Portfolio Risk and Investment Horizon of Institutional Investors

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Abstract

We examine the relationship between portfolio risk and investment horizon of institutional investors and its effect on equity returns. We find that short-term institutions outperform long-term institutions partly due to higher systematic risks. In particular, the former experience higher factor loadings in Carhart’s (1997) four-factor model and the liquidity risk factor of Pastor and Stambaugh (2003). While stocks increased by short-term institutions outperform those by long-term institutions by 0.14% per month, they exhibit higher factor loadings on market, firm size, and momentum. Our findings offer an additional explanation for the higher returns of short-term institutions.

JEL classification: G11, G12, G14, G20

Keywords: Institutional investors; investment horizons; portfolio risk; portfolio characteristics
1. Introduction

Since Nofsinger and Sias (1999) and Gompers and Metrick (2001) report that institutional trading varies positively with future stock returns, there have been on-going investigations into the source(s) of the relationship. One possible source is the information role of institutional investors. Puckett and Yan (2013) show that interim trading performance of institutional investors is positive and persistence due to their superior trading skills. In particular, Yan and Zhang (2009) find that short-term institutions’ trading is positive related to higher future returns and earnings surprises without price reversal for up to 3 years. Brockman et al. (forthcoming) show that short-term institutions tend to underweight financial firms relative to non-financial firms around the recent great recession. The findings suggest that informed institutional investors tend to trade more frequently to exploit their superior information and skills for higher returns.

However, Chen et al. (2007) and Attig et al. (2013) find that firms invested by long-term institutions tend to have better performance or lower cost of equity due to improved monitoring and information quality. In mergers and acquisitions, Gaspar et al. (2005) show that target firms with short-term shareholders are more likely to receive an acquisition bid with lower premiums. They suggest that the weaker monitoring role by short-term institutions may allow managers to proceed with value-reducing acquisitions at the expense of shareholders. Therefore, the stability of long-term institutional holdings is viewed as an advantage in collecting information and monitoring firms more effectively.

In this paper, we explore another potential source of the relationship between the heterogeneity of institution investment horizons and equity returns. We examine whether the observed relationship can be explained from the neoclassical risk-return tradeoff paradigm. In other words, can higher returns of short-term institutions be in part driven by higher systematic risks in their portfolios? Although our question appears to be quite
elementary, it is surprising that few studies, to our knowledge, have directly examined the risks of institutional portfolios in relation to their investment horizons. One such study is Cao and Petrasek (2014) who find that stocks held by hedge funds which are often considered as short-term institutions exhibit higher liquidity risk than those held by other types of institutions. Much of the extant literature however remains largely focused on institutions’ information advantage, stock picking skills or trading impacts on security prices and market movements (e.g. Wermers (1999 and 2000), Sias (2004), Dasgupta et al. (2011a, 2011b), and Cella et al. (2013)).

Our investigation is also motivated by a strand in the literature that examines institutional ownership and stock return volatility. Sias (1996) shows that institutional ownership varies positively with security return volatility and contends that it is itself the cause of increased volatility. Falkenstein (1996) also finds that mutual fund managers are averse to stocks with lower volatility. In more in-depth studies, Gabaix et al. (2005) and Greenwood and Thesmar (2011) find that increased volatility is driven by concentrated ownership and correlated liquidity shocks - characteristics related to institutional ownership. As institutional portfolios tend to tilt towards stocks that form part of their benchmark index, Basak and Pavlova (2013) report that trades by institutions induce excessive correlations among index stocks and hence amplifying stock volatilities.

While these studies find that institutional ownership is related to higher risk, they treat institutions as a homogenous group of investors. However, Cella et al. (2013) suggest that trading horizons are related to investors’ organizational structures. They show that hedge funds and investment companies exhibit the highest turnover rates while insurance companies, pension funds, and endowments have the lowest turnover rates. These variations in investment horizons of institutions are likely to be driven by different investment objectives, mandates, and clienteles. By separating institutions into short-term
and long-term investors, our study should provide more insights into the relationship between portfolio risk and investment horizons.

Finally, Yan and Zhang (2009) highlight that there are differences between short-term and long-term institutional preferences. Eventhough both types of institutions tend to choose large stocks, stocks with higher book-to-market equity, share price, and volatility, short-term institutions prefer younger firms, and firms with higher turnover and lower dividend yields. They also tend to be momentum traders. Furthermore, Lewellen (2011) and Hotchkiss and Strickland (2003) find that high turnover institutions tend to tilt toward small firms and firms with high momentum. Similarly, Bushee (2001) shows that transient investors with high turnover and more diversification are associated with an over- (under-) weighing of near-term (long-term) expected earnings. These systematic differences in preferences that lead to variations in subsequent returns may reflect differences in systematic risks inherent in their portfolios.

Our empirical results confirm that short-term institutions tend to enjoy higher returns than long-term institutions. However, their stock portfolios also appear to be related to higher systematic risks. In particular, short-term institutions prefer stocks with higher beta according to CAPM. They also exhibit higher factor loadings on the return differences between small and big size portfolios (SMB) and between past winner and loser portfolios (UMD) in Carhart’s (1997) four-factor model. Furthermore, short-term institutions prefer high liquidity stocks as they tend to choose stocks with lower factor loading on the return difference between high and low liquidity risk portfolios (LIQ) of Pastor and Stambaugh (2003). Our results suggest that part of the higher returns of short-term institutions is likely to be driven by holding stocks with higher systematic risks in their portfolios even if they are more informed.
Consistent with previous studies, we find that short-term institutions prefer smaller and younger firms, firms with lower dividend yields, and firms with higher volatility and turnover rate. They also prefer past winners. It is also important to note that short-term institutions have less concentrated stock holdings and lower percentage holdings in individual stocks. Taken together, short-term institutions prefer riskier stocks but are more diversified to help reducing unsystematic risk.

In analyzing trading patterns (i.e. changes in share holdings) of institutional investors, we find that stocks that are increased relative to those that are decreased by short-term institutions contain higher factor loadings on market risk premium, SMB, and UMD, but lower loadings on HML (return differences between high and low book-to-market equity portfolios), and LIQ. The results are consistent with Lewellen (2011) who report that high turnover institutions tend to invest in small and low book-to-market. While long-term institutions also prefer stocks with higher factor loading on market beta, they tend to increase stocks with lower factor loadings on SMB and HML. It appears that trading behaviors of long-term institutions tend to associate with lower systematic risks on size and book-to-market factors.

