DOES INVESTMENT HORIZON MATTER? DISENTAGLING THE EFFECT OF
INSTITUTIONAL HERDING ON STOCK PRICES

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Hasan Zafer Yuksel

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As members of the Dissertation Committee, we certify that we have read the dissertation

prepared by Hasan Zafer Yuksel

entitled Does Investment Horizon Matter? Disentangling the Effect of Institutional
Herdning on Stock Prices

and recommend that it be accepted as fulfilling the dissertation requirement for the

Degree of Doctor of Philosophy

George J. Jiang Date: 5-10-2012

Christopher Lamoureux Date: 5-10-2012

Lubomir Litov Date: 5-10-2012

Eric Kelley Date: 5-10-2012

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ABSTRACT

Existing studies document that institutional herding has a stabilizing effect on stock prices, as stock returns are positively correlated with herding over one- to three-quarter horizons. The literature also shows that short-term institutions are better informed than long-term institutions. Motivated by heterogeneity in the level of informed trading between short-term and long-term institutions, this study disentangles the herding effect of short-term and long-term institutions on stock prices. Our results show that herding by short-term institutions promotes price discovery. In contrast, herding by long-term institutions drives stock prices away from fundamentals. Taken together, our findings suggest that the stabilizing effect documented in the existing literature is mainly driven by short-term institutions, and herding by long-term institutions has a destabilizing effect on stock prices.

DOES INVESTMENT HORIZON MATTER? DISENTANGLING THE EFFECT OF INSTITUTIONAL HERDING ON STOCK PRICES

1. Introduction

A large body of empirical literature shows that institutional investors exhibit a tendency to herd. That is, institutional investors buy or sell the same stocks during the same time period.¹ Regarding the effect of institutional herding on future stock prices, these studies present evidence that stock prices continue in the same direction as herding over subsequent one to three quarters. Wermers (1999) documents that stocks bought by mutual funds in herds during a given quarter outperform stocks sold by mutual funds in herds in that quarter, and over the subsequent three quarters. Sias (2004) finds a positive correlation between the direction of institutional herding and future stock returns over the following four quarters. These findings are consistent with the notion that institutional herding aids in market efficiency by speeding up the price adjustment process.

In this paper, we extend existing studies by exploring the effect of institutional herding on future stock prices across different groups of institutions. In particular, previous studies on trading behavior of institutional investors document considerable differences in the level of informed trading among institutional investors with different

¹ See, for example, Lakonishok, Shleifer, and Vishny (1992), Wermers (1999), Nofsinger and Sias (1999), and Sias (2004). Broadly, theoretical literature offers two reasons for why institutions might herd. First, they might receive similar information and trade based on the new information (Froot et al. (1992), and Hirshleifer et al. (1994)). Such herding helps to incorporate new information into stock prices. Second, institutions may herd for reasons unrelated to information such as the reputational risk of acting differently from others or their preferences for specific stock characteristics (Scharfstein and Stein (1990), Banerjee (1992), Falkenstein (1996), and Gompers and Metrick (2001)). In this case, herding is expected to cause stocks to deviate from their fundamental values (see also Devenow and Welch (1996), Bikhchandani and Sharma (2001), and Hirshleifer and Teoh (2003) for detailed surveys of the herding literature).

investment horizons. These studies show that institutions with short investment horizons tend to be better informed than those with long investment horizons.² For example, Yan and Zhang (2009) find that changes in short-term institutional ownership (i.e. institutions that have high portfolio turnover) predict future stock returns and are positively associated with future earnings surprises. In contrast, changes in long-term ownership (i.e. institutions with lower portfolio turnover) are not related to future stock returns or earnings surprises. Their interpretation of these results is that short-term institutions trade aggressively to profit from their informational advantage. If the level of informed trading varies between institutions with short- and long-term investment horizons, then herding by these institutions may also have a different effect on future stock prices. Specifically, if short-term institutions trade based on information, we would expect herding by these institutions to promote price discovery. Conversely, if long-term institutions trade because of reasons unrelated to new information, then herding by these institutions could potentially introduce noise in prices and drive prices away from fundamentals. In this paper, we analyze the price impact of herding by short- and long-term institutions and directly test these hypotheses.

Using a sample of quarterly observations on the holdings of institutional investors between 1981 and 2008, we classify institutional investors into short- and long-term on the basis of their portfolio turnover over the past four quarters (Yan and Zhang (2009)).

² Recent accounting literature also provides evidence that transient institutions (i.e. institutions that trade frequently or have short-investment horizons) have private information about upcoming earnings and are able to profit from this information (Ke and Petroni (2004)). Further, some market anomalies are recognized and indeed exploited by these institutions, such as the accruals anomaly (Lev and Nissim (2006)) and post-earnings announcement drift (Ke and Ramalingegowda (2005)).

We then construct two measures to disentangle the effects of short- and long-term institutional herding. First, we compute the Laktonishok, Shleifer, and Vishny (1992) (LSV hereafter) herding metric for short- and long-term institutions separately.³ This approach measures the tendency of a given subgroup of institutions (short- or long-term institutions) to buy or sell the same stocks during the same time period. Second, we measure the extent to which the institutional herding measure is driven by short-term (long-term) institutions and compute the marginal effect of short-term (long-term) institutional investors on the overall LSV herding measure. In particular, if institutional herding during quarter t is mainly driven by the trading activities of short-term (long-term) institutions, then excluding their trading activities should dramatically reduce the overall LSV herding measure. Based on this intuition, we compute the marginal effect of short-term (long-term) institutions on the LSV herding measure to gauge the extent to which short-term (long-term) institutions' trades contribute to the overall LSV herding measure.

