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Institutional Trade Persistence and Long-Term Equity Returns

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ABSTRACT

Recent studies show that single-quarter institutional herding positively predicts short-term returns. Motivated by the theoretical herding literature, which emphasizes endogenous persistence in decisions over time, we estimate the effect of multiquarter institutional buying and selling on stock returns. Using both regression and portfolio tests, we find that persistent institutional trading negatively predicts long-term returns: persistently sold stocks outperform persistently bought stocks at long horizons. The negative association between returns and institutional trade persistence is not subsumed by past returns or other stock characteristics, is concentrated among smaller stocks, and is stronger for stocks with higher institutional ownership.

A GROWING LITERATURE ON THE trading behavior of institutional money managers shows that they exhibit a tendency to herd, that is, to imitate each others' trades. Given the increasing prevalence of such investors in financial markets, the potential price impact of institutional herding is of great interest. Institutional herding behavior is generally found to have a stabilizing effect on prices. Several well-known studies find a positive correlation between the direction of institutional herding and future stock returns, thus concluding that institutional trading pushes prices towards equilibrium values. For example, Wermers (1999) shows that stocks heavily bought by mutual funds during a given quarter outperform stocks heavily sold by funds in that quarter, over the subsequent 6 months. Sias (2004) finds that institutional demand is positively

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correlated over adjacent quarters and is positively related to returns over the following year.[1]

These studies use quarterly data to focus on short-term institutional herding measured over one or two quarters, that is, they measure herding by the extent to which institutions buy or sell the same stock in the same or adjacent periods of time. In this paper, we focus on the price impact of institutional trading when institutions persistently buy or sell the same stock over multiple time periods. While the analysis of single- or adjacent-period herding is of significant interest, theoretical models of herding are fundamentally dynamic (e.g., Bikhchandani, Hirshleifer, and Welch (1992), Scharfstein and Stein (1990)). In these models, when agents select a particular action over multiple periods, other agents imitate their choice, creating persistence in decisions over time. Since herding leads to persistence, the price impact of herding in financial markets may be identified by focusing on persistent trading decisions. Motivated by this insight, we analyze institutional trading decisions that persist over several quarters and examine the price impact of such trading persistence on the cross section of stock returns.

We show that persistence in institutional trading has significant power to predict the cross section of stock returns at long horizons, after controlling for past returns and other variables that are known to predict returns. Institutional trade persistence is associated with reversals in returns. Stocks that are persistently sold by institutions over three to five quarters outperform stocks that are persistently bought by them after a period of about 2 years. Thus, our long-term results complement the existing literature on the short-term price impact of institutional herding.

Our empirical analysis is based on a sample of quarterly observations on the stock holdings of U.S. institutional portfolio managers between 1983 and 2004. We measure the buy and sell persistence of institutional trading by the number of consecutive quarters in which a stock is bought or sold by institutions as an aggregate.

Our cross-sectional regression tests reveal that the persistence of institutional trading is negatively related to stock returns at long horizons. The predictability associated with institutional trade persistence is economically important and statistically significant, even after we control for a wide variety of other factors known to predict long-term returns. We include past 4-year returns and past 3-year returns measured skipping a year to control for the stylized patterns of return reversals previously documented by DeBondt and Thaler (1985). We also control for a number of other stock characteristics, such as market capitalization, institutional ownership, and share turnover. Since value stocks typically exhibit return reversals, we include book-to-market in our regression specification, as well as several other variables that capture the value characteristics of a company (earnings-to-price ratio, cash flow-to-price ratio, sales-to-price ratio, and past earnings growth). In addition, we control for

[1] Other papers finding evidence of a positive correlation between institutional demand and future returns include Nofsinger and Sias (1999), Grinblatt, Titman, and Wermers (1995), Cohen, Gompers, and Vuolteenaho (2002), and Chen, Hong, and Stein (2002), among others.

the reversal effect related to a company's share issuance or repurchase activity as documented in Daniel and Titman (2006). Finally, we control for changes in analyst coverage. While some of these controls significantly predict long-term returns, the negative association between institutional trade persistence and long-term returns remains strongly significant and is robust to all of them.

The impact of institutional trade persistence on stock returns is particularly strong for stocks that are mostly owned by institutional investors. In the first half of our sample period (1983 to 1993), stocks with higher than average institutional ownership experience significant return reversals associated with persistent institutional trading. In the more recent half of the sample period (1994 to 2004), the effect of institutional trade persistence on returns is unconditionally negative and significant, suggesting that the reversal effect associated with trade persistence is strong even for stocks with an average level of institutional ownership. At an intuitive level, this finding could be explained in light of the unprecedented growth in the delegated portfolio management industry witnessed by financial markets during our sample period. The second half of the sample is characterized by an increase in average institutional ownership, and thus institutional trading in the average stock is likely to be higher than that in the first half of the sample. Therefore, institutional herding may have a larger price impact on average in the second half of the sample.

We next examine the link between persistent institutional trading and stock returns by forming portfolios based on trade persistence and tracking their performance over periods of 1–10 quarters. We then measure the return differential between portfolios of sell and buy persistence. We adjust the portfolio returns in two different ways. First, we estimate monthly alphas from a five-factor model. Second, we compute monthly returns that are adjusted using the characteristic-matched benchmark of Daniel et al. (1997) (DGTW). The results for value-weighted portfolios show that a strategy based upon three-quarter institutional trade persistence yields monthly adjusted returns that vary between 15 and 22 basis points for holding periods of 2 years or more, regardless of the method used to compute abnormal returns. A four-quarter persistence strategy yields significant abnormal monthly returns of 19–24 basis points for holding periods of 2 years or more. Returns to equally weighted portfolios are substantially larger.

To analyze the robustness of our results to firm size, we repeat our analysis after excluding all stocks with price smaller than $5 and all stocks with market capitalization in the lowest NYSE decile, and find no substantial changes. This result suggests that our findings are not driven by microcaps. However, we emphasize that the return predictability related to institutional trade persistence is concentrated among stocks with market capitalization in the bottom NYSE tercile, a feature that our study shares in common with several other papers identifying return predictability.[2] We also show that our results are associated with a substantial fraction of the aggregate institutional portfolio. The measure of stocks that drives our statistically significant results represents at

[2] Fama and French (2008), for example, find that the abnormal returns to several anomalies are not equally strong across all size groups.

least 18% to 19% of the institutional portfolio, regardless of whether we use market capitalization or dollar volume.

When we split the sample into two subperiods, we find that the return differential between portfolios of sell and buy persistence is not significant on average during the first half of the sample, while it is large and significant in the second subperiod. During this later period, a value-weighted strategy based on three-quarter institutional trade persistence yields abnormal monthly returns of 25–40 basis points for holding periods of 2 years or more, and a strategy based on four-quarter persistence yields a return of 41–50 basis points.