When we cross compare stocks increased by short-term institutions with those by long-term institutions, the former tends to increase stocks with higher factor loadings on market risk, SMB, and UMD, but lower factor loading on LIQ. Since short-term institutions have higher turnover, it is not surprising that they prefer more liquid stocks than long-term institutions. Over the same corresponding sample period from 1980 to 2012, stocks increased by short-term institutions outperform those by long-term institutions by 0.14% per month. This equates to $5.10 million per month in an average portfolio of $3.64 billion (the average holding size of short-term institutions), a monthly return difference that is economically significant. Consistent with the evidence that short-
term institutions select stocks with higher systematic risk for better performance, they tend to unload stocks with lower factor loadings on HML and UMD, and higher factor loading on LIQ relative to their long-term counterparts.

Overall, our findings contribute to the literature by providing further insights into different investment and trading behaviors between short-term and long-term institutions in relation to risk in the following ways. First, our investigations reveal that institutional investors tend to vary their investment horizons inversely with portfolio risks. Short-term institutional portfolios on average exhibit higher systematic risks than long-term institutional portfolios. Institutions who pursue strategies with shorter (longer) duration are more likely to trade stocks with higher (lower) systematic risks. It appears that the risk and return trade-off paradigm are applicable to institutional portfolios even when some institutions possess superior information set and skills.

Second, short-term institutions which are more diversified (e.g. lower Herfindahl index) may attempt to reduce unsystematic risk of their portfolios to offset stocks of higher systematic risks. Alternatively, short-term institutions may include more stocks in their portfolios to take advantage of their private information. By contrast, long-term institutions which choose fewer stocks in their portfolios are consistent with Chen et al. (2007) and Attig et al. (2013) who suggest that long-term institutions play an important monitoring role. With fewer stocks in their portfolios, long-term institutions are more likely to monitor firms closely and effectively than short-term institutions.

Third, both short-term and long-term institutions hold stocks with higher market risk in their portfolios, suggesting that institutional investors are less risk-averse than individual investors. Therefore, while previous studies show that institutional investors, especially short-term institutions, may achieve higher returns, it could partly come at the expense of
higher systematic risks. It follows that individual investors should take into account their own risk profiles when investing in institutional funds.

The rest of the paper is organized as follows. Section 2 describes our data and measurements of short-term and long-term institutions. Section 3 reports our empirical results and the last section concludes the paper.

2. Data and measurements

2.1 Data

Securities and Exchange Commission (SEC) requires all institutions with greater than $100 million of equity securities to report their quarterly holdings in SEC Form 13F. Accordingly, we access quarterly institutional ownership data from Thomson-Reuters institutional holdings (13F), formerly known as CDA/Spectrum, from the first quarter of 1980 to the fourth quarter of 2012. Information such as price, trading volume, and stock returns (share code 10 or 11) and financial statement items such as book value, total assets, and cash dividends are collected from Center for Research in Security Prices (CRSP) and Compustat respectively. Carhart's (1997) four factors and Pastor and Stambaugh (2003) liquidity risk factor are obtained from Wharton Research Data Services (WRDS).

2.2 Classification of short-term and long-term institutions

Following Yan and Zhang (2009), we classify institutional investors into short-term and long-term institutions based on their portfolio turnovers over the past four quarters. We first summarize each institution’s stock i holding cash inflow/outflow in quarter t and calculate its aggregate purchase and sale at the end of quarter t as follows,
\[
CR_{\text{buy}}_{k,t} \left( S_{k,i,t} > S_{k,i,t-1} \right) = \frac{N_k}{\sum_{i=1}^{N_k} \left| S_{k,i,t} P_{i,t} - S_{k,i,t-1} P_{i,t-1} - S_{k,i,t-1} \Delta P_{i,t} \right|} \quad (1)
\]

\[
CR_{\text{sell}}_{k,t} \left( S_{k,i,t} \leq S_{k,i,t-1} \right) = \frac{\sum_{i=1}^{N_k} \left| S_{k,i,t} P_{i,t} - S_{k,i,t-1} P_{i,t-1} - S_{k,i,t-1} \Delta P_{i,t} \right|}{\sum_{i=1}^{N_k} \left| S_{k,i,t} P_{i,t} - S_{k,i,t-1} P_{i,t-1} - S_{k,i,t-1} \Delta P_{i,t} \right|} \quad (2)
\]

where \( CR_{\text{buy}}_{k,t} \) and \( CR_{\text{sell}}_{k,t} \) are institution \( k \)'s aggregate purchase and sale for quarter \( t \) respectively, \( S_{k,i,t} \) and \( S_{k,i,t-1} \) are number of shares of stock \( i \) held by institution \( k \) at the end of quarter \( t-1 \) and \( t \) respectively, \( P_{i,t-1} \) and \( P_{i,t} \) are listed share prices of stock \( i \) at the end of quarter \( t-1 \) and \( t \) respectively. We use CRSP price adjustment factor to adjust stock splits and stock dividends for stock \( i \)'s price change \( \Delta P_{i,t} \) at the end of quarter \( t \).

Next, we calculate institution \( k \)'s churn rate, \( CR_{k,t} \), at the end of quarter \( t \) as the minimum of aggregate purchase and sale divided by its average portfolio holding value during quarter \( t \),

\[
CR_{k,t} = \frac{\min \left( CR_{\text{buy}}_{k,t}, CR_{\text{sell}}_{k,t} \right)}{\sum_{i=1}^{N_k} \frac{S_{k,i,t} P_{i,t} + S_{k,i,t-1} P_{i,t-1}}{2}} \quad (3)
\]

To measure changes in institutional ownership according to the equations above, our sample period starts from 1981, a year after our sample begins for a total of 128 quarterly observations.

Finally, we calculate each institution's average churn rate over the past four quarters.

\[
AVG_{CR_{k,t}} = \frac{1}{4} \sum_{j=0}^{3} CR_{k,t-j} \quad (4)
\]
At the end of each quarter, we sort each institution’s AVG\_CR_{k,t} into three groups. Those that are in the highest tercile are classified as short-term institutions while those in the lowest tercile are considered as long-term institutions.