Our empirical results show the existence of herding among both short- and long-term institutional investors. More importantly, the overall LSV herding measure displays a strong correlation with both short- and long-term institutional herding, although there is only a weak association between short- and long-term institutional herding measures. This suggests that any differential price impact of short- and long-term institutional herding may not be captured by herding measures that consider all institutions as a group.

³ The LSV herding measure is widely used in the literature. See, for example, Grinblatt et al. (1995), Wermers (1999), and Brown et al. (2009).

Consistent with the previous literature (Wermers (1999) and Sias (2004)), we find that herding by all institutions and herding by short- and long-term institutions are persistent and strongly related to stock characteristics. Further, persistence in institutional herding is mainly driven by long-term institutions. As noted in Hirshleifer, Subrahmanyam, and Titman (1994), the sequential nature of information arrival leads investors to herd, as those informed late follow those informed early. If short-term institutions are better informed than long-term institutions, long-term institutional herding would be positively correlated with lagged herding measures of short-term institutions. Our findings support this notion. More specifically, we document a strong positive relation between long-term institutional herding and one-quarter lagged short-term institutional herding. In contrast, there is no evidence that lagged herding measures constructed for long-term institutions predict short-term institutional herding.

We begin our investigation by examining the price impact of overall herding by all institutions. Since institutional herding is strongly related to stock characteristics such as size, book-to-market, and past return, we compute quarterly abnormal returns using characteristic-matched benchmark of Daniel, Grinblatt, Titman, and Wermers (1997) (DGTW hereafter). This analysis shows that a portfolio of stocks heavily bought by all institutions outperforms the portfolio of stocks heavily sold by these institutions during the subsequent quarter. However, this brief return continuation is followed by a strong return reversal over the period of two to four quarters following the portfolio formation

period. These findings suggest that after adjusting stock returns for certain characteristics, the price stabilizing effect of herding by all institutions is short lived.⁴

Next, we repeat our portfolio analysis for short- and long-term institutions respectively. Specifically, the trading strategy of buying stocks with extreme buy herding and selling stocks with extreme sell herding portfolios based on the separate (marginal) herding measure constructed for short-term institutions yields an average monthly adjusted return of 167 (121) basis points over the subsequent quarter, while that based on the separate (marginal) herding measure constructed for long-term institutions earns an average monthly adjusted return of -89 (-56) basis points during the same time period. Further, the return continuation following short-term institutional herding continues over three quarters. In contrast, herding by long-term institutions is followed by reversals in returns from the first through the fourth quarter after portfolio formation. Contrary to previous findings, the strong return reversal following long-term institutional herding is evidence that herding by these institutions drives prices away from their equilibrium values.⁵ Overall, our analysis suggests that the stabilizing effect documented in the

⁴ These results contrast with the findings of Wermers (1999) and Sias (2004). Wermers (1999) examines the effect of herding by mutual funds, which are a subset of all institutions, and future stock returns adjusted for size portfolios. Sias (2004) examines the correlation between institutional herding and future stock (raw) returns. Since institutional herding is strongly related to stock characteristics, i.e. size as well as book-to-market ratio and momentum, examining institutional herding and subsequent quarters' abnormal returns using Daniel et al. (1997) provides a stronger test for the price impact of institutional herding. More recent studies are consistent with the short-lived stabilizing effect of institutional herding (Brown et al. (2009) and Dasgupta (2011)).

⁵ Scharfstein, and Stein (1990) and Trueman (1994) propose models in which individuals herd for reasons unrelated to any new information. In Scharfstein, and Stein (1990), individuals herd due to reputational risk of acting differently than others. In Trueman (1994), individuals' incentive structure encourages imitation. These types of herding models expect herding to be price destabilizing.

literature is mainly driven by short-term institutions, and herding by long-term institutions has a destabilizing effect on stock prices.

We next perform Fama-Macbeth (1973) regressions to examine the impact of short- and long-term institutional herding on future stock prices in a multivariate setting. The cross-sectional regression tests show that short-term (long-term) institutional herding measures are positively (negatively) related to stock returns over the period of one to four quarters after the formation period. The predictability associated with short- and long-term institutional herding is statistically significant and economically important, even after accounting for institutional demand (measured as changes in short- and long-term institutional ownership, Gompers and Metrick (2001) and Yan and Zhang (2009)), and stock characteristics including size, book-to-market, and past returns. These findings suggest that our results are not driven by the preferences of short- or long-term institutions for particular stock characteristics. Further, the return predictive power of short-term institutional demand of Yan and Zhang (2009) is completely subsumed by herding measures for short-term institutions. This is consistent with the argument that institutional herding represents a stronger signal about stock valuation than changes in institutional ownership (Sias, Starks, and Titman (2006) and Bennett, Sias, and Starks (2003)).

The recent study of Dasgupta, Prat, and Verardo (2011) argues that since institutional herding leads persistent trading decisions over several quarters, persistent institutional herding provides a more powerful test for the effect of institutional herding

on future stock prices. Contrary to studies on the price impact of institutional herding over one to four quarters, they find that persistence of institutional herding predicts a reversal in stock returns over the eight quarters following portfolio formation. Following their study, we further investigate the price impact of persistent short- and long-term institutional herding over longer horizons. Our results confirm the negative association between overall institutional herding persistence and future stock prices. However, we find that this negative association is mainly due to persistent herding of long-term institutions. In contrast, for short-term institutions, there is no relation between persistent herding and future stock prices. These results complement our earlier results regarding the price impact of institutional herding over a short horizon. Moreover, they also provide further evidence that the differential effect of short- and long-term institutional herding holds in longer horizons.

