1.14**	**1.17**	**1.23**	**1.14**	0.04	-0.02	-0.11	-0.08	-0.03	0.05	0.02	0.13
	(4.24)	**(2.92)**	**(3.59)**	**(4.21)**	**(4.70)**	**(4.78)**	(0.19)	(-0.24)	(-0.89)	(-0.78)	(-0.31)	(0.53)	(0.25)	(1.05)
R4	**1.18**	**1.20**	**1.15**	**1.16**	**1.23**	**1.15**	-0.05	0.02	0.00	-0.02	-0.02	0.07	0.06	0.06
	(4.22)	**(3.21)**	**(3.66)**	**(4.17)**	**(4.63)**	**(4.72)**	(-0.21)	(0.22)	(-0.02)	(-0.19)	(-0.24)	(0.70)	(0.61)	(0.46)
R5	**1.11**	**1.04**	**1.07**	**1.19**	**1.15**	**1.21**	0.16	-0.05	-0.11	-0.10	0.02	-0.04	0.09	0.20
	(3.16)	**(2.35)**	**(2.91)**	**(3.68)**	**(3.87)**	**(4.35)**	(0.66)	(-0.47)	(-0.68)	(-0.81)	(0.17)	(-0.41)	(0.81)	(1.32)
R5-R1	-0.17	**-0.27**	-0.18	-0.03	-0.12	-0.01	**0.27**	-0.04	-0.11	-0.03	0.11	-0.06	0.07	0.18
	(-1.50)	**(-1.97)**	(-1.50)	(-0.29)	(-1.09)	(-0.06)	**(2.18)**	(-0.40)	(-0.88)	(-0.27)	(1.08)	(-0.55)	(0.55)	(1.45)

Panel B

	Equal Weighted Raw Returns Turnover						Equal Weighted Raw Returns Average Fund Duration					
Momentum	D1	D2	D3	D4	D5	D5-D1	D1	D2	D3	D4	D5	D5-D1
R1	**1.16**	**1.19**	**1.13**	**1.19**	**1.43**	0.26	**1.19**	**1.30**	**1.31**	**1.33**	**1.24**	0.05
	(4.26)	**(3.89)**	**(3.43)**	**(3.26)**	**(2.98)**	(0.84)	**(2.82)**	**(3.30)**	**(3.57)**	**(3.98)**	**(4.22)**	(0.27)
R5	**1.10**	**1.07**	**1.17**	**1.11**	**1.14**	0.04	**0.94**	**1.21**	**1.21**	**1.17**	**1.18**	0.24
	(4.19)	**(3.71)**	**(3.76)**	**(3.14)**	**(2.38)**	(0.13)	**(2.19)**	**(3.34)**	**(3.65)**	**(3.84)**	**(4.21)**	(1.07)
R5-R1	-0.06	-0.13	0.04	-0.08	**-0.28**	-0.22	-0.25	-0.09	-0.09	-0.16	-0.07	0.18
	(-0.59)	(-1.06)	(0.33)	(-0.68)	**(-2.05)**	(-1.52)	(-1.66)	(-0.69)	(-0.81)	(-1.38)	(-0.53)	(1.35)

Panel C

	Equal Weighted Raw Returns Residual Average Stock Duration						Equal Weighted Raw Returns Residual Turnover					
Momentum	D1	D2	D3	D4	D5	D5-D1	D1	D2	D3	D4	D5	D5-D1
R1	**1.23**	**1.28**	**1.26**	**1.24**	**1.39**	0.16	**1.30**	**1.17**	**1.19**	**1.32**	**1.31**	0.00
	(3.06)	**(3.42)**	**(3.52)**	**(3.59)**	**(3.97)**	(1.22)	**(4.21)**	**(3.52)**	**(3.39)**	**(3.63)**	**(3.01)**	(0.02)
R5	**0.99**	**1.04**	**1.18**	**1.16**	**1.27**	**0.28**	**1.09**	**1.04**	**1.01**	**1.17**	**1.23**	0.14
	(2.52)	**(2.91)**	**(3.50)**	**(3.42)**	**(3.77)**	**(2.31)**	**(3.62)**	**(3.22)**	**(2.98)**	**(3.30)**	**(2.80)**	(0.62)
R5-R1	-0.24	-0.24	-0.08	-0.08	-0.11	0.13	-0.21	-0.13	-0.19	-0.15	-0.08	0.13
	(-1.72)	(-1.82)	(-0.64)	(-0.65)	(-0.91)	(1.11)	(-1.87)	(-1.09)	(-1.46)	(-1.25)	(-0.58)	(1.06)