2.3 Measurements for market timing, stock picking, and skill index

To measure institutions’ abilities on market timing and stock picking, we follow Kacperczyk et al. (2014) who develop measures to assess fund managers’ skills. For fund $j$ at time $t$, $Timing^j_t$ measures how fund $j$’s holdings of each asset, relative to the market, comove with the systematic component of the stock return. Before the market return increases, a fund with a high timing ability ($Timing^j_t$) should overweight assets that have high betas.

$$Timing^j_t = \sum_{i=1}^{N_j} (w^j_i - w^m_i) (\beta_{ij} R^m_{t+1})$$

where the portfolio weight $w^j_i$ is the fraction of fund $j$’s total assets held in risky asset $i$ at the start of time $t$ and the market weight $w^m_i$ is the fraction of total market capitalization in asset $i$. $\beta_{ij}$ measures the covariance of stock $i$’s return with the market return $R^m_{t}$ divided by the variance of the market return. The return $R^m_{t+1}$ is the realized market return between the beginnings of period $t$ and $t+1$, and $Picking^j_t$ measures how fund $j$’s holdings of each stock, relative to the market, comove with the idiosyncratic component of the stock return:

$$Picking^j_t = \sum_{i=1}^{N_j} (w^j_i - w^m_i) (\beta_{ij} R^m_{t+1})$$
According to Eq. (6), a fund with a high picking ability will overweight assets with subsequently high idiosyncratic returns and underweight assets with low idiosyncratic returns. \( \text{Timing}_t \) and \( \text{Picking}_t \) are expressed in units of return per quarter. Kacperczyk et al. (2014) further develop a skill index for fund \( j \) in month \( t + 1 \) as a weighted average of \( \text{Timing}_t \) and \( \text{Picking}_t \), where the weights \( (w) \) of each measure depend on the state of the business cycle.

\[
\text{Skill}_{t+1} = w_t \text{Timing}_t + (1 - w_t) \text{Picking}_t
\]  

(7)

\( \text{Timing} \) and \( \text{Picking} \) are normalized with a mean of zero and a standard deviation of one in the cross section for each period. \( w \) which varies between 0 and 1 is the recession probability from survey of professional forecasters.\(^1\)

2.4 **Factor loadings in asset pricing models**

To estimate factor loadings of a portfolio, we first use market beta based on CAPM. We then follow Hou and Moskowitz (2005), Fang and Peress (2009), and Huang et al. (2011) and use Carhart (1997) 4-factor model with aggregate liquidity risk factor of Pastor and Stambaugh (2003). We regress monthly portfolio returns on monthly market excess return for beta in CAPM or on monthly return difference on each factor for the factor loading in the following 5-factor model over 60 months with a minimum of 36 monthly observations.

\(^1\) The recession probability can be obtained from http://www.phil.frb.org/research-and-data/real-time-center/survey-of-professional-forecasters/historical-data/probability-variables.cfm
\[ R_{p,t} = \alpha_0 + \beta_1 \text{MKT}_t + \beta_2 \text{SMB}_t + \beta_3 \text{HML}_t + \beta_4 \text{UMD}_t + \beta_5 \text{LIQ}_t + e_{p,t} \]  \hspace{1cm} (8) 

where \( R_{p,t} \) is portfolio excess return at time \( t \), \( \text{MKT}_t \) is the market risk premium, \( \text{SMB}_t \) is the return difference between small and big portfolios, \( \text{HML}_t \) is the return difference between high and low book-to-market equity portfolios, \( \text{UMD}_t \) is the return difference between winner and loser portfolios, and \( \text{LIQ}_t \) is the return difference between high and low liquidity risk portfolios.

3. **Empirical results**

3.1 **Summary statistics of institutional portfolios**

We first report the summary statistics of institutional portfolios. Panel A of Table 1 shows that there is a large difference in the average churn rate (\( CR \)) between short-term (11.42%) and long-term institutions (1.71%). The extent of active investment can vary substantially among institutional investors. Short-term institutions with higher turnover hold an average of $3.64 billion in their portfolio (THV) compared to long-term institutions of $2.19 billion. Furthermore, the former own an average of 0.63% (HP) of a stock in their portfolios relative to the latter of 1.15%. While short-term institutions have less percentage holding of individual stocks, their portfolios consist of more stocks. Based on our sample, short-term and long-term institutions hold an average of 287 and 167 stocks respectively. The Herfindahl index (HHI), the sum of square of each stock holding percentage of an institution, for measuring stock concentration confirms that short-term institutions are more diversified than long-term institutions with an average HHI of 0.03 compared to that of 0.13.
Panel B of Table 1 reports firm characteristics in portfolios held by both types of institutions. Given that they are more diversified, short-term institutions tend to choose firms that are smaller (MKTCAP), younger (AGE) and with lower dividend yields (DP), Amihud's (2002) price impact measure (ILR), and return on asset (ROA). They are also more likely to exhibit higher volatility (VOL), turnover rate (TURN), cash ratio (CA), and gross profitability ratio (PTA). Interestingly, several of these firm characteristics that differ between short-term and long-term institutions are closely related to various dimensions of systematic risks.

As Table 1 shows that portfolio characteristics differ between institutions, Table 2 highlights that factor loadings related to the systematic factors also vary between them. For example, short-term institutions have higher market beta according to CAPM. They also experience higher factor loading on firm size (SMB) but lower factor loadings on value (HML) and momentum (UMD) in Carhart (1997) four-factor model. In addition, they show lower factor loadings related to liquidity risk (LIQ) in Pastor and Stambaugh (2003) model. Differences between factor loadings raise the question of whether different portfolio returns between short-term and long-term institutions documented in the literature can, in part, be explained by differences in their systematic risks.