Robustness checks show that our findings are not driven by small-cap stocks. Excluding stocks with prices less than \$5 or stocks with market capitalization in the lowest NYSE decile does not alter the main conclusion of this paper. We also conduct sub-period analysis and divide our sample into two 56-quarter periods (1981 to 1994 and 1995 to 2008). Although the price impact of short- and long-term institutional herding is stronger in the latter half of the sample period, the differential predictability of herding by these institutions is statistically significant in both periods. A larger price impact of institutional herding suggests an increasing role of institutional trading in U.S. stock markets in the latter half of the sample period.

To summarize, motivated by the heterogeneity in the level of informed trading among institutions with different investment horizons, this study extends the existing literature on institutional herding and examines the price impact of short- and long-term institutional herding. Through the use of both portfolio tests and cross-sectional regressions, we find short- and long-term institutional herding have different effects on future stock prices. In particular, while stock prices continue in the same direction as short-term institutional herding over the one to three quarters after portfolio formation, a strong return reversal follows long-term institutional herding over the same horizon. Taken together, the results of our paper suggest that the stabilizing effect of institutional herding documented in the previous literature is mainly driven by short-term institutions. Contrary to existing studies, the strong return reversal following long-term institutional herding provides new evidence that herding behavior by these institutions has a destabilizing effect on stock prices over a short horizon.

The remainder of the paper is organized as follows. We describe our data and methodology in Section 2. Section 3 presents empirical results for portfolios formed on the basis of herding measures for short- and long-term institutions. We present regression tests of the relation between institutional herding measures and the cross section of stock returns in Section 4. Section 5 concludes the paper.

2. Data and Methodology

We obtain quarterly institutional holdings for all common stocks traded on NYSE, AMEX, and NASDAQ for the period between the first quarter of 1981 and the fourth

quarter of 2008; for a total of 112 quarters, from Thomson Financial. Under Section 13-F of the Securities and Exchange Act of 1934, all institutions with discretion over 13-F securities worth \$100 million or more must report the list of all equity holdings that are greater than 10,000 shares or \$200,000 in market value at the end of each quarter.⁶ Institutional ownership for each stock is defined as the number of shares held by institutional investors divided by the stock's total number of shares outstanding. We exclude those observations with total institutional ownership greater than 100%. Data on stock returns, share prices, number of shares outstanding, and CRSP price adjustment factors for all NYSE/AMEX/NASDAQ stocks are obtained from the Center for Research in Security Prices (CRSP).⁷ Finally, the data on book value of equity and cash dividends come from COMPUSTAT.

2.1. Classification of Short- versus Long-term Institutions

We employ the methodology in Yan and Zhang (2009) and classify institutions as short- or long-term on the basis of their average portfolio turnover over the past four quarters. Specifically, each quarter, we calculate the aggregate buy and sell for each institution:

⁶ These institutions include banks, investment advisors (both domestic and foreign), investment companies, nonprofit institutions, pension funds, colleges and foundations, insurance companies, broker-dealer, and investment banks. Although state pension funds are not required to file 13-F statements, some (i.e. CALPERS) report their holdings voluntarily. 13-F securities include common stock, preferred stock, and convertible debt.

⁷ CRSP price adjustment factor allows us to adjust the number of firm's stock for splits and stock dividends.

$$CR_{k,t}^{buy} = \sum_{\substack{i=1 \\ S_{k,i,t} > S_{k,i,t-1}}}^{N_k} |S_{k,i,t}P_{i,t} - S_{k,i,t-1}P_{i,t-1} - S_{k,i,t-1}\Delta P_{i,t}| \quad (1)$$

and

$$CR_{k,t}^{sell} = \sum_{\substack{i=1 \\ S_{k,i,t} \leq S_{k,i,t-1}}}^{N_k} |S_{k,i,t}P_{i,t} - S_{k,i,t-1}P_{i,t-1} - S_{k,i,t-1}\Delta P_{i,t}| \quad (2)$$

where $P_{i,t}$ and $P_{i,t-1}$ are the share prices for stock i at the end of quarters t and $t-1$ respectively. $S_{k,i,t}$ and $S_{k,i,t-1}$ are the number of shares of stock i held by investor k at the end of quarters t and $t-1$ respectively. We adjust stock splits and stock dividends by using the CRSP price adjustment factors. $CR_{k,t}^{buy}$ represents institution k 's aggregate purchase, while $CR_{k,t}^{sell}$ represents institution k 's aggregate sale during the quarter t . Then we define institution k 's churn rate as:

$$CR_{k,t} \equiv \frac{\min(CR_{k,t}^{buy}, CR_{k,t}^{sell})}{\frac{\sum_{i=1}^{N_k} S_{k,i,t}P_{i,t} + S_{k,i,t-1}P_{i,t-1}}{2}} \quad (3)$$

As discussed in Yan and Zhang (2009), this measure uses the minimum of aggregate purchases and sales, which in effect minimizes the impact of investor cash flows on portfolio turnover. Finally, the average churn rate over the past four quarters is computed as follows:

$$Average\ CR_{k,t} = \frac{1}{4} \sum_{j=0}^3 CR_{k,t-j} \quad (4)$$

Based on *Average CR_{k,t}*, we group all institutions into three terciles each quarter. Institutions ranked in the top tercile with the highest average churn rates are classified as short-term institutions and those ranked in the bottom tercile, those with the lowest churn rates, are classified as long-term institutions.