Table 7. Average Stock Duration and Accruals Anomaly

This table presents monthly 4-factor Fama-French alphas and raw returns from portfolio strategies based on an independent two-way sort based on total accruals and measures of investor horizon. Total accruals are calculated from the quarterly COMPUSTAT data by using the definition given in Sloan (1996): Accruals = (ΔCA-ΔCash)- (ΔCL-ΔSTD-ΔTP)-Dep; where ΔCA is the change in current assets, ΔCash is the change in cash/cash equivalents, ΔCL is the change in current liabilities, ΔSTD is the change in debt included in current liabilities, ΔTP is the change in income tax payable, Dep is the depreciation and amortization expense. Accruals are scaled by the average assets of the firm ((Assets(t-1)+Assets(t))/2) to calculate the value of "Total Accruals" used in the analysis. At the beginning of each quarter, stocks are first divided into five groups based on total accruals and then independently divided into three groups based on average Average Stock Duration calculated using equation (1) in the text. Average equal-weighted monthly raw returns and Fama-French 4-factor alphas for these 15 portfolios are reported in panel A of the table. The returns for the unconditional portfolio strategy based on total accruals are reported in the first column. Panel B, presents the results of a portfolio strategy based on total accruals and average daily turnover. A gap of one quarter is left between portfolio formation and return calculation to allow for accounting information and institutional holdings to become public. Similarly, Panel C presents the results of portfolio strategies based on total accruals and either Residual Average Stock Duration (residual obtained by regressing log of Average Stock Duration on log of average daily turnover) or Residual Turnover (residual obtained from regressing log of turnover on log of Average Stock Duration). Panel D presents regression evidence on interaction of accruals anomaly and stock-level investor horizon measures. We present results of quarterly Fama-MacBeth regressions of future three month stock returns (RET3MONTH) on average stock holding duration (STOCK_DUR), total accruals (ACCRUALS) and other stock characteristics. ACCRUALS_Q1 and ACCRUALS_Q5 are dummy variables corresponding to the stocks in the first and the last accrual quintiles. All the returns are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

	Equal Weighted 4- Factor Alpha					Equal Weighted Raw Returns				
	Average Stock Duration					Average Stock Duration				
Accrual Rank	Uncond.	D1	D2	D3	D3-D1	Uncond.	D1	D2	D3	D3-D1
R1	**0.50**	**0.67**	**0.43**	**0.35**	-0.32	**1.54**	**1.67**	**1.52**	**1.37**	-0.30
	(4.59)	**(3.95)**	**(3.13)**	**(3.01)**	(-1.71)	**(4.43)**	**(3.60)**	**(4.65)**	**(5.34)**	(-1.02)
R2	**0.24**	0.26	**0.26**	**0.28**	0.03	**1.30**	**1.24**	**1.35**	**1.37**	0.13
	(2.42)	(1.65)	**(2.07)**	**(2.50)**	(0.15)	**(4.41)**	**(3.09)**	**(4.49)**	**(5.48)**	(0.51)
R3	0.11	0.06	0.10	0.17	0.11	**1.14**	**1.06**	**1.15**	**1.20**	0.14
	(1.21)	(0.37)	(0.85)	(1.72)	(0.64)	**(4.12)**	**(2.68)**	**(4.07)**	**(5.33)**	(0.55)
R4	0.08	0.06	0.03	0.09	0.03	**1.12**	**1.09**	**1.12**	**1.11**	0.02
	(0.78)	(0.38)	(0.23)	(0.85)	(0.21)	**(3.80)**	**(2.71)**	**(3.64)**	**(4.62)**	(0.09)
R5	-0.06	-0.27	0.03	0.16	**0.44**	**1.02**	0.80	**1.10**	**1.29**	0.49
	(-0.54)	(-1.69)	(0.22)	(1.25)	**(2.28)**	**(2.88)**	(1.76)	**(3.22)**	**(4.76)**	(1.70)
R5-R1	**-0.56**	**-0.95**	**-0.39**	**-0.19**	**0.75**	**-0.52**	**-0.87**	**-0.42**	-0.08	**0.79**
	(-4.79)	**(-5.01)**	**(-2.51)**	(-1.41)	**(3.47)**	**(-4.60)**	**(-4.84)**	**(-2.75)**	(-0.59)	**(3.84)**