To demonstrate that different portfolio returns among institutional investors can be driven by differences in factor loadings, we first calculate the average monthly risk premium of each factor according to the asset pricing models. We then multiply the monthly risk premium with the differences in factor loadings related to each factor. Based on CAPM where the monthly market risk premium is 0.58%, short-term institutions are expected to earn $0.0957 \times 0.58\% = 0.0555\%$ more than long-term institutions per month. According to Carhart (1997) four-factor model where the monthly risk premiums related to SMB, HML, and UMD are 0.12%, 0.37%, and 0.60% respectively, the monthly
expected return for short-term institutions should be $0.0544 \times 0.58\% + 0.158 \times 0.12\% + (-0.0194) \times 0.37\% + (-0.02) \times 0.60\% = 0.0298\%$ higher than that of long-term institutions. In a five-factor model that includes Pastor and Stambaugh (2003) liquidity risk factor with a monthly risk premium of 0.52%, the monthly expected return is $0.0298\% + (-0.003) \times 0.52 = 0.0282\%$ higher than long-term institutions. These illustrations show that differences in betas of systematic factors may account for different returns between short-term and long-term institutions.

An alternative explanation for different portfolio returns is that institutional managers may possess different information set and stock picking abilities. Using Kacperczyk et al. (2014) measures of market timing (MT), stock picking (SP), and skill level (SL), Panel B shows that short-term institutions have more ability in market timing but lower ability in stock picking. Combining these two measures, long-term institutions seem to exhibit higher skill level than short-term institutions. Our preliminary results are therefore not consistent with Yan and Zhang (2009) who find that short-term institutions are better informed with superior skills.

### 3.2 Institutional ownership and firm characteristics

Sequel to the preliminary results, we run Fama and Macbeth (1973) regressions to examine the relationship between institutional ownership and firm characteristics. We follow Gompers and Metrick (2001) and Yan and Zhang (2009) for the following firm characteristics.

\[
 IO_{it} = a_0 + b_1 beta + b_2 CAR_{it} + b_3 PTA_{it} + b_4 ROA_{it} + b_5 \ln(MKTCAP_{it}) + b_6 \ln(Age_{it}) \\
+ b_7 \ln(1 + DP_{it}) + b_8 \ln(BM_{it}) + b_9 \ln(PRC_{it}) + b_{10} \ln(TURN_{it}) + b_{11} \ln(VOL_{it}) \\
+ b_{12} \text{S \& P500}_{it} + b_{13} RET(t - 3, t)_{it} + b_{14} RET(t - 12, t - 3)_{it} + e_{it} \tag{9}
\]
where $IO_{it}$ is total institutional ownership, short-term institutional ownership, or long-term institutional ownership. $\beta$ is the market risk according to CAPM. $CAR$ is quarterly cash plus short-term investments divided by total asset (see Palazzo (2012)). $PTA$ is quarterly gross profitability (total revenue minus total cost) divided by total asset (see Novy-Marx (2013)). $ROA$ is quarterly net income divided by total asset in the previous quarter. $\ln(MKTCAP)$ is natural log of quarterly outstanding shares times share price. $\ln(\text{AGE})$ is natural log of firm age in months since first return observation appears in CRSP. $\ln(1+\text{DP})$ is natural log of one plus quarterly cash dividend divided by share price. $\ln(BM)$ is natural log of quarterly most recent book equity divided by market equity. $\ln(\text{PRC})$ is natural log of share price. $\ln(\text{TURN})$ is natural log of monthly average trading volume divided by outstanding shares in the most recent quarter. $\ln(\text{VOL})$ is natural log of standard deviations of previous 24 monthly stock returns. S&P500 is a dummy variable for S&P 500 stocks. $\text{RET}(t-3, t)$ is accumulated return in most recent quarter. $\text{RET}(t-12, t-3)$ is the accumulated return over the previous 3 quarters preceding the most recent quarter.

Table 3 shows that consistent with Gompers and Metrick (2001) and Yan and Zhang (2009), beta varies positively with institutional ownership for both short-term and long-term institutions after controlling for other firm characteristics. It suggests that institutional investors tend to engage in higher market risk with their portfolios. Institutional investors also prefer firms that are larger (MKTCAP) and more profitable (PTA), with lower dividend yields (DP) and volatility (VOL), but higher book-to-market (BM), share prices (PRC), and turnovers (TURN). Between institutions however, short-term institutions are more likely to choose stocks with higher return on assets (ROA). It is also interesting to note that short-term institutions prefer younger firms (AGE) and firms
that are not included in the S&P 500 index. It confirms earlier results that size effect appears to be an important factor in driving differences in institutional returns.

### 3.3 Holding returns of institutional investors

After examining differences in portfolio characteristics and factor loadings between short-term and long-term institutions, we turn our attention to their holding returns. Table 4 reports portfolio returns from 4 previous to 4 subsequent quarters ($t$-12 to $t$+12). In the previous quarter (RET ($t$-3, $t$)), short-term institutions exhibit higher returns than long-term institutions by an average of 1.1%. Over the 3 quarters prior to the previous quarter (RET ($t$-12, $t$-3)), the average difference in their returns is 4.76%. In dollar terms, short-term institutions with an average portfolio size of $3.64 billion enjoy an excess of $213.30 million over the previous 12 months ($t$-12 to $t$). Our results are consistent with Yan and Zhang (2009) who report that short-term institutions have better past performance. Taken together with earlier results, short-term institutions which prefer past winners may also bear higher systematic risk according to the risk-return tradeoff paradigm.

Interestingly, the superior performance of short-term institutions does not persist into the future. Table 4 shows that there is little difference in average portfolio returns between short-term and long-term institutions over the next quarter (RET ($t$, $t$+3)) and the next 4 quarters (RET ($t$, $t$+12)). Their holding returns tend to converge over time. To shed more lights into institutions’ subsequent returns and risk characteristics, we examine future returns in their trading portfolios. In particular, we investigate whether stocks that are being traded in subsequent quarters differ in both returns and factor loadings between short-term and long-term institutions. Results of their trading patterns may reveal whether short-term institutions are engaging in riskier behavior than long-term institutions.
3.4 Trading performance and portfolio risk

For each quarter, we rank stocks traded by short-term and long-term institutions based on the total dollar trading value and sort them into five groups. We then form value-weighted (i.e. total dollar trading value) portfolios of short-term buy, short-term sell, long-term buy, and long-term sell. The short-(long-) term buy portfolio consists of stocks with the largest increase by short-(long-) term institutions and the short-(long-) term sell portfolio consists of stocks with the largest decrease by short-(long-) term institutions.