2.2. Measuring Herding

2.2.1. LSV Herding Measure

Lakonishok, Shleifer, and Vishny (1992) define and measure herding as the average tendency of a group of institutional investors to buy (or sell) particular stocks at the same time, relative to what would be expected if institutions traded independently. For each stock and each quarter, we compute the LSV herding measure (HM_{it}) as:

$$HM_{it} = |p_{it} - \bar{p}_{it}| - AF_{it} \quad (5)$$

where p_{it} is the number of institutions buying stock i during quarter t , relative to the total number of institutions trading stock i during the same quarter t . We define an institution buying (selling) stock i , if it holds more (fewer) split-adjusted shares at the end of quarter t than at the beginning of the quarter t . $\bar{p}_{it}$ denotes the expected p_{it} during quarter t , as represented by the average p_{it} across all stocks during the same quarter t . The expression AF_{it} is an adjustment factor where the expectation is calculated under the null hypothesis of random and independent trading by institutional investors.⁸ The adjustment factor is

⁸ The adjustment factor is computed by assuming a binomial process for p_{it} during each stock-quarter where the binomial parameter is the number of institutions trading that stock during the quarter and p is the average proportion of all institutions' trades of all stocks that are buys during the quarter. See Lakonishok et al. (1992) and Wermers (1999) for more detail.

computed by assuming a binomial process for p_{it} during each stock-quarter where the binomial parameter is the number of institutions trading that stock during the quarter and p is the average proportion of all institutions' trades of all stocks that are buys during the quarter. Values of HM_{it} significantly different from zero are interpreted as evidence of institutional herding. To ensure that this measure reasonably captures the concept of a herd, we require each stock in our sample to be traded by at least five institutions during any quarter.⁹

To distinguish herding on the buy- and sell-side, we follow the methodology described in Wermers (1999) and Brown, Wei, and Wermers (2009). We first measure herding conditional on whether a stock has a higher or lower proportion of buys than the average stock and then define the buy herding (BHM_{it}) and sell herding (SHM_{it}) measures as:

$$BHM_{it} = HM_{it} | p_{it} > \bar{p}_{it} \quad (6)$$

and

$$SHM_{it} = HM_{it} | p_{it} < \bar{p}_{it} \quad (7)$$

Finally, we construct the *adjusted herding measure*, denoted as $ADJHERD$, which combines the *buy-* and *sell-herding* measures (Brown, Wei, and Wermers (2009)). Specifically, for each quarter and within each group of buy-herding (or sell-herding) stock, we subtract the minimum value of BHM (or SHM) from each stock's BHM_{it} (or

⁹ Varying the number of institutions that trade a stock for this restriction does not alter the main findings of this study.

SHM_{it}), which generates the non-negative differenced herding measure. Then we set $ADJHERD$ equal to the differenced BHM_{it} if the stock is a buy-herding stock, and equal to -1 times the differenced SHM_{it} if the stock is a sell-herding stock during the quarter. Thus, a high (low) $ADJHERD$ measure indicates that the stock is heavily bought (sold) by a herd of institutions.

2.2.2. LSV Herding Measure for Short- and Long-term Institutional Investors

To disentangle the effects of short- and long-term institutional herding, we construct two measures. In our first measure, we compute the LSV herding measure for short- and long-term institutions separately, which gauges the tendency of a subgroup of institutions (short- or long-term institutions) to trade together in the same direction. The LSV herding measure for short-term and long-term institutions in a stock i during the quarter t can be expressed as;

$$HM_{it}^{ST} = |p_{it}^{ST} - \bar{p}_{it}^{ST}| - AF_{it}^{ST} \quad (8)$$

and

$$HM_{it}^{LT} = |p_{it}^{LT} - \bar{p}_{it}^{LT}| - AF_{it}^{LT} \quad (9)$$

where p_{it}^{ST} (p_{it}^{LT}) is the proportion of short-term (or long-term) institutions buying stock i during quarter t , relative to the total number of short-term (or long-term) institutions trading that stock during the same quarter. Both $E[p_{it}^{ST}]$ ($E[p_{it}^{LT}]$) and AF_{it}^{ST} (AF_{it}^{LT}) are re-computed for short-term institutions and separately for long-term institutions. BHM_{it}^{ST} (BHM_{it}^{LT}), SHM_{it}^{ST} (SHM_{it}^{LT}) and $ADJHERD_{it}^{ST}$ ($ADJHERD_{it}^{LT}$) are constructed in a

similar way to that described above for short-term institutions and separately from long-term institutions. $ADJHERD_{it}^{ST}$ represents the adjusted herding measure based on short-term institutions, and $ADJHERD_{it}^{LT}$ denotes the adjusted herding measure based on long-term institutions.

2.2.3. Herding Driven by Short- and Long-term Institutions: Marginal Herding Measures

In our second approach, we measure the extent to which trading activities of short-term (or long-term) contribute to the overall LSV herding measure (HM_{it}). The rationale of this approach is as follows: if herding is mainly driven by the trading activities of short-term (long-term) institutions during quarter t , then excluding trading activities of short-term (long-term) institutions should dramatically reduce the overall LSV herding measure (HM_{it}). In other words, trading activities of short-term (long-term) institutions have a higher marginal effect on the overall LSV herding measure. We first compute the LSV herding measure excluding the trading activities of short- or long-term institutions as follows:

$$HM_{it}^{excl_ST} = |p_{it}^{excl_ST} - \bar{p}_{it}^{excl_ST}| - AF_{it}^{excl_ST} \quad (10)$$

and

$$HM_{it}^{excl_LT} = |p_{it}^{excl_LT} - \bar{p}_{it}^{excl_LT}| - AF_{it}^{excl_LT} \quad (11)$$