Panel B

	Equal Weighted 4-factor Alpha Turnover				Equal Weighted Raw Returns Turnover			
Accrual Rank	D1	D2	D3	D3-D1	D1	D2	D3	D3-D1
R1	**0.29**	**0.37**	**0.82**	**0.53**	**1.32**	**1.50**	**1.74**	0.42
	(2.36)	**(2.65)**	**(4.63)**	**(2.53)**	**(5.20)**	**(4.71)**	**(3.53)**	(1.21)
R2	0.21	**0.28**	0.23	0.02	**1.31**	**1.45**	**1.16**	-0.14
	(1.77)	**(2.11)**	(1.51)	(0.12)	**(5.40)**	**(4.83)**	**(2.71)**	(-0.47)
R3	0.07	0.14	0.14	0.07	**1.13**	**1.19**	**1.08**	-0.06
	(0.66)	(1.21)	(0.83)	(0.39)	**(5.01)**	**(4.34)**	**(2.52)**	(-0.18)
R4	0.02	0.11	0.02	0.00	**1.06**	**1.20**	**1.02**	-0.05
	(0.22)	(0.94)	(0.11)	(-0.02)	**(4.50)**	**(4.22)**	**(2.31)**	(-0.16)
R5	0.22	-0.06	-0.23	**-0.45**	**1.42**	**1.05**	0.80	**-0.62**
	(1.59)	(-0.46)	(-1.36)	**(-2.15)**	**(4.97)**	**(3.22)**	(1.71)	**(-1.98)**
R5-R1	-0.06	**-0.44**	**-1.04**	**-0.98**	0.10	**-0.45**	**-0.94**	**-1.04**
	(-0.48)	**(-2.94)**	**(-5.46)**	**(-4.53)**	(0.76)	**(-3.21)**	**(-5.15)**	**(-4.98)**

Panel C

Residual Average Stock Duration: Residual from regression log(STOCK_DUR)=log(TURNOVER)
Residual Turnover: Residual from log(TURNOVER)=log(STOCK_DUR)

	Equal Weighted 4-Factor Alpha Residual Average Stock Duration				Equal Weighted 4-Factor Alpha Residual Turnover			
Accrual Rank	D1	D2	D3	D3-D1	D1	D2	D3	D3-D1
R1	**0.52**	**0.39**	**0.60**	0.08	**0.41**	**0.36**	**0.73**	0.32
	(3.55)	**(2.68)**	**(4.70)**	(0.56)	**(3.39)**	**(2.45)**	**(4.41)**	(1.75)
R2	0.08	**0.34**	**0.29**	0.21	**0.25**	0.19	0.25	0.00
	(0.57)	**(2.51)**	**(2.70)**	(1.39)	**(2.07)**	(1.46)	(1.68)	(0.01)
R3	-0.09	0.11	**0.27**	**0.36**	-0.04	0.20	0.14	0.17
	(-0.58)	(0.90)	**(2.64)**	**(2.34)**	(-0.33)	(1.67)	(0.92)	(1.02)
R4	0.08	0.05	0.09	0.00	0.07	0.10	0.01	-0.07
	(0.59)	(0.41)	(0.79)	(0.02)	(0.66)	(0.83)	(0.05)	(-0.39)
R5	-0.17	-0.18	0.16	0.33	0.13	-0.16	-0.09	-0.22
	(-0.99)	(-1.32)	(1.29)	(1.89)	(0.86)	(-1.16)	(-0.57)	(-1.11)
R5-R1	**-0.68**	**-0.56**	**-0.44**	0.25	-0.28	**-0.51**	**-0.83**	**-0.54**
	(-3.87)	**(-3.46)**	**(-2.72)**	(1.22)	(-1.91)	**(-3.40)**	**(-4.34)**	**(-2.60)**