Table 5 presents the results of next quarter (RET \( (t, t+3) \)) and annual (RET \( (t, t+12) \)) returns of institutions’ trading portfolios. The short-term buy portfolio has an average quarterly return of 3.24% compared to the short-term sell portfolio of 2.84%. In contrast, the long-term buy portfolio has an average quarterly return of 2.78% relative to the long-term sell portfolio of 3.03%. Therefore, the short-term buy outperforms the long-term buy portfolios by 0.47% per quarter while short-term sell portfolio underperforms long-term sell portfolios by 0.19% per quarter. These trading return patterns persist over the following 4 quarters. Our findings suggest that short-term institutions tend to pick up “winners” and reduce “losers” more than long-term institutions.

To examine whether these stocks traded by short-term institutions differ in systematic risk from those by long-term institutions, we again estimate their factor loadings based on CAPM and Carhart’s (1997) four-factor model with Pastor and Stambaugh (2003) liquidity risk factor in Eq. (7). Specifically, we first use the quarterly change in dollar value of institutional holdings to obtain value weights for each buy and sell portfolios of short-term and long-term institutions. We then estimate factor loadings from monthly regressions over the sample period.

Panel A of Table 6 shows stocks increased (buy) by short-term institutions tend to exhibit higher factor loadings on market, SMB, and UMD than stocks decreased (sell). It
suggests that short-term institutions prefer to trade stocks that smaller with higher beta and momentum. Meanwhile, the negative differences on HML and LIQ factor loadings between buy and sell portfolios indicate that short-term institutions prefer growth and liquid stocks. Our results on trading performance are consistent with earlier findings on holding returns where short-term institutions tend to prefer stocks with higher systematic risk. By contrast, stocks increased (buy) by long-term institutions tend to show lower factor loadings on SMB and HML than stocks decreased (sell). Furthermore, factor loadings on market, UMD, and LIQ do not vary significantly between buy and sell portfolios. Overall, long-term institutions experience lower systematic risk related to firm size and value in their trading.

Finally, we cross compare trading returns and factor loadings between short-term and long-term institutions. Panel B of Table 6 shows that stocks increased by short-term institutions outperform those by long-term institutions by 0.14% per month. Correspondingly, the former have higher factor loadings on market, SMB, and UMD but lower factor loading on LIQ. Therefore, similar to the results reported earlier, short-term institutions tend to experience higher systematic risk related to market, firm size and momentum but lower liquidity risk when they trade. Since the alpha in the five-factor model is not significant, the average higher returns of stocks increased by short-term institutions are likely to be driven by their systematic risks.

Comparing stocks decreased by both groups of institutions, short-term institutions tend to sell stocks with a negative UMD factor loading. It implies that their trading strategy is to reduce past losers in their portfolios. Short-term institutions are also more likely to sell stocks with higher factor loading on LIQ or reducing stocks with higher liquidity risk. This does not come as a surprise since short-term institutions have higher turnovers and may experience higher liquidity risk. On the contrary, their long-term counterparts tend to
unload stocks with a positive HML factor loading or reduce value stocks in their portfolios. In sum, these contrasts in trading behaviors suggest that short-term institutions have preferences for riskier stocks.

4. Conclusion

In light of the negative relationship between investment horizons and performance of institutional investors documented in the extant literature, this study sets out to explore an alternative hypothesis on the source of such relationship from the neoclassical risk-return perspective. We find that portfolios of short-term institutions when compared to those of long-term institutions exhibit higher risks related to market and firm size. Consistent with the difference in portfolio risk, short-term institutions tend to increase stocks with higher risks related to market, firm size, and momentum. As expected, short-term institutions with higher turnovers prefer more liquid stocks or stocks with lower liquidity risk. Nevertheless, short-term institutions appear to bear higher overall systematic risk than long-term institutions. This difference in risk behavior may partly explain why short-term institutions outperform long-term institutions.

It is important to point out that our findings are not necessarily inconsistent with the hypothesis that short-term institutions possess superior information and trading skills. Short-term institutions may enjoy higher returns because they have private information and higher portfolio risks. For example, they may exploit their information advantage on smaller firms which are more opaque and difficult to value. However, these smaller firms also exhibit higher systematic risk as indicated by higher factor loading on firm size. Similarly, short-term institutions may choose firms with higher market beta for higher returns to take advantage of their private information.
In sum, our paper adds to another angle on the relationships among investment horizons, information role, and portfolio risk of institutional investors. Although short-term institutions such as hedge funds or investment companies may have private information which tend to facilitate price discovery process and improve capital market efficiency, their trading behaviors and thereby portfolios are also inherently riskier. Long-term institutions such as insurance companies and pension funds with different objectives are more likely to play an important role in monitoring firms that in turn lower information asymmetry and the cost of capital. Therefore, short-term and long-term institutions with different informational roles and thus trading behaviors may differ in portfolio risks.
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Table 1
Summary statistics of institutional portfolios

This table reports the summary statistics of portfolios held by institutional investors from 1981 to 2012. Panel A reports time-series average of quarterly portfolio characteristics of all institutions, short-term and long-term institutions. CR is the average churn rate over the past four quarters. THV is the total holding value of institutional portfolios. HP is the average percentage holding of individual stocks by an institution. NS is the average number of stocks held by an institution. HHI is the Herfindahl index measured as the sum of square of each stock holding percentage of an institution. Panel B reports firm characteristics in institutional portfolios. MKTCAP is the average quarterly market capitalization (number of outstanding shares times share price). DP is the average quarterly cash dividend divided by share price. AGE is the average firm age in number of months since first return appears in CRSP. VOL is the average standard deviation of monthly returns over the previous 24 months. TURN is natural logarithm of monthly average trading volume divided by outstanding shares in the most recent quarter. ILR is the daily average of absolute return divided by dollar trading volume in millions of the most recent quarter. CAR is the average quarterly cash plus short-term investments divided by total asset. PTA is the average quarterly gross profitability (total revenue minus total cost) divided by total asset. ROA is the average quarterly net income divided by total asset in the previous quarter. Ln (BM) is the natural log of the average quarterly book-to-market ratio.