All parameters in these measures above are constructed in the same manner described in the previous section. For example, $p_{it}^{excl_ST}$ ($p_{it}^{excl_LT}$) excludes all short-term (long-term) institutions and is computed as the proportion of all institutions buying

stock i during the quarter t , relative to the total number of institutions trading that stock during that quarter. $AF_{it}^{excl_ST}$ ($AF_{it}^{excl_LT}$) denotes the adjustment factor for trading activities of all institutions excluding short-term (long-term) institutions. Then, we calculate the marginal herding measures as:

$$MHM_{it}^{ST} = HM_{it} - HM_{it}^{excl_ST} \quad (12)$$

and;

$$MHM_{it}^{LT} = HM_{it} - HM_{it}^{excl_LT} \quad (13)$$

where MHM_{it}^{ST} (MHM_{it}^{LT}) is the marginal effect of short-term (or long-term) institutions on the LSV herding measure. A high MHM_{it}^{ST} (MHM_{it}^{LT}) would indicate that the overall LSV herding measure is driven by the trading activities of short-term (long-term) institutions. Similarly, for each MHM_{it}^{ST} and MHM_{it}^{LT} , we distinguish marginal herding measures on the buy- and sell-side and then combine buy herding and sell herding to construct adjusted herding measures, i.e. $MADJHERD^{ST}$ and $MADJHERD^{LT}$. $MADJHERD^{ST}$ is the marginal herding measure for short-term institutions and $MADJHERD^{LT}$ is the marginal herding measure for long-term institutional investors.

3. Empirical Results

3.1. Descriptive Statistics

3.1.1. Portfolio and Legal/Style Characteristics of All institutions, Short-, and Long-term Institutions

In this section, we explore whether short- and long-term institutions exhibit different preferences for size, value, and momentum characteristics in their portfolio holdings. Specifically, we group each stock listed in CRSP into respective quintiles according to market value (size) of equity at the end of June with break points based on NYSE stocks only, book-to-market ratio (B/M), and its prior twelve month return (momentum). Using quintile information, we compute value-weighted size, book-to-market (B/M), and momentum ranks for each institution in each quarter. For example, an institution holding stocks with the largest (smallest) size quintile would have *Size Rank* of 5 (1). Table 1 reports the descriptive statistics for the full sample of institutional investors (overall institutional investors) and separately for short- and long-term institutions. Each month, we compute cross-sectional averages of portfolio holding characteristics during the sample period. We then calculate and report the time-series mean and median of these characteristics for all institutions, short-, and long-term institutions. Panel A shows that, on average, institutional investors as a whole tend to hold larger stocks (*Size Rank*= 3.67) and stocks with larger book-to-market ratios (*B/M Rank*=2.76) in their portfolio. Further, the portfolio holdings of an average institution are slightly tilted toward momentum stocks (*Mom Rank*=3.24). There are several differences in characteristics between short- and long-term institutional investors. For example, compared to long-term institutions, short-term institutions tend to hold stocks in their portfolio that are smaller and with higher momentum. Panel A also show that the average holding period of short- (long-term) institutions is 1.2 (8.3) years implied by the quarterly portfolio turnover (*Average Churn*) of 21% (3%).

Each type of institution (i.e. bank trusts, independent investment advisors, etc.) is governed by different fiduciary responsibility laws, follows different investment practices and faces different competitive pressure.¹⁰ To better understand the characteristics of short- and long-term institutional investors, we investigate the relation between investment horizon, and legal type and the capitalization/style characteristics of institutional investors. Table 1, Panel B presents the time-series mean of the percentage of the legal type and capitalization/style composition for all, short-term and long-term institutions. Both legal type and style classification information is obtained from Brian Bushee's Web site.¹¹ We divide our sample of institutional investors into five legal type categories; bank trusts (*BNK*), insurance companies (*INS*), investment companies (*INV*), independent investment advisors (*IIA*), and other institutions (*OTHER*) including corporate (private) pension funds, university and foundation endowments, and miscellaneous.

Panel B of Table 1 shows that a large proportion of institutions in our sample (more than 60% of all institutional investors) belong to the independent advisor category, followed by banks (18% of all institutional investor). Insurance and investment companies amount to 6% and 5% of all institutional investors, respectively. Long-term institutions are dominated by bank trusts and independent investment advisors. Together,

¹⁰ For example, Del Guercio (1996) show that bank trusts and pensions are subject to more stringent fiduciary standards than investment advisors and so tilt their portfolios toward safer stocks. Badrinath and Wahal (2002), Hotchkiss and Strickland (2003), and Dennis and Strickland (2002) argue that trading of investment advisors and mutual funds is more sensitive to the current performance of portfolio companies due to higher level of market scrutiny (see also Bushee (2004) for detailed discussion).

¹¹ We thank Brian Bushee for providing data used in this paper. The data on legal type/style classification on of institutional investors are available at <http://acct3.wharton.upenn.edu/faculty/bushee/IIvars.html#typ>

bank trusts and independent advisors account for 70% of all long-term institutions. On the other hand, independent investment advisors account for more than 75% of all short-term institutions.

We also use the updated institutional investor style classifications from Abarbanell, Bushee, and Ready (2003) in Panel C. They classify institutions into four capitalization/valuation style dimensions: large-value (*LVA*), large-growth (*LGR*), small-value (*SVA*), and small-growth (*SGR*) based on institutions' past investment preferences for value versus small-cap firms.¹² As with the categorization by legal type, institutions' investment horizons vary within each capitalization/style group. The greater proportion of long-term institutions is composed of large-growth and large-value institutions (74% of all long-term institutions), while small-value and small-growth institutions constitute 73% of all short-term institutions. Overall, as expected, both legal type and the capitalization/valuation style are related to institutions' investment horizons. However, this analysis highlights substantial variation in terms of investment horizon within legal type and capitalization/valuation style characteristics, which suggests that grouping institutions on the basis of their legal type or style characteristics does not capture institutions' heterogeneity in terms of investment horizons.