Our evidence that persistent institutional trading is associated with return reversals contributes to the debate on the price impact of institutional herding. We discuss here a few potential explanations for our findings. Distinguishing between these explanations represents a potential area for future research. One hypothesis is that institutions are affected by a behavioral bias leading them, for example, to trade on stale information, and thus contributing to prices being pushed away from fundamental values. A second hypothesis is that our findings are a consequence of the reputational concerns of delegated portfolio managers. Informally, the desire to impress investors generates endogenous herding: since better informed managers receive more correlated information, fund managers are tempted to trade in a correlated manner. This makes them excessively keen to buy (sell) assets that have been persistently bought (sold) in the recent past, leading to mispricing and thus return reversals.[3] A third alternative is that the negative association between institutional trading and stock returns arises because institutions trade against insiders with superior knowledge of future cash flows. While it is difficult to rule out this possibility given the available data, acceptance of this theory would amount to a profoundly negative indictment of the fund management industry: for our findings to be explained in this manner, it must be the case that professional money managers trade, on average, against better informed insiders, and are systematically unaware of this fact. In addition, we find that our results are robust to controlling for share issuance, a measure of intangible information. A final possibility is that retail flows drive the relationship between institutional trading and return reversals. Although they do not examine persistent institutional trading behavior, Coval and Stafford (2007) and Frazzini and Lamont (2008) find that retail flows are negatively correlated with future returns. We repeat our analysis after excluding institutions that are likely to be more subject to inflows and outflows, such as mutual funds. We find that our results remain qualitatively unchanged and of a similar order of magnitude, suggesting that such flows cannot be the main driver of our aggregate results.[4]

[3] Theoretical foundations for this idea can be found in Dasgupta and Prat (2008) and Dasgupta, Prat, and Verardo (2011), who study the sequential trading behavior of fund managers whose future pay depends on investors' perception of the precision of their information.

[4] A few recent studies document a negative relationship between institutional trading and stock returns. For example, Dennis and Strickland (2002) find that stocks mostly owned by institutions experience return reversals during 6 months following a large market drop. Other very recent papers include Gutierrez and Kelley (2009), who find evidence of reversals after institutional buy

The remainder of the paper is organized as follows. Section I describes the data. Section II presents regression tests of the link between institutional trade persistence and the cross-section of stock returns. Section III presents empirical results for portfolios formed on the basis of institutional trade persistence. Section IV concludes the paper.

I. Data and Descriptive Statistics

The sample consists of quarterly observations for firms listed on NYSE, Amex, and NASDAQ during the period 1983 to 2004. Data on prices, returns, and firm characteristics are from CRSP, data on book values of equity come from Compustat, and data on analyst forecasts are obtained from I/B/E/S. The sample includes common stocks of firms incorporated in the United States. Quarterly data on institutional holdings are obtained from the CDA/Spectrum database maintained by Thomson Financial. All institutions with more than $100 million under discretionary management are required to report to the SEC all equity positions greater than either 10,000 shares or $200,000 in market value. Our sample consists of an average of 1,130 managers per quarter (varying from 640 to 2,023). The aggregate value of their portfolio shows a substantial increase over the sample period, from about 30% of the CRSP market value in 1983 to 64% in 2004.

We define net trade by institutional managers in a given security as the percentage change in the number of shares of stock i belonging to the aggregate institutional portfolio at time t, $S_{i,t}$, taking place between quarter $t-1$ and quarter t: $d_{i,t} = \frac{S_{i,t} - S_{i,t-1}}{S_{i,t-1}}$. Each quarter, we rank stocks on the basis of $d_{i,t}$ and define net buys as those stocks with a value of $d_{i,t}$ above the cross-sectional median, and net sells as those stocks with a value of $d_{i,t}$ below the median.[5] Trade persistence is defined as the number of consecutive quarters in which we observe a net buy or a net sell for stock i. This variable is positive for net buys and negative for net sells. For example, a stock that has been bought in quarter t and quarter $t-1$ but has been sold in quarter $t-2$ has trade persistence 2, while a stock that has been sold in quarter t and quarter $t-1$ but has been bought in quarter $t-2$ has trade persistence -2. The maximum trade persistence assigned to a stock is 5 (-5), for stocks that have been bought (sold) for at least five consecutive quarters. Persistence values of 1 and -1 (for stocks bought or sold in quarter t only) are consolidated as persistence 0.[6]

herding measured over one quarter, and Puckett and Yan (2008), who examine high-frequency institutional herding and find evidence of return reversals after short-term sell herds.

[5] We obtain similar results if we classify net buys and net sells according to the sign of $d_{i,t}$. Furthermore, our findings are robust to using two alternative definitions of net trade: the change in the number of shares scaled by shares outstanding, and the change in the number of shares scaled by trading volume. These results are shown in the Internet Appendix, available online in the "Supplements and Datasets" section at http://www.afajof.org/supplements.asp.

[6] To reconcile our results with the existing literature on institutional herding, we perform our empirical analysis using a long-horizon version of commonly used one-period herding measures. We use the number of buyers of stock i in quarter t as a fraction of the total number of active traders in

Table I illustrates the characteristics of stocks with different trade persistence, computed as time-series averages of cross-sectional statistics. The average number of stocks in each persistence portfolio is highest for a persistence of 0, meaning that more stocks have been bought or sold in the current quarter than in n consecutive quarters, and decreases rapidly with the horizon over which persistence is measured. The table also reports median values of net trade, $d_{i,t}$, for each persistence portfolio. Market capitalization, turnover, and book-to-market (B/M) are measured in the last month of quarter t.[7] Past returns and institutional ownership are measured in quarter t. The summary statistics show that market capitalization tends to increase across persistence portfolios, although the variation is relatively small. Share turnover increases with persistence, suggesting that institutions tend to buy stocks that are more liquid. Furthermore, institutions tend to sell value stocks (high B/M) and buy growth stocks (low B/M). Average institutional ownership is higher among stocks with positive trade persistence. Market-adjusted quarterly returns are negative for stocks that have been persistently sold and positive for stocks that have been bought by institutions.

While the number of analysts following a stock (*Coverage*) does not vary across trade persistence portfolios, the summary statistics show that stocks persistently sold exhibit negative or small changes in analyst coverage during the previous year, while stocks persistently bought exhibit positive changes in analyst coverage (*Dcoverage*). We also provide several measures of valuation for the firms in our sample. Specifically, we estimate a stock's earnings-to-price ratio (E/P), cash flow-to-price ratio (CF/P), and sales-to-price ratio (S/P). As with B/M, these variables are measured at the end of year $t-1$ and are employed starting in June of year t. We exclude observations with negative accounting values. The summary statistics show that these valuation ratios are larger for portfolios of sell persistence and smaller for portfolios of buy persistence. We also compute past earnings growth for each stock in our sample, measured as the change in earnings during the year that precedes portfolio formation and scaled by price.[8] The summary statistics suggest that stocks persistently sold by institutions are characterized by low past earnings growth,

the stock, a measure based on Lakonishok, Shleifer, and Vishny (1992). We also use signed herding, as defined in Wermers (1999). We then construct measures of "herding persistence" by counting the number of consecutive quarters during which a stock exhibits buy or sell herding. The results are consistent with the findings presented using our trade-persistence measure, and suggest that the link between trade persistence and returns is not specific to our definition of institutional trading. The estimates from these tests are presented in the Internet Appendix.

[7] Since NASDAQ is a dealer market and thus volume is double counted, we divide NASDAQ volume by two so that turnover is comparable across different exchanges. The results do not change if we subtract from each stock's volume the average volume of the exchange in which the stock is traded.