Panel D

Independent Variable	Dependent Variable: RET3MONTH				
	1	2	3	4	5
ACCRUALS	**-0.064**	**-0.168**	**-0.438**		
	(-2.50)	**(-2.11)**	**(-2.67)**		
ACCRUALS*LOG(STOCK_DUR)		0.062	-0.004		
		(1.36)	(-0.07)		
LOG(STOCK_DUR)		0.004	0.003		
		(1.11)	(0.89)		
ACCRUALS*LOG(TURNOVER)			**-0.070**		
			(-2.04)		
LOG(TURNOVER)	0.001		0.001		0.001
	(0.13)		(0.15)		(0.33)
ACCRUALS_Q1				**0.040**	**0.058**
				(3.79)	**(3.31)**
ACCRUALS_Q5				**-0.020**	**-0.041**
				(-2.04)	**(-2.67)**
DUMQ1*LOG(STOCK_DUR)				**-0.017**	**-0.011**
				(-3.01)	**(-1.97)**
DUMQ5*LOG(STOCK_DUR)				**0.011**	0.004
				(2.07)	(0.57)
DUMQ1*LOG(TURNOVER)					0.005
					(1.39)
DUMQ5*LOG(TURNOVER)					-0.006
					(-1.77)
LOG(BMRATIO)	0.003	0.003	0.003	0.003	0.003
	(1.08)	(1.02)	(0.98)	(1.05)	(1.05)
LOG(MCAP)	0.000	-0.001	-0.001	0.000	0.000
	(-0.16)	(-0.42)	(-0.42)	(-0.21)	(-0.26)
MOM6	0.012	0.012	0.012	0.012	0.013
	(1.53)	(1.51)	(1.48)	(1.37)	(1.64)
Average Rsquare (%)	6.6	7.1	7.3	6.2	7.9
N	89	89	89	89	89

Table 8. Investor Horizon and under-reaction to R&D Investment Increases

This table presents the Fama and French 4-factor alphas for a sample of 11,487 unexpected R&D increases by the firms from 1985 to 2007 conditional on the holding duration of institutional investors. Following criteria were applied to determine economically significant R&D investment and unexpected R&D increases for a stock to be included in the sample: 1) Increase in R&D intensity (R&D/Assets) during the last fiscal year >=2.5%, 2) Percentage increase in dollar value of R&D during last year >=2.5%, 3) End of last year R&D Intensity (R&D/Assets and R&D/Sales) >=2.5%. Holding period of the stocks is one quarter. A gap of one quarter is left between the calculation of R&D and duration variables and return calculation to ensure that these variables are public information at the time of portfolio formation. At the beginning of a quarter, the number of stocks in the sample with significant R&D increases varies between 82 and 206 (average number of stocks is 125). The first row of panel A reports the Fama and French(1993) 4-factor value-weighed and equal-weighed alphas for all the stocks in the sample. Each quarter stocks in the sample are sorted into five groups based on their Average Stock Duration and monthly 4-factor alphas for each portfolio are calculated. The results are reported in the remaining rows of panel A. Similarly, Panel B and Panel C report the 4-factor alphas for portfolio strategies based on significant R&D increases and either one of the following: residual stock duration, stock turnover and residual turnover. All the returns are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