3.1.2. Stock Characteristics and Institutional Herding

For each stock traded by at least five institutional investors, we compute the mean quarterly cross-sectional stock characteristics over the sample period from 1981 to

¹² Abarbanell, Bushee, and Ready (2003) classify institutions based on managers' portfolio weighted average of 15 firm-specific characteristics, for example size, E/P, and B/P.

2008. Table 2, Panel A reports the time-series mean, median, maximum, minimum, and standard deviation of these 112 cross-sectional averages. The average institutional ownership is 37.1% over our sample period. On average, short-term institutions own 10.7% and long-term institutions own 11.1% of total shares outstanding. We find that the average change in both short- and long-term institutional ownership is 0.34% and 0.35% respectively, reflecting the increasing role of institutional investors in U.S. financial markets over time. For example, in 2001, institutional investors account for more 60% of total U.S. equity ownership, compared to 16% in 1965.¹³ The average firm has a market capitalization of \$1,762.9 million, and a book-to-market value of 0.74.¹⁴

Panel B of Table 2 reports the time-series statistics of cross sectional averages of the LSV herding measures used in this study. The average level of herding for all institutions is 0.97% over our sample period.¹⁵ Since a financial asset bought by one institution might be sold by another, we cannot expect all institutions as a group to be part of buy or sell herding.¹⁶ Next we differentiate institutions according to their investments horizons. Although we find the existence of herding among both short- ($HM^{ST}=0.50\%$) and long-term institutional investors ($HM^{LT}=0.25\%$), the overall herding measure is higher than that for short-term and long-term institutions. This finding

¹³ Securities Industry Fact Book 2002.

¹⁴ Our sample is comparable with Yan and Zhang (2009). Please note that unlike their study, we include stocks traded by at least five institutional traders in a given quarter.

¹⁵ Investigating herding behavior of 769 pension funds from 1985 to 1990, Lakonishok, et al. (1992) find herding measure of 2.7%. Similarly, Wermers examine mutual funds herding from 1975 to 1994 and find herding measure of 3.4%.

¹⁶ Badrinath and Wahal (2002) show that since different institutions are often buyers and sellers in the same securities, aggregating their holdings obscures the correlation between changes in individual portfolio holdings and past returns.

suggests commonalities in investment strategies of short-term and long-term institutional investors.¹⁷

Panel B also shows that the average level of herding is greater on the buy-side than on the sell-side for all, short-term and long-term institutions.¹⁸ As noted in Wylie (2005), this finding might be due to a critical assumption of the LSV herding measure. The LSV herding measure assumes that all institutions can engage in short-selling and it is computed assuming a binomial distribution. However, 13-F institutions in the Thomson database are only required to report their long positions.¹⁹ Wylie (2005) argues that a short-sales constraint causes a left truncation of the distribution, and, as a result, buy-side herding is expected to be stronger than sell-side herding. Consistent with this argument, he examines the accuracy of the LSV herding measure and finds no significant evidence of herding in U.K. equity mutual funds after adjusting the LSV herding measure.

The last panel of Table 2 reports the time series mean of cross-sectional correlations between the herding measures and institutional demand variables. Consistent with Panel B, the positive correlation (*correlation coefficient*= 0.13) between short-term ($ADJHERD^{ST}$) and long-term institutional herding ($ADJHERD^{LT}$) suggests some commonality in the investment strategy followed by both short- and long-term

¹⁷ Wermers (1999) also finds that the average herding measure for all funds is not significantly lower, and in many cases is higher than calculated for subgroups with different investment styles.

¹⁸ Wermers (1999) analyzes the herding behavior of the mutual funds from 1975 through 1994 and documents that mutual funds herd more strongly on sell-side.

¹⁹ Further, the long positions reported in 13-F files do not account for their short-positions. The detailed information about institutions reporting rules can be found in SEC Web site (<http://www.sec.gov/divisions/investment/13ffaq.htm>).

institutions. On the other hand, both short-term ($ADJHERD^{ST}$) and long-term ($ADJHERD^{LT}$) institutional herding measures are highly correlated with the overall LSV herding measure ($ADJHERD$). For example, the correlation coefficient between short-term (long-term) institutional herding and herding by all institutions is 0.60 (0.61). This finding suggests that the overall herding measure seems to capture both short- and long-term institutional herding. The important implication of this finding is that any differential price impact of short-term and long-term institutions may not be captured by the overall herding measure. More importantly, a low correlation between institutional demand (i.e., changes in institutional ownership) and institutional herding measures suggests that a change in institutional demand does not need to reflect institutions trading a particular stock in the same direction in the same time period. For example, a large change in institutional demand may be driven by large position changes by one or two institutions.