[8] Alternatively, we measure the change in earnings between quarter t and quarter $t-4$, to account for the seasonality in the earnings process. The results are not sensitive to the measurement method for past earnings growth.

Table I
Characteristics of Portfolios Based on Institutional Trade Persistence

This table reports time-series averages of quarterly cross-sectional means and medians for characteristics of portfolios based on institutional trade persistence. Trade persistence is the number of consecutive quarters for which we observe a net institutional buy or a net institutional sell for stock i. Net buys have positive persistence and net sells have negative persistence. Net institutional trade in security i is defined as the percentage change in the number of shares of i in the aggregate institutional portfolio from the end of quarter $t-1$ to the end of quarter t: $d_{i,t} = \frac{S_{i,t} - S_{i,t-1}}{S_{i,t-1}}$, where $S_{i,t}$ is the number of shares of i in the institutional portfolio in quarter t. Net buys (sells) are stocks with a value of $d_{i,t}$ above (below) the cross-sectional median in quarter t. At the end of each quarter t, stocks are assigned to portfolios based on the persistence of institutional net trade. Persistence 0 includes stocks that have been bought or sold in quarter t. The portfolio with persistence -5 (5) includes stocks that have been sold (bought) for at least five consecutive quarters. *Market cap* is a stock's market capitalization ($ millions) measured at the end of quarter t. *NYSE cap decile* is the average NYSE decile of market capitalization to which a stock belongs. B/M is the book-to-market ratio measured at the end of quarter t. *Share turnover* is the monthly trading volume of stock i scaled by total shares outstanding, measured in the last month of quarter t. *Inst. Ownership* is the number of shares of stock i held by institutional investors divided by total shares outstanding, measured in quarter t. *Past return* is the portfolio equally weighted market-adjusted return, measured in quarter t. *Coverage* is the number of analysts following a stock in the year before portfolio formation. *Dcoverage* is the change in the number of analysts following a stock during the year preceding portfolio formation. E/P is the earnings-to-price ratio. CF/P is the cash flow-to-price ratio. S/P is the sales-to-price ratio. These valuation ratios are measured in the year preceding portfolio formation. *Earnings growth* is the annual change in earnings before portfolio formation, scaled by price. *Fraction value* and *fraction dollar volume* are the fractions of the aggregate institutional portfolio represented by each persistence portfolio in terms of market capitalization and dollar volume.

Persistence Portfolio	−5	−4	−3	−2	0	2	3	4	5
Number of stocks	160	136	256	514	2220	498	250	134	174
Net trade (median)	−0.038	−0.042	−0.042	−0.041	0.015	0.103	0.103	0.107	0.103
Mkt cap ($mill., mean)	855	1042	1066	1039	1021	953	882	934	1038
Mkt cap ($mill., median)	37.4	60.4	72.1	85.9	90.7	130.2	151.8	177.4	220.1
NYSE cap decile	2.7	3.1	3.3	3.4	3.6	3.8	3.9	4.0	4.3
B/M	1.06	1.08	0.97	0.88	0.74	0.63	0.56	0.53	0.47
Share turnover	0.04	0.05	0.05	0.05	0.05	0.06	0.06	0.07	0.08
Inst. ownership	0.21	0.23	0.25	0.26	0.28	0.3	0.31	0.33	0.36
Past return	−0.022	−0.027	−0.032	−0.034	−0.005	0.035	0.039	0.041	0.038
Coverage (median)	4.3	4.6	4.6	4.4	3.9	3.8	3.7	3.6	3.9
Dcoverage (median)	−0.12	0.11	0.16	0.16	0.14	0.18	0.22	0.31	0.60
E/P (median)	0.077	0.073	0.071	0.067	0.062	0.058	0.054	0.051	0.045
CF/P (median)	0.114	0.107	0.100	0.095	0.087	0.079	0.072	0.068	0.059
S/P (median)	1.969	1.566	1.404	1.258	1.102	0.975	0.886	0.818	0.721
Earnings growth (median)	−0.006	0.003	0.006	0.007	0.007	0.008	0.009	0.010	0.016
Fraction value	0.04	0.04	0.06	0.13	0.51	0.11	0.05	0.03	0.04
Fraction dollar volume	0.04	0.03	0.06	0.12	0.49	0.11	0.06	0.03	0.05

while stocks persistently bought show stronger earnings growth. Finally, Table I reports the fraction of the aggregate institutional portfolio represented by each persistence portfolio, measured in terms of market capitalization and dollar volume.

II. Regression Analysis

In this section, we test the link between the persistence of institutional trading and future stock returns using regression methods. We estimate cross-sectional predictive regressions of cumulative eight-quarter market-adjusted returns on past trade persistence, past returns, and a wide variety of other control variables. Our specification is as follows:

$$R_{i,t+1:t+8} = \alpha_0 + \beta\, Pers_{i,t} + \gamma R_{i,t-m+1:t} + \delta \boldsymbol{X}_{i,t} + \varepsilon_{i,t},$$

where the dependent variable, $R_{i,t+1:t+8}$, is the eight-quarter market-adjusted return for stock i, cumulated over quarters $t+1$ to $t+8$. The explanatory variable $Pers_{i,t}$ is institutional trade persistence, measured by the number of consecutive quarters in which institutions buy (positive sign) or sell (negative sign) a given stock. The variable $R_{i,t-m+1:t}$ is the past return on stock i measured during a period of m quarters up to quarter t. In order to fully capture the reversal effect in returns documented in the literature (DeBondt and Thaler (1985)), we use past 4-year returns measured up to quarter t ($R_{i,t-15:t}$) or 3-year returns measured skipping a year before quarter t ($R_{i,t-15:t-4}$). The vector $\boldsymbol{X}_{i,t}$ contains a number of control variables that we describe below. All independent variables are standardized by subtracting their cross-sectional mean and dividing them by their cross-sectional standard deviation, to facilitate the interpretation of the coefficient estimates. The cross-sectional moments used to standardize the variables are computed each quarter. We estimate the above regressions following the Fama–MacBeth (1973) procedure. The regression estimates are time-series averages of coefficients obtained from quarterly cross-sectional regressions. The t-statistics are computed from standard errors that are adjusted for autocorrelation following Newey and West (1987).[9]

Table II reports the results from the regression analysis. We start by focusing on specifications (1) and (2). The coefficient estimates show that institutional trade persistence significantly predicts future return reversals. The results imply that a one-standard deviation increase in trade persistence predicts a decrease in future returns of about 1%, net of the effects of all control variables. We control for the reversal effect associated with past long-term returns, for firm size ($cap_{i,t}$), B/M ($b/m_{i,t}$), institutional ownership ($own_{i,t}$), and share turnover ($turn_{i,t}$). We also add a measure of change in analyst coverage ($dcoverage_{it}$)}. The coefficient estimates provide evidence that changes in analyst coverage are associated with reversals in long-term returns.[10] These results are consistent with Kecskes and Womack (2008), who find that firms added (dropped) by analysts have positive (negative) contemporaneous abnormal returns and

[9] We also estimate panel regressions that include time-fixed effects and allow for clustering of the standard errors by firm. Alternatively, we estimate the panel regressions by including time- and firm-fixed effects. We present results for the Fama–MacBeth (1973) specification because it yields standard errors that are more conservative across all alternatives.