Average	Value-Weighted	Equal Weighted				
Stock Duration	4-Factor Alpha	4-Factor Alpha	MKT	HML	SMB	UMD
All Stocks	**0.37**	**0.68**	**1.18**	**-0.36**	**0.71**	**-0.19**
	(2.72)	**(4.57)**	**(31.26)**	**(-6.33)**	**(15.33)**	**(-5.81)**
1	**1.19**	**1.29**	**1.33**	**-0.95**	**1.22**	**-0.30**
	(2.98)	**(4.17)**	**(16.94)**	**(-8.08)**	**(12.77)**	**(-4.39)**
2	0.22	**0.52**	**1.28**	**-0.59**	**0.79**	**-0.21**
	(0.74)	**(2.05)**	**(19.94)**	**(-6.19)**	**(10.13)**	**(-3.74)**
3	0.15	**0.48**	**1.22**	**-0.24**	**0.82**	**-0.22**
	(0.52)	**(2.37)**	**(23.51)**	**(-3.12)**	**(13.04)**	**(-4.90)**
4	**0.53**	**0.59**	**1.12**	**-0.09**	**0.57**	**-0.09**
	(2.40)	**(3.58)**	**(26.57)**	**(-1.49)**	**(11.15)**	**(-2.54)**
5	**0.39**	**0.52**	**0.96**	**0.08**	**0.13**	**-0.14**
	(2.29)	**(3.92)**	**(28.71)**	**(1.63)**	**(3.15)**	**(-4.63)**
D5-D1	-0.80	**-0.78**	**-0.37**	**1.03**	**-1.10**	**0.17**
	(-1.87)	**(-2.39)**	**(-4.54)**	**(8.35)**	**(-10.87)**	**(2.31)**

Panel B

log(STOCKDURATION)=log(TURNOVER)			log(STOCKDURATION)=log(TURNOVER), log(MCAP), log(BMRATIO), log(IO)		
	4-Factor Alpha			4-Factor Alpha	
Residual Average Stock Duration	EW	VW	Residual Average Stock Duration	EW	VW
1	**1.10**	**0.73**	1	**1.30**	**0.98**
	(4.16)	**(2.16)**		**(5.14)**	**(2.84)**
2	**0.68**	0.55	2	**0.39**	**0.20**
	(2.91)	(1.92)		(1.77)	(0.74)
3	**0.48**	0.24	3	**0.45**	0.34
	(2.30)	(1.03)		**(2.37)**	(1.36)
4	**0.47**	**0.60**	4	**0.44**	0.37
	(2.52)	**(3.08)**		**(2.10)**	(1.67)
5	**0.65**	0.30	5	**0.74**	0.51
	(3.74)	(1.40)		**(3.63)**	(1.85)
5-1	-0.44	-0.43	5-1	**-0.55**	-0.47
	(-1.65)	(-1.37)		**(-2.08)**	(-1.09)

Panel C

			log(TURNOVER)=log(STOCKDURATION)		
	4-Factor Alpha			4-Factor Alpha	
Turnover	EW	VW	Residual Turnover	EW	VW
1	**0.62**	**0.40**	1	**1.03**	**0.92**
	(3.96)	**(1.97)**		**(5.31)**	**(2.87)**
2	**0.60**	0.37	2	**0.68**	0.30
	(3.59)	(1.70)		**(3.85)**	(1.39)
3	**0.65**	0.41	3	**0.53**	0.20
	(3.07)	(1.31)		**(2.50)**	(0.92)
4	**0.69**	0.39	4	**0.77**	**0.58**
	(2.71)	(1.29)		**(3.33)**	**(2.27)**
5	**0.85**	**0.87**	5	0.38	0.56
	(2.67)	**(2.28)**		(1.42)	(1.69)
5-1	0.22	0.46	5-1	**-0.66**	-0.36
	(0.63)	(0.98)		**(-2.22)**	(-0.78)

Table 9. Average Stock Duration and Issuance Anomaly

This table presents monthly equal-weighted and value-weighted 4-factor Fama-French alphas from portfolio strategies based on an independent two-way sort based on the annual share issuance measure (ISSUE_ANNUAL) and the measures of investor horizon. Annual Share Issuance measure is calculated from the quarterly CRSP data by using the definition given in equation (7) in the text. At the beginning of each quarter, stocks are first divided into five groups based on the annual share issuance measure and then independently divided into give groups based on Average Stock Duration calculated using equation (1) in the text. Average equal-weighted and value-weighted Fama-French 4-factor alphas for these 25 portfolios are reported in panel A of the table. The returns for the unconditional portfolio strategy based on the annual share issuance measure are reported in the first column. Panel B, presents the results of a portfolio strategy based on the annual share issuance measure and the Residual Average Stock Duration (residual obtained by regressing log of Average Stock Duration on log of average daily turnover) measure. A gap of one quarter is left between portfolio formation and return calculation to allow for accounting information and institutional holdings to become public. Similarly, Panel C presents the results of portfolio strategies based on total accruals and either average daily turnover or Residual Turnover (residual obtained from regressing log of turnover on log of Average Stock Duration). Panel D presents regression evidence on interaction of share issuance anomaly and stock-level investor duration measures. We present results of quarterly Fama-MacBeth regressions of future three month stock returns (RET3MONTH) on average stock holding duration (STOCK_DUR), annual share issuance (ISSUE_ANNUAL) and other stock characteristics. All the returns are in monthly percentage. 5% significance level is denoted in bold and t-statistics are given in parentheses.