3.1.3. Determinants of Short- and Long-term Institutional Herding

Next we investigate the determinants of herding for all institutions as a group, and separately for short- and long-term institutions, and estimate following regression during each quarter:

$$\begin{aligned}
 ADJHERD_{i,t} = & \alpha + \beta_1 ADJHERD_{i,t-k} + \beta_2 Size_{i,t} + \beta_3 (B/M)_{i,t} + \beta_4 PRC_{i,t} \\
 & + \beta_5 TURNOVER_{i,t} + \beta_6 RETVOL_{i,t} + \beta_7 S\&P500_{i,t}^{add_drop} \\
 & + \beta_8 Ret_{i,t-1} + \beta_9 Ret_{i,t-4:t-2} + \varepsilon_{i,t}
 \end{aligned} \tag{14}$$

where the dependent variable, $ADJHERD$ ($ADJHERD^{ST}$ and $ADJHERD^{LT}$), indicates herding by all institutions (short- or long-term institutions). Previous literature documents that herding leads persistence in institutional trading (Sias (2004) and Dasgupta, Prat, and Verardo (2011)). However, if institutional investors are differentially informed, we should see differences in the relation between institutions following trades of other institutions and their own lag trades. Specifically, Hirshleifer, Subrahmanyam, and Titman (1994) show that the sequential nature of information arrival leads to those traders informed early to trade aggressively when they receive new information.²⁰ As a result, those traders informed late appear to follow the early informed (i.e. leader) as their trades are positively correlated with the early informed. If short-term institutions are indeed better informed than long-term institutions, then we should expect long-term institutional herding to exhibit a positive association with short-term institutional herding in the previous quarters. Further, as noted in Hirshleifer, Subrahmanyam, and Titman (1994), early informed investors bear the extraneous risk if they have to hold their position longer. They also show that the presence of late informed traders allows the early informed to partially reverse their trades to reduce the risk. This implies that the persistence of short- and long-term institutional herding may also differ. To address these questions, we include lagged values of herding measures constructed for all, short- and long-term institutions. $ADJHERD_{t-k}$ denotes all institutional herding, with k varying from one to four.

²⁰ Hirshleifer, et al. (1994) examine the security analysis and trading decisions of risk-averse individuals, where investigation of a security leads some individuals to receive information before others.

Previous studies also document that institutional herding is related to several stock characteristics. For example, Wermers (1999) and Brown, Wei, and Wermers (2009) show that mutual fund herding is more pronounced among small stocks and stocks with high momentum, while Sias (2004) finds that institutional herding occurs in stocks with high information asymmetry. Following these studies, we add size, book-to market, and the prior four-quarter stock returns. *Size* is the logarithm of beginning of quarter t market capitalization. B/M is the log of book-to-market value of equity as of the prior December. Variable Ret_{t-1} is the raw return of the stock at the end of quarter $t-1$, and $Ret_{t-4:t-2}$ is the lagged three-quarter raw returns preceding the beginning of quarter $t-1$. Furthermore, theoretical models such as Bikhchandani, Hirshleifer, and Welch (1992), and Scharfstein and Stein (1990) suggest that herding can be driven by a lack of reliable information. To account for information uncertainty, we use share turnover (*TURNOVER*) measured as volume divided by shares outstanding for the month prior to the beginning of the quarter, and stock return volatility (*RET VOL*) measured as the logarithm of the standard deviation of monthly returns over the previous two years. If institutional investors benchmark a portion of their holdings against major indexes, then, we would observe a strong herding behavior following index changes (Brown, Wei, and Wermers (2009)). To control for this effect, we use $S\&P500^{add_drop}$ which takes value “1” if the stock was added to the index, “-1” if it was dropped from index and “0” otherwise. The regression estimates are time-series averages of coefficients obtained from quarterly cross sectional regressions (Fama and MacBeth (1973)). The *t-statistics*

are computed from standard errors that are adjusted for heteroskedasticity and autocorrelation following Newey and West (1987).

Regarding the persistence of institutional herding, specification (1) of Table 3 indicates that overall institutional herding exhibits a strong persistence up to four quarters. However, when focusing on persistence of short- and long-term institutional herding separately, we find that the persistence of overall institutional herding is driven by long-term institutions. In particular, specification (5) shows that the coefficients on long-term institutional herding in the previous four quarters are positive and significant. On the other hand, short-term institutional herding is positively related to short-term institutional herding in the previous two quarters. This relation becomes negative during the fourth quarter in specification (2). More importantly, specifications (6) and (7) further show a strong relation between long-term institutional herding and lagged values of short-term institutional herding. By contrast, there is no relation between short-term institutional herding and lagged values of long-term institutional herding in specifications (3) and (4). Put together, the evidence that lagged short-term institutional herding is strongly positively associated with both short- and long-term institutional herding over subsequent quarters is consistent with the notion that short-term institutions are better informed than long-term institutions.

Finally, both short- and long-term institutional herding is significantly related to stock characteristics such as size, book-to-market ratio, and prior quarter return. Unlike the previous section, which documents that on average, long-term institutions do not have

a strong preference for momentum stocks in their portfolio holdings, this analysis shows that momentum trading is an important source of herding by not only short-term institutions but also long-term institutions. The negative and significant relation between volatility and trading volume indicate that these stock characteristics have stronger effects on sell-herding. The coefficient on $S\&P500^{add_drop}$ is positive and significant only for long-term institutional investors.²¹

3.2. Portfolio Analysis

3.2.1. Abnormal Returns

To examine the relationship between institutional herding and future abnormal returns, we calculate value-weighted quarterly rebalanced Daniel, Grinblatt, Titman, and Wermers (1997) (DGTW hereafter) characteristics benchmark. Since institutional herding is strongly related to stock characteristics such as firm size, book-to-market ratio and prior 12-month stock returns, the DGTW characteristic-adjusted abnormal returns provide a stronger test for the impact of short- and long-term institutional herding on stock prices.²²

The DGTW benchmark portfolios are constructed from the CRSP universe by sorting stocks on size based on NYSE cutoffs, then on book-to-market, and finally on past annual returns. We calculate the value-weighted returns for each of the 125

²¹ This finding is not surprising in a sense that passive institutions specializing in index funds are more likely to be long-term institutions than short-term institutions.