<table>
<thead>
<tr>
<th>Panel A: Institutional portfolio characteristics</th>
<th>All institutions</th>
<th>Short-term institutions</th>
<th>Long-term institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>CR</td>
<td>5.95%</td>
<td>11.42%</td>
<td>1.71%</td>
</tr>
<tr>
<td>THV</td>
<td>$2.81 billion</td>
<td>$3.64 billion</td>
<td>$2.19 billion</td>
</tr>
<tr>
<td>HP</td>
<td>0.79%</td>
<td>0.63%</td>
<td>1.15%</td>
</tr>
<tr>
<td>NS</td>
<td>226</td>
<td>287</td>
<td>167</td>
</tr>
<tr>
<td>HHI</td>
<td>0.07</td>
<td>0.03</td>
<td>0.13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B: Firm characteristics in institutional portfolio</th>
<th>All institutions</th>
<th>Short-term institutions</th>
<th>Long-term institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKTCAP</td>
<td>$33.36 billion</td>
<td>$25.94 billion</td>
<td>$39.75 billion</td>
</tr>
<tr>
<td>DP</td>
<td>0.64%</td>
<td>0.60%</td>
<td>0.67%</td>
</tr>
<tr>
<td>AGE</td>
<td>383</td>
<td>347</td>
<td>413</td>
</tr>
<tr>
<td>VOL</td>
<td>0.0878</td>
<td>0.0939</td>
<td>0.0830</td>
</tr>
<tr>
<td>TURN</td>
<td>12.01%</td>
<td>14.35%</td>
<td>10.19%</td>
</tr>
<tr>
<td>ILR</td>
<td>0.0965</td>
<td>0.0589</td>
<td>0.1513</td>
</tr>
<tr>
<td>CAR</td>
<td>12.29%</td>
<td>13.59%</td>
<td>11.39%</td>
</tr>
<tr>
<td>PTA</td>
<td>9.04%</td>
<td>9.09%</td>
<td>8.95%</td>
</tr>
<tr>
<td>ROA</td>
<td>1.32%</td>
<td>1.25%</td>
<td>1.32%</td>
</tr>
<tr>
<td>Ln (BM)</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>N</td>
<td>1,432</td>
<td>477</td>
<td>477</td>
</tr>
</tbody>
</table>
Table 2

Factor loadings of institutional portfolios and manager skills

This table reports the average factor loadings of asset pricing models and manager skills for institutional investors. Panel A reports the average factor loadings of CAPM, Carhart four-factor (1997) including liquidity risk factor of Pastor and Stambaugh (2003) from previous 60-month (a minimum of 36 monthly observations is required). CAPM is the factor loading on market excess return from Sharpe’s CAPM. MKTRF, SMB, HML, UMD, and PS_LIQ are the factor loadings on market excess return, small minus big size, high minus low book-to-market ratio, winner minus loser from Carhart (1997), and high liquidity minus low liquidity risk from Pastor and Stambaugh (2003). Panel B reports the average manager skills. MT and SP are measures of manager abilities in market timing and stock picking respectively according to Kacperczyk et al. (2014). SL is a composite measure of manager skill estimated from MT and SP.

<table>
<thead>
<tr>
<th>Beta</th>
<th>All institutions</th>
<th>Short-term institutions</th>
<th>Long-term institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel A: Average factor loadings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPM</td>
<td>0.9623</td>
<td>1.0138</td>
<td>0.9181</td>
</tr>
<tr>
<td>MKTRF</td>
<td>0.9560</td>
<td>0.9843</td>
<td>0.9299</td>
</tr>
<tr>
<td>SMB</td>
<td>0.0904</td>
<td>0.1731</td>
<td>0.0151</td>
</tr>
<tr>
<td>HML</td>
<td>0.0340</td>
<td>0.0242</td>
<td>0.0436</td>
</tr>
<tr>
<td>UMD</td>
<td>-0.0526</td>
<td>-0.0637</td>
<td>-0.0437</td>
</tr>
<tr>
<td>LIQ</td>
<td>-0.0061</td>
<td>-0.0086</td>
<td>-0.0056</td>
</tr>
<tr>
<td>Panel B: Manager skills</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MT</td>
<td>0.0224</td>
<td>0.0230</td>
<td>0.0224</td>
</tr>
<tr>
<td>SP</td>
<td>0.0005</td>
<td>0.0002</td>
<td>0.0012</td>
</tr>
<tr>
<td>SL</td>
<td>0.0039</td>
<td>0.0034</td>
<td>0.0049</td>
</tr>
</tbody>
</table>
Regression results of institutional ownership and its determinants

This table reports the results of cross-sectional regressions of institutional ownership on stock characteristics. The sample period is from 1981 to 2012. Beta is the factor loading of the past 60-month (minimum 36 months) monthly return regressions on market excess return. CAR is quarterly cash plus short-term investments divided by total asset. ROA is quarterly net income divided by total asset in the previous quarter. Ln(MKTCAP) is natural log of quarterly outstanding shares times share price. Ln(AGE) is natural log of the measure of firm age as the number of months since its first return observation appearing in CRSP. Ln(1+DP) is natural log of one plus quarterly cash dividend divided by share price. Ln(BM) is natural log of quarterly most recent book equity divided by market equity. Ln(PRC) is natural logarithm of share price. Ln(TURN) is natural log of monthly average trading volume divided by outstanding shares in the most recent quarter. Ln(VOL) is natural log of standard deviation over previous 24 months of stock returns. S&P500 is a dummy variable for S&P500 stocks. RET(t-3, t) is the accumulated return in the most recent quarter. RET(t-12, t-3) is the accumulated return over three previous quarters preceding the most recent quarter. We report time-series average cross-section regression coefficients based on Fama and MacBeth (1973) method. Numbers in parentheses are t-values corrected for heteroskedasticity and autocorrelation by Newey and West (1987) approach. ***, **, * denote statistical significance at the 1%, 5%, and 10% level respectively.