[10] This result is robust to measuring changes in analyst coverage between quarter t and quarter $t-1$, or between quarter t and quarter $t-4$, to account for possible seasonalities in analyst coverage.

Table II

Cross-sectional Predictive Regressions of Long-Term Stock Returns

This table reports Fama–MacBeth (1973) coefficient estimates from predictive regressions of cumulative eight-quarter market-adjusted returns on past trade persistence, past returns, and control variables. Past returns are measured during 4 years up to quarter t ($R_{i,t-15:t}$) or during 3 years skipping a year before quarter t ($R_{i,t-15:t-4}$). Share issuance ($issuance_{i,t}$) is the composite measure of share issuance constructed as in Daniel and Titman (2006). $Pers\_Rown_{i,t}$ is an interaction term defined as the product between institutional trade persistence $Pers_{i,t}$ and residual ownership $Rown_{i,t}$, where $Rown_{i,t}$ is estimated from cross-sectional regressions of a logit transformation of institutional ownership on log(cap) and (log(cap))^2. The other independent variables are described in Table I. All independent variables are standardized using their quarterly cross-sectional mean and standard deviation. t-statistics (in parentheses) are adjusted following Newey–West (1987). *, **, *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

	Entire Sample				1983 to 1993		1994 to 2004	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$Pers_{i,t}$	−0.009**	−0.011**	−0.007*	−0.008*	0.000	0.000	−0.016***	−0.018***
	(−2.57)	(−2.33)	(−1.84)	(−1.87)	(0.00)	(−0.07)	(−3.29)	(−2.86)
$Pers\_Rowr_{i,t}$			−0.011**	−0.011**	−0.020***	−0.020***	0.000	0.000
			(−2.09)	(−2.12)	(−3.05)	(−2.97)	(0.03)	(−0.05)
$R_{i,t-15:t}$	0.002		−0.001		0.014		−0.019	
	(0.12)		(−0.08)		(0.65)		(−0.70)	
$R_{i,t-15:t-4}$		0.004		−0.001		−0.004		0.003
		(0.30)		(−0.09)		(−0.19)		(0.15)
$cap_{i,t}$	−0.010	−0.008	−0.008	−0.008	0.015	0.017	−0.036	−0.035
	(−0.45)	(−0.36)	(−0.38)	(−0.37)	(0.61)	(0.66)	(−1.04)	(−1.04)
b/m_{it}	0.036	0.033	0.050	0.037	0.020	0.000	0.085**	0.093***
	(0.87)	(0.78)	(1.14)	(0.86)	(0.26)	(0.00)	(2.57)	(2.77)
$own_{i,t}$	−0.017	−0.017	−0.014	−0.014	−0.001	−0.003	−0.029	−0.027
	(−1.53)	(−1.56)	(−1.24)	(−1.31)	(−0.09)	(−0.23)	(−1.48)	(−1.42)
$turn_{i,t}$	0.034*	0.030	0.032	0.029	0.000	0.000	0.069**	0.062*
	(1.73)	(1.55)	(1.61)	(1.51)	(−0.01)	(−0.00)	(2.10)	(1.91)
$dcoverage_{it}$	−0.014***	−0.015***	−0.016***	−0.016***	−0.025***	−0.023***	−0.004	−0.008*
	(−2.75)	(−3.02)	(−2.67)	(−3.02)	(−2.98)	(−2.72)	(−0.83)	(−1.79)
$issuance_{i,t}$	−0.015*	−0.017**	−0.007	−0.009	−0.009	−0.006	−0.005	−0.012
	(−1.65)	(−2.10)	(−1.61)	(−1.31)	(−1.57)	(−1.04)	(−0.63)	(−0.93)
e/p_{it}	−0.002	0.001	−0.002	0.003	−0.011	−0.003	0.009	0.006
	(−0.10)	(0.03)	(−0.08)	(0.12)	(−0.36)	(−0.09)	(0.24)	(0.14)
cf/p_{it}	0.016	0.017	0.010	0.014	−0.003	−0.004	0.024	0.030
	(0.67)	(0.68)	(0.40)	(0.56)	(−0.11)	(−0.13)	(0.61)	(0.69)
s/p_{it}	0.042	0.047	0.042	0.050	0.054***	0.056***	0.028	0.037
	(1.39)	(1.51)	(1.43)	(1.63)	(2.80)	(2.80)	(0.49)	(0.62)
$e\,growth_{it}$	0.022	0.015	0.039	0.023	0.117*	0.095*	−0.053	−0.064
	(0.63)	(0.45)	(0.54)	(0.73)	(1.69)	(1.76)	(−0.43)	(−0.50)

zero (positive) future abnormal returns. We then control for the impact of share issuance and repurchase activity on long-run returns, since a number of papers show evidence of a negative relationship between firm issuance activity and future long-run returns (see Ikenberry, Lakonishok, and Vermaelen (1995), Loughran and Ritter (1995), and Daniel and Titman (2006)). Following Daniel and Titman (2006), we construct a measure of share issuance ($issuance_{i,t}$) capturing a firms' growth in market value that is not attributable to past returns. This measure increases with seasoned equity offerings, employee stock option plans, and share-based acquisitions, while it decreases with share repurchases

and dividend distributions.[11] The coefficient estimates in regressions (1) and (2) show that share issuance has a negative and significant impact on future returns.

To enhance the ability of the regressions to control for the value effect on long-term returns, and thus to better identify the predictive ability of institutional trade persistence, we add E/P $(e/p_{i,t})\}$, CF/P $(cf/p_{i,t})$, and S/P $(s/p_{i,t})$ as further proxies for value. Finally, we include a control for past earnings growth $(e\,growth_{i,t})$ in our regression specification. The descriptive statistics in Table I show that past earnings growth is low for stocks that institutions tend to persistently sell, and increases with institutional buy persistence, consistent with the finding that institutions tend to buy growth stocks and sell value stocks. As argued in Fama and French (1995), high B/M firms exhibit consistently low earnings profitability, while low B/M firms show higher profitability. The results from the regressions generally yield a positive estimate for the coefficients on the accounting ratios and past growth, consistent with the reversal effect in returns associated with value, but the estimates are not statistically significant.[12]

To better identify the role of institutional trading in explaining the association between trade persistence and future returns, we include an interaction term between trade persistence and institutional ownership in specifications (3) and (4). The institutional ownership of a given stock can be viewed as a proxy for the measure of institutional trade in that stock. Since institutional ownership is positively correlated with size (the average correlation between a stock's level of institutional ownership and the log of its market capitalization is 66% in our sample), we employ a stock's *residual* institutional ownership $(Rown_{i,t})$, constructed as the residual from a cross-sectional regression of institutional ownership on market capitalization.[13] We standardize this measure with respect to its cross-sectional distribution, as we do for all the explanatory variables in the regression analysis. Columns (3) and (4) of Table II show that the coefficients on trade persistence are slightly smaller and less significant, and the coefficients on the interaction term are strongly negative. Thus, the return reversal associated with trade persistence is larger for stocks with higher

[11] The variable $issuance_{i,t}$ is defined as $\log(\frac{ME_{i,t}}{ME_{i,t-\tau}}) - r_{i,t-\tau:t}$, where $ME_{i,t}$ is a firm's market equity at the end of quarter t and $r_{i,t-\tau:t}$ is the log stock's return from $t-\tau$ to t. We measure share issuance over a 4-year horizon to be consistent with the measurement period for past returns, but the results do not vary if we measure issuance activity over any horizon from 1 year (as in Pontiff and Woodgate (2008)) to 5 years (as in Daniel and Titman (2006)).