Panel A

	Equal Weighted 4-Factor Alpha							Value Weighted 4-Factor Alpha						
		Average Stock Duration							Average Stock Duration					
ISSUE_ANNUAL	Uncond.	D1	D2	D3	D4	D5	D5-D1	Uncond.	D1	D2	D3	D4	D5	D5-D1
R1	**0.28**	0.34	0.11	**0.26**	0.22	**0.22**	-0.12	0.14	0.20	0.06	0.19	0.11	0.10	-0.09
	(2.72)	(1.94)	(0.83)	**(2.15)**	(1.67)	**(2.06)**	(-0.68)	(1.34)	(0.92)	(0.35)	(1.36)	(0.81)	(0.77)	(-0.68)
R2	**0.06**	0.26	0.07	0.20	0.09	0.10	-0.15	0.10	-0.04	-0.08	0.28	0.01	0.12	0.16
	(0.77)	(1.32)	(0.51)	(1.70)	(0.86)	(1.11)	(-0.69)	(1.10)	(-0.14)	(-0.47)	(1.79)	(0.10)	(1.05)	(0.55)
R3	**0.03**	0.17	0.05	0.12	0.19	0.12	-0.05	-0.01	0.11	**0.30**	0.27	0.10	-0.03	-0.15
	(0.38)	(0.98)	(0.40)	(0.97)	(1.76)	(1.12)	(-0.28)	(-0.18)	(0.50)	**(1.97)**	(1.62)	(0.74)	(-0.25)	(-0.54)
R4	**0.18**	**0.38**	0.11	0.15	0.15	0.21	-0.17	0.17	0.35	0.09	-0.01	-0.20	0.17	-0.18
	(2.31)	**(2.33)**	(0.88)	(1.32)	(1.24)	(1.95)	(-0.84)	(1.75)	(1.55)	(0.53)	(-0.04)	(-1.24)	(0.89)	(-0.62)
R5	**-0.27**	-0.25	0.03	0.02	**-0.23**	-0.09	0.16	**-0.32**	**-0.39**	-0.22	-0.32	**-0.35**	0.01	0.40
	(-2.78)	(-1.60)	(0.24)	(0.20)	**(-1.97)**	(-0.59)	(0.80)	**(-3.38)**	**(-2.07)**	(-1.11)	(-1.92)	**(-2.32)**	(0.06)	(1.31)
R5-R1	**-0.55**	**-0.60**	-0.08	-0.24	**-0.44**	**-0.31**	0.28	**-0.46**	**-0.58**	-0.28	**-0.52**	**-0.46**	-0.09	0.49
	(-4.06)	**(-2.82)**	(-0.45)	(-1.58)	**(-3.06)**	**(-2.04)**	(1.14)	**(-2.83)**	**(-2.12)**	(-1.03)	**(-2.20)**	**(-2.24)**	(-0.37)	(1.38)