<table>
<thead>
<tr>
<th></th>
<th>Total institutional ownership</th>
<th>Short-term institutional ownership</th>
<th>Long-term institutional ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.0946***</td>
<td>0.1561***</td>
<td>-0.0542***</td>
</tr>
<tr>
<td></td>
<td>(3.41)</td>
<td>(9.03)</td>
<td>(-12.84)</td>
</tr>
<tr>
<td>Beta</td>
<td>0.0190***</td>
<td>0.0117***</td>
<td>0.0027***</td>
</tr>
<tr>
<td></td>
<td>(5.26)</td>
<td>(6.05)</td>
<td>(4.16)</td>
</tr>
<tr>
<td>CAR</td>
<td>-0.0056</td>
<td>0.00018</td>
<td>0.00020</td>
</tr>
<tr>
<td></td>
<td>(-0.91)</td>
<td>(0.46)</td>
<td>(0.92)</td>
</tr>
<tr>
<td>PTA</td>
<td>0.1699***</td>
<td>0.0850***</td>
<td>0.0133***</td>
</tr>
<tr>
<td></td>
<td>(10.82)</td>
<td>(8.14)</td>
<td>(4.52)</td>
</tr>
<tr>
<td>ROA</td>
<td>-0.0189</td>
<td>0.0342***</td>
<td>-0.0284***</td>
</tr>
<tr>
<td></td>
<td>(-1.41)</td>
<td>(3.65)</td>
<td>(-7.61)</td>
</tr>
<tr>
<td>Ln(MKTCAP)</td>
<td>0.0484***</td>
<td>0.0253***</td>
<td>0.0111***</td>
</tr>
<tr>
<td></td>
<td>(31.11)</td>
<td>(26.79)</td>
<td>(16.04)</td>
</tr>
<tr>
<td>Ln(AGE)</td>
<td>-0.0053**</td>
<td>-0.0153***</td>
<td>0.0070***</td>
</tr>
<tr>
<td></td>
<td>(-2.17)</td>
<td>(-9.98)</td>
<td>(9.46)</td>
</tr>
<tr>
<td>Ln(1+DP)</td>
<td>-0.5510***</td>
<td>-0.3770***</td>
<td>-0.0658***</td>
</tr>
<tr>
<td></td>
<td>(-5.26)</td>
<td>(-5.33)</td>
<td>(-3.36)</td>
</tr>
<tr>
<td>Ln(BM)</td>
<td>0.0322***</td>
<td>0.0114***</td>
<td>0.0070***</td>
</tr>
<tr>
<td></td>
<td>(14.29)</td>
<td>(9.14)</td>
<td>(14.54)</td>
</tr>
<tr>
<td>Ln(PRC)</td>
<td>0.0548***</td>
<td>0.0251***</td>
<td>0.0113***</td>
</tr>
<tr>
<td></td>
<td>(21.57)</td>
<td>(13.86)</td>
<td>(20.54)</td>
</tr>
<tr>
<td>Ln(TURN)</td>
<td>0.0601***</td>
<td>0.0447***</td>
<td>0.0020*</td>
</tr>
<tr>
<td></td>
<td>(11.07)</td>
<td>(15.08)</td>
<td>(1.73)</td>
</tr>
<tr>
<td>Ln(VOL)</td>
<td>-0.0344***</td>
<td>-0.0044*</td>
<td>-0.0087***</td>
</tr>
<tr>
<td></td>
<td>S&amp;P500</td>
<td>RET(t-3, t)</td>
<td>RET(t-12, t-3)</td>
</tr>
<tr>
<td>----------</td>
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<tr>
<td></td>
<td>(-6.24)</td>
<td>(-1.67)</td>
<td>(-6.34)</td>
</tr>
<tr>
<td></td>
<td>-0.0397***</td>
<td>-0.0365***</td>
<td>0.0120***</td>
</tr>
<tr>
<td></td>
<td>(-2.95)</td>
<td>(-5.45)</td>
<td>(4.50)</td>
</tr>
<tr>
<td></td>
<td>-0.0664***</td>
<td>-0.0308***</td>
<td>-0.0137***</td>
</tr>
<tr>
<td></td>
<td>(-13.39)</td>
<td>(-12.04)</td>
<td>(-10.44)</td>
</tr>
<tr>
<td></td>
<td>-0.0348***</td>
<td>-0.0052***</td>
<td>-0.0112***</td>
</tr>
<tr>
<td></td>
<td>(-9.47)</td>
<td>(-3.31)</td>
<td>(-11.61)</td>
</tr>
<tr>
<td></td>
<td>-0.0348***</td>
<td>-0.0052***</td>
<td>-0.0112***</td>
</tr>
<tr>
<td></td>
<td>(-9.47)</td>
<td>(-3.31)</td>
<td>(-11.61)</td>
</tr>
<tr>
<td></td>
<td>-0.0348***</td>
<td>-0.0052***</td>
<td>-0.0112***</td>
</tr>
<tr>
<td></td>
<td>(-9.47)</td>
<td>(-3.31)</td>
<td>(-11.61)</td>
</tr>
<tr>
<td></td>
<td>296,984</td>
<td>296,984</td>
<td>296,984</td>
</tr>
<tr>
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</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.48</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.48</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.48</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.48</td>
<td>0.30</td>
</tr>
<tr>
<td></td>
<td>0.58</td>
<td>0.48</td>
<td>0.30</td>
</tr>
</tbody>
</table>
Table 4
Past and future portfolio returns of institutional investors

This table reports short-term and long-term institutions’ portfolio returns from $t-3$ to $t+12$ from 1980 to 2012. $RET(t-3, t)$ is the accumulated return over the previous quarter. $RET(t-12, t-3)$ is the accumulated return over the previous 3 quarters preceding the most recent quarter. $RET(t, t+3)$ is the accumulated return over the next quarter. $RET(t, t+12)$ is the accumulated return over the next 4 quarters. *** denotes statistical significance at the 1% level.