[12] We also re-estimate the cross-sectional regressions after excluding January returns to provide a further test that the reversal effect associated with trade persistence is distinct from the value effect (see Loughran (1997), e.g.). We find that the results remain qualitatively similar. For the more recent sample period, institutional trade persistence is the only variable that significantly predicts 2-year future returns, while both B/M and changes in analyst coverage lose their significance. These results are presented in the Internet Appendix.

[13] Following Nagel (2005), we first perform a logit transformation of institutional ownership, $\text{logit}(own_{i,t}) = \log(\frac{own_{i,t}}{1-own_{i,t}})$, and then estimate the following quarterly cross-sectional regression: $\text{logit}(own_{i,t}) = a + b\,\log(cap_{i,t}) + c(\log(cap_{i,t}))^2 + e_{i,t}$. We use the residual $e_{i,t}$ (denoted $Rown_{i,t}$) as our measure of residual institutional ownership for stock i in quarter t.

levels of institutional ownership. This finding reinforces the link between institutional trading and future returns, and provides further evidence that the effect of trade persistence on returns is distinct from the value effect. As documented in Nagel (2005), the value effect is generally larger for stocks with lower levels of institutional ownership.

We next estimate cross-sectional regressions for two periods of equal length, 1983 to 1993 and 1994 to 2004. The results are presented in columns (5)–(8) of Table II. In the first half of the sample, the estimated coefficient on the interaction between persistence and residual institutional ownership is −2% and strongly significant, while the coefficient on trade persistence alone is not. This means that trade persistence predicts return reversals only for stocks with above average institutional ownership. In the more recent sample period, the estimated coefficient on trade persistence is negative (−1.6% to −1.8%) and strongly significant, and the interaction term does not play an important role. This result implies that the reversal effect associated with trade persistence is unconditionally strong, even for stocks with an average level of institutional ownership. At an intuitive level, this finding could be explained by the unprecedented growth in the delegated portfolio management industry that occurred during our sample period, where institutional ownership increased from 24% in the first half of the sample to 35% in the second half, on average. When the proportion of institutional trade is not high enough, it is possible that the return effect induced by institutional trade persistence does not show up on average, even if it is present for stocks with high institutional ownership and trading.

In summary, the regression results in Table II show that the reversal effect associated with institutional trade persistence is robust to controlling for past returns, B/M, turnover, market capitalization, institutional ownership, changes in analyst coverage, equity issuance activity, and a number of valuation ratios capturing the value and growth characteristics of a stock. Furthermore, the effect of trade persistence on future returns is generally stronger for stocks with higher levels of institutional ownership.[14]

III. Trade Persistence Portfolios

In this section, we analyze the relationship between trade persistence and future returns by estimating the returns to portfolios of stocks sorted by institutional trade persistence. Specifically, we evaluate the difference in monthly returns between portfolios of stocks with sell persistence and portfolios of stocks with buy persistence.

We use the calendar methodology to compute average monthly returns from overlapping portfolios formed at the end of each quarter t on the basis of past

[14] We also re-estimate our cross-sectional regressions for nonoverlapping one-quarter returns measured one to eight quarters in the future. The coefficient estimates suggest that, except for the first two quarters, trade persistence has a negative and significant impact on the returns of all future quarters during the 2-year period considered. The results from these tests are presented in the Internet Appendix.

Table III
Adjusted Return Differentials for Institutional Trade Persistence Portfolios

This table reports average monthly return differentials between portfolios of stocks persistently sold by institutions for n quarters and portfolios of stocks persistently bought by institutions for n quarters $(-n, n)$. The portfolios are value weighted. Institutional trade persistence is measured over three, four, and five or more quarters. Holding periods are 3–30 months. Five-factor alphas are estimated intercepts from the five-factor model, which includes the three Fama–French (1993) factors, the Carhart (1997) momentum factor, and the Pástor and Stambaugh (2003) liquidity factor. DGTW returns are measured using characteristic-matched benchmarks (size, book-to-market, and momentum) as in Daniel et al. (1997). Estimates are reported in % per month. t-statistics are in parentheses. *, **, *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

	Holding Period									
Persistence	3m	6m	9m	12m	15m	18m	21m	24m	27m	30m
					Panel A: Five-Factor Alphas (VW)					
(−3, 3)	0.53**	0.36**	0.33**	0.43***	0.35***	0.31***	0.21**	0.20**	0.22***	0.21***
	(2.53)	(2.41)	(2.46)	(3.46)	(3.08)	(2.88)	(2.19)	(2.36)	(2.71)	(2.72)
(−4, 4)	0.10	0.15	0.28	0.20	0.24	0.16	0.16	0.23*	0.20*	0.24**
	(0.34)	(0.71)	(1.48)	(1.20)	(1.59)	(1.17)	(1.30)	(1.92)	(1.81)	(2.36)
(−5, 5)	0.32	0.46*	0.39*	0.27	0.16	0.17	0.12	0.10	0.13	0.13
	(1.22)	(1.92)	(1.79)	(1.26)	(0.77)	(0.90)	(0.70)	(0.62)	(0.80)	(0.81)
					Panel B: DGTW Returns (VW)					
(−3, 3)	0.04	0.07	0.08	0.20**	0.18**	0.17**	0.15**	0.16**	0.16**	0.15**
	(0.23)	(0.66)	(0.74)	(2.14)	(2.12)	(2.13)	(2.03)	(2.30)	(2.38)	(2.27)
(−4, 4)	0.17	0.07	0.15	0.10	0.15	0.18*	0.19*	0.21**	0.19**	0.20**
	(0.75)	(0.39)	(1.08)	(0.87)	(1.39)	(1.66)	(1.88)	(2.17)	(2.10)	(2.39)
(−5, 5)	−0.08	0.10	0.16	0.16	0.14	0.18	0.21	0.19	0.20	0.20
	(−0.38)	(0.54)	(0.94)	(0.92)	(0.83)	(1.10)	(1.31)	(1.26)	(1.36)	(1.41)

trade persistence, and held for up to 10 quarters in the future. This approach implies that, for a holding period of k quarters, a fraction $1/k$ of the portfolio is rebalanced every quarter. We consider two alternative ways of adjusting the returns for risk exposures and stock characteristics. We first estimate intercepts from a five-factor model that includes the Fama–French (1993) factors, the Carhart (1997) momentum factor, and the Pástor and Stambaugh (2003) liquidity factor. We also compute abnormal returns with respect to a benchmark that is matched to the stock on the basis of its size, B/M, and momentum characteristics, following DGTW. The benchmark portfolios are constructed from the CRSP universe by sorting stocks first on size (using NYSE cutoffs), then on B/M, and finally on past annual returns. The portfolios are value weighted.