Panel B

	Equal Weighted 4-Factor Alpha Residual Average Stock Duration						Value Weighted 4-Factor Alpha Residual Average Stock Duration					
ISSUE_ANNUAL	D1	D2	D3	D4	D5	D5-D1	D1	D2	D3	D4	D5	D5-D1
R1	0.19	0.21	0.12	**0.24**	**0.26**	0.07	0.16	0.06	-0.04	0.21	0.09	-0.07
	(1.30)	(1.61)	(0.97)	**(1.97)**	**(2.27)**	(0.56)	(0.90)	(0.37)	(-0.28)	(1.64)	(0.60)	(-0.37)
R5	-0.26	-0.13	0.14	-0.11	-0.02	0.24	**-0.63**	**-0.48**	-0.21	-0.24	0.03	**0.66**
	(-1.72)	(-0.93)	(0.97)	(-0.86)	(-0.12)	(1.27)	**(-3.41)**	**(-2.84)**	(-1.29)	(-1.47)	(0.16)	**(2.45)**
R5-R1	**-0.44**	-0.34	0.02	**-0.35**	-0.28	0.16	**-0.79**	**-0.54**	-0.16	**-0.45**	-0.06	**0.73**
	(-2.47)	(-1.95)	(0.12)	**(-1.97)**	(-1.33)	(0.76)	**(-3.39)**	**(-2.27)**	(-0.73)	**(-2.03)**	(-0.21)	**(2.48)**

Panel C

	Equal Weighted 4-Factor Alpha Turnover						Equal Weighted 4-Factor Alpha Residual Turnover					
ISSUE_ANNUAL	D1	D2	D3	D4	D5	D5-D1	D1	D2	D3	D4	D5	D5-D1
R1	0.17	0.20	0.11	**0.30**	**0.45**	0.28	0.14	0.22	0.16	0.14	**0.43**	0.29
	(1.38)	(1.63)	(0.96)	**(2.16)**	**(2.31)**	(1.29)	(1.13)	(1.76)	(1.37)	(1.14)	**(2.65)**	(1.62)
R5	-0.03	-0.16	0.00	-0.11	-0.17	-0.15	-0.10	-0.13	-0.17	-0.09	-0.08	0.02
	(-0.20)	(-1.14)	(-0.03)	(-0.86)	(-1.01)	(-0.63)	(-0.72)	(-0.93)	(-1.22)	(-0.59)	(-0.44)	(0.10)
R5-R1	-0.20	**-0.35**	-0.12	**-0.41**	**-0.63**	-0.43	-0.24	-0.35	-0.34	-0.23	-0.51	-0.27
	(-1.53)	**(-2.36)**	(-0.79)	**(-2.39)**	**(-2.84)**	(-1.71)	(-1.63)	(-2.22)	**(-1.98)**	(-1.24)	**(-2.38)**	(-1.21)

Panel D

	Dependent Variable: RET3MONTH				
Independent Variable	1	2	3	4	5
ISSUE_ANNUAL	**-0.073**	**-0.110**	**-0.306**	**-0.291**	**-0.668**
	(-6.04)	**(-3.29)**	**(-4.27)**	**(-3.89)**	**(-3.30)**
ISSUE_ANNUAL*LOG(STOCK_DUR)		0.028		-0.021	-0.031
		(1.37)		(-0.93)	(-1.25)
Log(STOCK_DUR)		-0.002		0.004	0.004
		(-0.27)		(1.08)	(1.07)
ISSUE_ANNUAL*Log(TURNOVER)			**-0.044**	**-0.049**	**-0.063**
			(-3.46)	**(-3.22)**	**(-3.66)**
Log(TURNOVER)			0.004	0.005	0.004
			(0.72)	(0.97)	(0.65)
ISSUE_ANNUAL*LOG(IO)					**0.080**
					(2.27)
Log(IO)					-0.005
					(-0.95)
ISSUE_ANNUAL*Log(1+NUMANALYST)					0.004
					(0.27)
Log(1+NUMANALYST)					**0.009**
					(3.83)
ISSUE_ANNUAL*Log(MCAP)					-0.001
					(-0.09)
Log(BMRATIO)	0.006	0.007	0.007	0.007	0.007
	(1.18)	(1.38)	(1.53)	(1.52)	(1.51)
Log(MCAP)	-0.001	-0.001	0.000	-0.001	-0.003
	(-0.36)	(-0.30)	(-0.20)	(-0.41)	(-1.41)
MOM6	**0.051**	**0.052**	**0.053**	**0.053**	**0.055**
	(3.99)	**(4.14)**	**(4.49)**	**(4.49)**	**(4.67)**
Average Rsquare (%)	4.3	5.9	6.8	7.1	8.1
N	89	89	89	89	89