<table>
<thead>
<tr>
<th></th>
<th>Short-term institution portfolio return</th>
<th>Long-term institution portfolio return</th>
<th>Short-term minus Long-term portfolio return</th>
</tr>
</thead>
<tbody>
<tr>
<td>$RET(t-3, t)$</td>
<td>0.0582***</td>
<td>0.0472***</td>
<td>0.0110***</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0601</td>
<td>0.0508</td>
<td>0.0090</td>
</tr>
<tr>
<td>Median</td>
<td>0.3677</td>
<td>0.2480</td>
<td>0.1414</td>
</tr>
<tr>
<td>Maximum</td>
<td>-0.2255</td>
<td>-0.2098</td>
<td>-0.0419</td>
</tr>
<tr>
<td>$RET(t-12, t-3)$</td>
<td>0.1984***</td>
<td>0.1509***</td>
<td>0.0476***</td>
</tr>
<tr>
<td>Mean</td>
<td>0.1747</td>
<td>0.1411</td>
<td>0.0323</td>
</tr>
<tr>
<td>Median</td>
<td>0.7674</td>
<td>0.5901</td>
<td>0.4308</td>
</tr>
<tr>
<td>Maximum</td>
<td>-0.3030</td>
<td>-0.2974</td>
<td>-0.0413</td>
</tr>
<tr>
<td>$RET(t, t+3)$</td>
<td>0.0303***</td>
<td>0.0301***</td>
<td>0.0002</td>
</tr>
<tr>
<td>Mean</td>
<td>0.0380</td>
<td>0.0331</td>
<td>0.0017</td>
</tr>
<tr>
<td>Median</td>
<td>0.2279</td>
<td>0.2089</td>
<td>0.0493</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.2382</td>
<td>-0.2207</td>
<td>-0.0582</td>
</tr>
<tr>
<td>$RET(t, t+12)$</td>
<td>0.1245***</td>
<td>0.1262***</td>
<td>-0.0017</td>
</tr>
<tr>
<td>Mean</td>
<td>0.1424</td>
<td>0.1419</td>
<td>-0.0030</td>
</tr>
<tr>
<td>Median</td>
<td>0.6614</td>
<td>0.5763</td>
<td>0.0946</td>
</tr>
<tr>
<td>Minimum</td>
<td>-0.3729</td>
<td>-0.3566</td>
<td>-0.1031</td>
</tr>
</tbody>
</table>
Table 5

Future quarterly and annual returns of short-term and long-term institutions’ trading portfolios

This table reports short-term and long-term institutions buy/sell portfolios’ returns from 1981 to 2012. We rank stocks traded by short-term and long-term institutions in each quarter based on the total dollar trading value and sort them into five groups. The short-(long-) term buy portfolio consists of stocks with the largest increase in dollar value by short-(long-) term institutions and the short-(long-) term sell portfolio consists of stocks with the largest decrease in dollar value by short-(long-) term institutions. We then use change in dollar value of institutional holdings to calculate value-weighted returns for each portfolio. RET \((t, t+3)\) is the accumulated return over the next quarter. RET \((t, t+12)\) is the accumulated return over the next 4 quarters. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level respectively.

<table>
<thead>
<tr>
<th>RET((t, t+3))</th>
<th>Short-term buy</th>
<th>Short-term sell</th>
<th>Long-term buy</th>
<th>Long-term sell</th>
<th>Short-term buy minus sell</th>
<th>Long-term buy minus sell</th>
<th>Short-term buy minus Long-term buy</th>
<th>Short-term sell minus Long-term sell</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>0.0324***</td>
<td>0.0284***</td>
<td>0.0278***</td>
<td>0.0303***</td>
<td>0.0040</td>
<td>-0.0026</td>
<td>0.0047*</td>
<td>-0.0019</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>0.0381</td>
<td>0.0343</td>
<td>0.0319</td>
<td>0.0345</td>
<td>0.0050</td>
<td>-0.0013</td>
<td>0.0059</td>
<td>0.0011</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>0.3102</td>
<td>0.2260</td>
<td>0.3263</td>
<td>0.4108</td>
<td>0.1898</td>
<td>0.1939</td>
<td>0.1415</td>
<td>0.1372</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>-0.2891</td>
<td>-0.3192</td>
<td>-0.2984</td>
<td>-0.3209</td>
<td>-0.1501</td>
<td>-0.1815</td>
<td>-0.1023</td>
<td>-0.1849</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RET((t, t+12))</th>
<th>Short-term buy</th>
<th>Short-term sell</th>
<th>Long-term buy</th>
<th>Long-term sell</th>
<th>Short-term buy minus sell</th>
<th>Long-term buy minus sell</th>
<th>Short-term buy minus Long-term buy</th>
<th>Short-term sell minus Long-term sell</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
<td>0.1274***</td>
<td>0.1170***</td>
<td>0.1181***</td>
<td>0.1253***</td>
<td>0.0104</td>
<td>-0.0073</td>
<td>0.0094**</td>
<td>-0.0083</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>0.1501</td>
<td>0.1229</td>
<td>0.1444</td>
<td>0.1310</td>
<td>0.0051</td>
<td>0.0003</td>
<td>0.0100</td>
<td>-0.0113</td>
</tr>
<tr>
<td><strong>Maximum</strong></td>
<td>0.6921</td>
<td>0.6632</td>
<td>0.7653</td>
<td>0.5998</td>
<td>0.3321</td>
<td>0.3614</td>
<td>0.1441</td>
<td>0.2506</td>
</tr>
<tr>
<td><strong>Minimum</strong></td>
<td>-0.5836</td>
<td>-0.4133</td>
<td>-0.4850</td>
<td>-0.3564</td>
<td>-0.5233</td>
<td>-0.5843</td>
<td>-0.1266</td>
<td>-0.3287</td>
</tr>
</tbody>
</table>
Table 6


This table reports factor loadings according to CAPM and Carhart (1997) with Pastor and Stambaugh (2003) liquidity risk factor models from 1981 to 2013 for short-term buy, short-term sell, long-term buy, and long-term sell stock portfolios. We rank stocks traded by short-term and long-term institutions in each quarter based on the total dollar trading value and sort them into five groups. The short-(long-) term buy portfolio consists of stocks with the largest increase in dollar value by short-(long-) term institutions and the short-(long-) term sell portfolio consists of stocks with the largest decrease in dollar value by short-(long-) term institutions. We then use holding change in dollar value to calculate value-weighted returns for each portfolio. Factor loadings are estimated from monthly regressions over the sample period. Numbers in parentheses are t-values. ***, **, * denote statistical significance at 1%, 5%, and 10%, respectively.

Panel A: Factor loadings of within short-term and long-term buy and sell portfolios

<table>
<thead>
<tr>
<th>CAPM</th>
<th>Short-term</th>
<th>Long-term</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Buy</td>
<td>Sell</td>
<td>Buy minus sell</td>
</tr>
<tr>
<td>Return</td>
<td>0.0102***</td>
<td>0.0093***</td>
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5-factor model

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Panel B: Factor loadings across short-term and long-term buy and sell portfolios

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<th>Short-term buy</th>
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* Note: *** indicates statistical significance at the 1% level.