Table III presents the estimated intercepts (alphas) and the DGTW returns for value-weighted persistence portfolios. The results show that a strategy that buys stocks sold by institutions over three quarters and sells stocks bought by them over the same period yields an abnormal return between 15 and 22 basis

points per month for holding periods of 2 years or more, depending on whether the returns are estimated alphas or characteristic-adjusted returns. A strategy based on four-quarter trade persistence generally yields abnormal returns of about 19–24 basis points for holding periods of 2 years or more. A strategy based on longer trade persistence does not show significant profitability.

We also compute alphas and DGTW returns for equally weighted portfolios.[15] Equally weighted strategies exhibit larger and more significant abnormal returns. For a holding period of 2 years or more, the abnormal returns vary between 19 and 34 basis points for trade persistence of three quarters, and between 31 and 48 basis points for trade persistence of four quarters. A trading strategy based on longer trade persistence $(-5, 5)$ is also significantly profitable.

We note that the positive return differentials between sell and buy persistence are mostly due to the large and significant returns of stocks that have been persistently sold by institutional investors. Therefore, short-sale constraints would not limit the profitability of such strategies, which earn most of their returns from buying stocks that institutions have been selling for a number of quarters.[16]

To analyze the robustness of our results to firm size, we repeat our analysis after excluding all stocks with price smaller than \$5 and all stocks with market capitalization in the lowest decile of the NYSE. Table IV presents the results from this analysis for value-weighted portfolios. The estimated returns are similar to those obtained from the entire sample. For example, considering a holding period of 2 years, the five-factor alphas are 20, 23, and 10 basis points using the entire sample of stocks, and 18, 23, and 8 basis points after eliminating small, low-priced stocks. The DGTW returns change from 16, 21, and 19 basis points to 15, 23, and 19 basis points. These results confirm that our findings are not driven by microcaps.

The return predictability that we identify is concentrated, however, among stocks with market capitalization in the bottom tercile of the NYSE, a feature consistent with other papers identifying cross-sectional return predictability (see, e.g., Fama and French (2008)). Table V presents estimates of five-factor alphas and DGTW returns for value-weighted portfolios based on institutional trade persistence. Stocks are sorted by market capitalization based on NYSE cutoff points. The estimates show that long-horizon return differentials between sell and buy persistence are generally positive and significant for stocks in the small NYSE tercile.[17]

The predictability of institutional trade persistence is associated with a substantial fraction of the aggregate institutional portfolio. The measure of stocks

[15] The results from these tests are presented in the Internet Appendix.

[16] The Internet Appendix presents single-factor (CAPM) alphas that are separately estimated for portfolios of buy and sell persistence.

[17] We also estimate returns to persistence portfolios excluding the month of January to check for possible misspecifications of the value benchmark (see, e.g., Loughran (1997)). The estimated returns are similar to those obtained using all calendar months and are presented in the Internet Appendix.

Table IV

Adjusted Return Differentials for Institutional Trade Persistence Portfolios: Excluding Small Stocks and Penny Stocks

This table reports average monthly return differentials between portfolios of stocks persistently sold by institutions for n quarters and portfolios of stocks persistently bought by institutions for n quarters $(-n, n)$. All stocks with price below \$5 and all stocks belonging to the smallest NYSE decile of market capitalization are excluded from the sample. The portfolios are value weighted. Institutional trade persistence is measured over three, four, and five or more quarters. Holding periods are 3–30 months. Five-factor alphas are estimated intercepts from the five-factor model, which includes the three Fama–French (1993) factors, the Carhart (1997) momentum factor, and the Pástor and Stambaugh (2003) liquidity factor. DGTW returns are measured using characteristic-matched benchmarks as in Daniel et al. (1997). Estimates are reported in % per month. t-statistics are in parentheses. *, **, *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

	Holding Period									
Persistence	3m	6m	9m	12m	15m	18m	21m	24m	27m	30m
					Panel A: Five-Factor Alphas (VW)					
(−3, 3)	0.48**	0.32**	0.30**	0.40***	0.33***	0.28***	0.18*	0.18**	0.20**	0.18**
	(2.27)	(2.12)	(2.20)	(3.20)	(2.83)	(2.62)	(1.93)	(2.06)	(2.41)	(2.37)
(−4, 4)	0.12	0.17	0.29	0.22	0.26*	0.17	0.17	0.23*	0.19*	0.24**
	(0.40)	(0.80)	(1.54)	(1.36)	(1.69)	(1.25)	(1.36)	(1.93)	(1.75)	(2.29)
(−5, 5)	0.29	0.42*	0.37*	0.24	0.14	0.15	0.10	0.08	0.10	0.10
	(1.07)	(1.74)	(1.65)	(1.12)	(0.66)	(0.79)	(0.57)	(0.46)	(0.62)	(0.61)
					Panel B: DGTW Returns (VW)					
(−3, 3)	0.00	0.04	0.05	0.18*	0.17*	0.16**	0.14*	0.15**	0.15**	0.14**
	(0.00)	(0.38)	(0.53)	(1.94)	(1.95)	(1.98)	(1.86)	(2.13)	(2.22)	(2.05)
(−4, 4)	0.17	0.07	0.17	0.13	0.17	0.20*	0.20**	0.23**	0.20**	0.21**
	(0.74)	(0.44)	(1.18)	(1.07)	(1.56)	(1.82)	(2.04)	(2.29)	(2.16)	(2.43)
(−5, 5)	−0.07	0.10	0.16	0.15	0.14	0.18	0.21	0.19	0.19	0.19
	(−0.35)	(0.52)	(0.92)	(0.87)	(0.79)	(1.06)	(1.28)	(1.20)	(1.29)	(1.33)

that drive our statistically significant results represents at least 18% to 19% of the institutional portfolio in terms of market capitalization and dollar volume. To appreciate what measure of stocks drives our results, we use the following criterion. Taking our main value-weighted portfolio results (Table III), we consider only those portfolios for which the monthly abnormal returns at long horizons (eight quarters or higher) are significant at the 10% level measured by both five-factor alphas and DGTW characteristic-adjusted returns. This includes the (−3, 3) and (−4, 4) portfolios. From Table I, we see that these portfolios represent approximately 18% to 19% of the institutional portfolio, depending on the specific measure used.[18] For comparability, other studies on

[18] If we include the (−5, 5) portfolio, for which results are significant for equally weighted portfolios but not for value-weighted ones, then the measure of stocks driving our results rises to 26% to 27% of the institutional portfolio.

Table V

Adjusted Return Differentials for Institutional Trade Persistence Portfolios: By NYSE Market Capitalization

This table reports average monthly return differentials between portfolios of stocks persistently sold by institutions for n quarters and portfolios of stocks persistently bought by institutions for n quarters $(-n, n)$. The portfolios are value weighted. Institutional trade persistence is measured over three, four, and five or more quarters. Holding periods are 3–30 months. Five-factor alphas are estimated intercepts from the five-factor model, which includes the three Fama–French (1993) factors, the Carhart (1997) momentum factor, and the Pástor and Stambaugh (2003) liquidity factor. DGTW returns are measured using characteristic-matched benchmarks as in Daniel et al. (1997). Cap is the tercile of NYSE market capitalization to which the stock belongs in a given month. Estimates are reported in % per month. t-statistics are in parentheses. *, **, *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

		Five-Factor Alphas (VW)						DGTW returns (VW)					
		Holding Period						Holding period					
Cap	Pers	3m	6m	12m	18m	24m	30m	3m	6m	12m	18m	24m	30m
	(−3, 3)	−0.06	0.01	0.21**	0.16*	0.22***	0.25***	−0.28*	−0.22*	0.02	−0.01	0.06	0.10
		(−0.37)	(0.10)	(2.00)	(1.68)	(2.61)	(3.37)	(−1.72)	(−1.78)	(0.23)	(−0.11)	(0.84)	(1.37)
1	(−4, 4)	−0.43	0.04	0.23	0.29**	0.33***	0.31***	−0.25	0.08	0.13	0.22*	0.21*	0.17*
		(−1.75)	(0.21)	(1.43)	(2.00)	(2.67)	(2.78)	(−1.10)	(0.46)	(1.06)	(1.82)	(1.77)	(1.77)
	(−5, 5)	0.60**	0.57**	0.60***	0.66***	0.61***	0.58***	0.62***	0.57***	0.54***	0.48***	0.47***	0.48***
		(2.48)	(2.54)	(3.17)	(3.64)	(3.61)	(3.92)	(2.78)	(3.06)	(3.41)	(2.96)	(3.13)	(3.75)
	(−3, 3)	0.18	0.28**	0.21*	0.20**	0.14*	0.11	0.08	0.13	0.21**	0.23***	0.22***	0.22***
		(0.93)	(1.96)	(1.84)	(2.09)	(1.71)	(1.46)	(0.50)	(1.05)	(2.27)	(2.82)	(3.06)	(3.16)
2	(−4, 4)	0.39	0.09	0.13	−0.01	0.11	0.08	0.35	−0.03	0.22	0.13	0.18*	0.14
		(1.56)	(0.46)	(0.89)	(−0.05)	(0.87)	(0.73)	(1.62)	(−0.16)	(1.63)	(1.15)	(1.71)	(1.35)
	(−5, 5)	0.95***	0.71***	0.38*	0.23	0.18	0.10	0.70***	0.53**	0.19	0.18	0.17	0.12
		(3.21)	(2.75)	(1.88)	(1.36)	(1.21)	(0.75)	(2.63)	(2.33)	(1.03)	(1.07)	(1.09)	(0.81)
	(−3, 3)	0.57**	0.39**	0.41***	0.21*	0.10	0.10	0.11	0.13	0.25**	0.20**	0.19**	0.16**
		(2.27)	(2.26)	(2.89)	(1.79)	(0.97)	(1.08)	(0.51)	(0.95)	(2.21)	(2.12)	(2.26)	(2.08)
3	(−4, 4)	−0.02	0.08	0.10	0.05	0.15	0.19	0.05	0.06	0.07	0.17	0.24*	0.28**
		(−0.05)	(0.31)	(0.53)	(0.28)	(0.93)	(1.39)	(0.17)	(0.28)	(0.45)	(1.21)	(1.91)	(2.41)
	(−5, 5)	0.01	0.23	0.12	0.04	−0.03	−0.05	−0.33	−0.10	0.04	0.10	0.14	0.17
		(0.03)	(0.82)	(0.48)	(0.16)	(−0.15)	(−0.26)	(−1.25)	(−0.42)	(0.19)	(0.50)	(0.77)	(0.97)

Table VI

Adjusted Return Differentials for Institutional Trade Persistence Portfolios: Subperiod Evidence

This table reports average monthly return differentials between portfolios of stocks persistently sold by institutions for n quarters and portfolios of stocks persistently bought by institutions for n quarters $(-n, n)$ during two sample periods of equal length: 1983 to 1993 and 1994 to 2004. The portfolios are value weighted. Institutional trade persistence is measured over three, four, and five or more quarters. Holding periods are 3–30 months. Five-factor alphas are estimated intercepts from the five-factor model, which includes the three Fama–French (1993) factors, the Carhart (1997) momentum factor, and the Pástor and Stambaugh (2003) liquidity factor. DGTW returns are measured using characteristic-matched benchmarks (size, book-to-market, and momentum) as in Daniel et al. (1997). Estimates are reported in % per month. t-statistics are in parentheses. *, **, *** indicates statistical significance at the 10%, 5%, and 1% level, respectively.

	1983 to 1993						1994 to 2004					
	Holding Period						Holding Period					
Pers	3m	6m	12m	18m	24m	30m	3m	6m	12m	18m	24m	30m
						Panel A: Five-Factor Alphas (VW)						
(−3, 3)	0.34	0.17	0.02	−0.04	0.05	0.07	0.88***	0.62***	0.88***	0.69***	0.40***	0.38***
	(1.57)	(1.06)	(0.12)	(−0.39)	(0.56)	(0.83)	(2.69)	(2.87)	(4.54)	(4.09)	(3.04)	(3.28)
(−4, 4)	−0.06	−0.27	−0.15	−0.09	0.05	0.01	0.28	0.62**	0.56**	0.46**	0.45**	0.50***
	(−0.19)	(−1.12)	(−0.82)	(−0.55)	(0.39)	(0.13)	(0.65)	(1.97)	(2.34)	(2.27)	(2.50)	(3.13)
(−5, 5)	−0.58*	−0.32	−0.40	−0.24	−0.19	−0.12	1.24***	1.25***	0.97***	0.61**	0.43*	0.41*
	(−1.81)	(−1.10)	(−1.50)	(−0.97)	(−0.85)	(−0.63)	(3.16)	(3.58)	(3.16)	(2.28)	(1.78)	(1.75)
						Panel B: DGTW Returns (VW)						
(−3, 3)	0.05	0.06	−0.02	−0.04	0.03	0.04	0.02	0.09	0.41***	0.37***	0.28**	0.25**
	(0.28)	(0.45)	(−0.23)	(−0.48)	(0.54)	(0.69)	(0.09)	(0.49)	(2.62)	(2.68)	(2.31)	(2.20)
(−4, 4)	0.15	−0.25	−0.19	−0.10	−0.01	−0.02	0.18	0.36	0.39**	0.44**	0.41**	0.42***
	(0.67)	(−1.33)	(−1.41)	(−0.90)	(−0.06)	(−0.23)	(0.47)	(1.35)	(2.03)	(2.51)	(2.55)	(2.91)
(−5, 5)	−0.88***	−0.59**	−0.40*	−0.17	−0.05	0.02	0.69**	0.76***	0.69***	0.52**	0.42*	0.36*
	(−3.33)	(−2.38)	(−1.83)	(−0.81)	(−0.27)	(0.14)	(2.32)	(2.85)	(2.75)	(2.09)	(1.79)	(1.65)

the price impact of herding are also driven by a similar or smaller proportion of the institutional portfolio. For example, Wermers (1999) finds that herding by mutual funds has a significant price effect for a subset of stocks representing about 20% of the value of stocks traded by mutual funds. Lakonishok, Shleifer, and Vishny (1992) find that pension fund herding is related to future returns for stocks that amount to about 3% of the total value of stocks traded by pension funds.

We next examine the predictability of institutional trade persistence over two subperiods of equal length, 1983 to 1993 and 1994 to 2004. We compute five-factor alphas and DGTW returns for portfolios that buy stocks with negative trade persistence and sell stocks with positive trade persistence. Table VI reports the returns for the two subperiods. The return differential between buy and sell persistence stocks is not significant in the first half of the sample, and becomes very large, positive, and significant in the later subperiod. For example, the 2-year return differential ranges from −19 to 5 basis points in the first period, and varies between 28 and 45 basis points in the second period. This is consistent with our regression results, which show that the impact of institutional trading on the cross section of stock returns is higher on average in the second half of the sample.[19]

IV. Conclusions

An important strand of the recent empirical literature on institutional herding finds evidence of a positive correlation between the direction of institutional trading and future short-term returns. These studies focus on relatively short-term herding, typically measured over one or two quarters. Motivated by the theoretical literature on herding, which emphasizes endogenous persistence in decisions over time, we focus here on the temporal dimension of institutional trading. We test the impact of multiquarter persistent patterns of buying and selling by institutions on the cross section of stock returns. Using both regression and portfolio tests, we show that persistence in institutional trading has significant power to predict the cross section of stock returns at long horizons, after controlling for past returns and other variables that are known to predict returns. Institutional trade persistence is associated with reversals in returns. Stocks that are persistently sold by institutions over three to five quarters outperform stocks that are persistently bought by them, after a period of about 2 years. Thus, our long-term results complement the existing literature on the short-term price impact of institutional herding.

[19] To conclude our portfolio analysis, we explore the possibility that our results are driven by retail flows, given previous evidence that mutual fund flows are negatively associated with future returns (see Coval and Stafford (2007) and Frazzini and Lamont (2008)). We examine a subsample of stocks after excluding those institutions that are more likely to be subject to retail flows, such as mutual funds and investment advisors (over 40% of our observations). We find that the results are qualitatively similar and we conclude that the negative relationship between persistence of trading and returns is not driven by retail flows.

Our regression tests show that the effect of institutional trade persistence on stock returns is not subsumed by the effect of past returns or other stock characteristics, such as B/M, size, share issuance activity, changes in analyst coverage, and a number of valuation ratios capturing a firm's value and growth characteristics. The return reversal associated with trade persistence is particularly strong for stocks with higher levels of institutional ownership, and is unconditionally strong and significant in the second half of our sample period.

Trading strategies that buy stocks persistently sold and sell stocks persistently bought by institutions yield positive long-term abnormal returns. These results are concentrated among small stocks, but are not driven by microcap stocks. Moreover, the return differential between portfolios of sell and buy persistence is driven by the second half of our sample period. This is consistent with our cross-sectional regression results and mirrors the dramatic growth of the delegated portfolio management industry during the sample period.

REFERENCES

Bikhchandani, Sushil, David Hirshleifer, and Ivo Welch, 1992, A theory of fads, fashion, custom, and cultural change as information cascades, *Journal of Political Economy* 100, 992–1026.

Carhart, Mark, 1997, On persistence in mutual fund performance, *Journal of Finance* 52, 57–82.

Chen, Joseph, Harrison Hong, and Jeremy C. Stein, 2002, Breadth of ownership and stock returns, *Journal of Financial Economics* 66, 171–205.

Cohen, Randolph B., Paul A. Gompers, and Tuomo Vuolteenaho, 2002, Who underreacts to cash-flow news? Evidence from trading between individuals and institutions, *Journal of Financial Economics* 66, 409–462.

Coval, Joshua, and Erik Stafford, 2007, Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86, 479–512.

Daniel, Kent, Mark Grinblatt, Sheridan Titman, and Russ Wermers, 1997, Measuring mutual fund performance with characteristic-based benchmarks, *Journal of Finance* 52, 1035–1058.

Daniel, Kent, and Sheridan Titman, 2006, Market reaction to tangible and intangible information, *Journal of Finance* 61, 1605–1643.

Dasgupta, Amil, and Andrea Prat, 2008, Information aggregation in financial markets with career concerns, *Journal of Economic Theory* 143, 83–113.

Dasgupta, Amil, Andrea Prat, and Michela Verardo, 2011, The price impact of institutional herding, *Review of Financial Studies, forthcoming*.

DeBondt, Werner, and Richard Thaler, 1985, Does the stock market overreact? *Journal of Finance* 40, 793–805.

Dennis, Patrick, and Deon Strickland, 2002, Who blinks in volatile markets, individuals or institutions? *Journal of Finance* 57, 1923–1950.

Fama, Eugene, and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3–56.

Fama, Eugene, and Kenneth R. French, 1995, Size and book-to-market factors in earnings and returns, *Journal of Finance* 50, 131–155.

Fama, Eugene, and Kenneth R. French, 2008, Dissecting anomalies, *Journal of Finance* 63, 1653–1678.

Fama, Eugene, and James MacBeth, 1973, Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.

Frazzini, Andrea, and Owen Lamont, 2008, Dumb money: Mutual fund flows and the cross-section of stock returns, *Journal of Financial Economics* 88, 299–322.

Grinblatt, Mark, Sheridan Titman, and Russ Wermers, 1995, Momentum investment strategies, portfolio performance, and herding: A study of mutual fund behavior, *American Economic Review* 85, 1088–1105.

Gutierrez, Roberto C. Jr., and Eric K. Kelley, 2009, Institutional herding and future stock returns, Working paper, University of Oregon and University of Arizona.

Ikenberry, David, Josef Lakonishok, and Theo Vermaelen, 1995, Market underreaction to open market share repurchases, *Journal of Financial Economics* 39, 181–208.

Kecskes, Ambrus, and Kent L. Womack, 2008, Adds and drops of coverage by equity research analysts, Working paper, Virginia Tech and University of Toronto.

Lakonishok, Josef, Andrei Shleifer, and Robert W. Vishny, 1992, The impact of institutional trading on stock prices, *Journal of Financial Economics* 32, 23–43.

Loughran, Tim, 1997, Book-to-market across firm size, exchange, and seasonality: Is there an effect? *Journal of Financial and Quantitative Analysis* 32, 249–268.

Loughran, Tim, and Jay R. Ritter, 1995, The new issues puzzle, *Journal of Finance* 50, 23–52.

Nagel, Stefan, 2005, Short sales, institutional investors and the cross-section of stock returns, *Journal of Financial Economics* 78, 277–309.

Newey, Whitney K., and Kenneth D. West, 1987, A simple, positive semi-definite, heteroskedasticity and autocorrelation consistent covariance matrix, *Econometrica* 55, 703–708.

Nofsinger, John, and Richard Sias, 1999, Herding and feedback trading by institutional and individual investors, *Journal of Finance* 54, 2263–2295.

Pástor, Ľuboš, and Robert F. Stambaugh, 2003, Liquidity risk and expected stock returns, *Journal of Political Economy* 111, 642–685.

Pontiff, Jeffrey, and Artemiza Woodgate, 2008, Share issuance and cross-sectional returns, *Journal of Finance* 63, 921–945.

Puckett, Andy, and Xuemin Sterling Yan, 2008, Short-term institutional herding and its impact on stock prices, Working paper, University of Missouri and University of Tennessee.

Scharfstein, David, and Jeremy Stein, 1990, Herd behavior and investment, *American Economic Review* 80, 465–479.

Sias, Richard, 2004, Institutional herding, *Review of Financial Studies* 17, 165–206.

Wermers, Russ, 1999, Mutual fund herding and the impact on stock prices, *Journal of Finance* 54, 581–622.