²² For details on the construction of the DGTW characteristics benchmarks, see Daniel, Grinblatt, Titman, and Wermers (1997) and Wermers (2004). As noted in Wermers (2004) and Brown et al. (2009), adjusting returns with quarterly (instead of annually) rebalanced DGTW benchmark portfolio returns provides stronger control for momentum.

benchmark portfolios over the subsequent quarters. The benchmark for each stock is the portfolio to which it belongs. The DGTW-adjusted abnormal return for each stock is the difference between the stock return and its benchmark portfolio return over a particular quarter. Using monthly returns instead of quarterly returns or equal-weighted DGTW characteristic-adjusted benchmark returns does not affect the main findings of this study. Although not reported here, the details of these tests are available from author upon request.

3.2.2. Institutional Herding and Abnormal Stock Returns

The extant literature shows that institutional trading often has an impact on stock prices (see, for example, Chan, and Lakonishok (1995), Wermers (1999), Sias (2004), Sias, Starks, and Titman (2006), and Coval and Stafford (2007)). If institutional investors trade in the same direction due to new information, then we expect such a trading behavior to move stock prices closer to their true values, (i.e., a permanent price impact). This is what the literature has documented about the effect of institutional herding on future stock prices. On the other hand, if institutional herding is at least partly driven by any other reasons unrelated to new information; such as incentives to conform, then we expect the large scale of institutional trading to cause temporary price pressure leading to a reversal in returns over subsequent quarters. In this section, we begin our empirical study by examining the relation between institutional herding (all institutions as a group) and future stock returns. Then we explore differences in the price impact of herding behavior between short- and long-term institutional investors and to what extent the

herding behavior of these institutions is related to findings documented in the existing literature.

Each quarter, we rank stocks traded by at least five institutions into quintile portfolios based on *ADJHERD* constructed for all institutions. The top quintile identifies the portfolio of stocks that institutions heavily buy in herds (or the *extreme buy herding*), and the bottom quintile indicates the portfolio of stocks that institutions heavily sell in herds (or the *extreme sell herding*). We then compute the value-weighted quarterly-rebalanced DGTW characteristics-adjusted abnormal returns for each of these five portfolios during the two quarters prior to herding quarter, for the quarter the herding occurs, and during the following four quarters. We also report cumulative abnormal returns over the following two quarters and the following four quarters. To avoid overlapping returns and the accompanying positive serial correlation in returns, we also employ calendar-time methodology (Jegadeesh and Titman (1993)). Specifically, we compute average quarterly abnormal returns from overlapping portfolios formed at the end of each herding quarter t based on institutional herding measures, and held for up to four quarters in the future. For a holding period of k quarters, a fraction $1/k$ of the portfolio is rebalanced every quarter.

Table 4 reports the time-series average of DGTW characteristic-adjusted abnormal returns for portfolios computed over 112 event quarters. While Panel A of Table 4 presents the relation between DGTW characteristic-adjusted portfolio returns and overall institutional herding, Panel B and Panel C investigate this association for short-

and long-term institutional investors respectively. Consistent with prior studies on positive feedback trading (Grinblatt, Titman, and Wermers (1995), Nofsinger and Sias (1999), and Pucket and Yan (2010)), we find positive abnormal returns in the quarter preceding the extreme buy herding and negative abnormal returns in the quarter preceding the extreme sell herding for all institutions, and separately for short-term and long-term institutions. These findings also confirm our findings in the previous section, and suggest that momentum trading is an important source of both short- and long-term institutional herding (Wermers (1999) and Sias (2004)).

Not surprisingly, Table 4 shows that the contemporaneous abnormal stock returns are related to the direction of herding. For example, in Panel A, stock portfolios in the extreme buy herding experience positive contemporaneous DGTW characteristic-adjusted returns of 7.84% (t -statistic=13.86). Similarly, the DGTW characteristic-adjusted abnormal return in the extreme buy herding for short-term institutional herding is 10.48% (t -statistic=16.87) in Panel B and that for long-term institutional herding is 3.16% (t -statistic=8.46). On the other hand, stock portfolios in the *extreme sell herding* have negative contemporaneous DGTW characteristic-adjusted abnormal return of -4.86% (t -statistic=-13.29) for all institutional herding in Panel A, -3.40% (t -statistic=-15.74) for short-term institutional herding in Panel B, and -1.18% (t -statistic=-4.98) for long-term institutional herding in Panel C. Overall, these findings are consistent with the hypothesis that institutional herding impacts stock prices (Chan and Lakonishok (1995), Wermers (1999), and Coval and Stafford (2007)).

Panel A shows that, over the quarter $t+1$, stock the extreme buy herding portfolio for all institutions earns a significantly higher abnormal return (0.51% with t -statistic of 2.57) than the extreme sell herding portfolio (0.02% with t -statistic of 0.09). The difference in abnormal returns between these portfolios is 0.49% (t -statistic = 1.75). The lack of return reversals in these portfolios suggests that the herding behavior of all institutions as a group seems to have a stabilizing effect on stock prices over the subsequent quarter $t+1$. However beginning from the quarter $t+2$, we document a return reversal strong enough to offset the return continuation observed in the subsequent quarter $t+1$. For example, the difference in abnormal returns between the extreme buy herding portfolios and the extreme sell herding portfolios is -0.56% (t -statistic = -2.56) over the second quarter and -1.68% (t -statistic = -6.07) over the fourth quarter. Both calendar-time and cumulative abnormal returns confirm the short-lived return continuation and subsequent return reversal of stocks bought or sold by institutions in herds.²³

Next we repeat our analysis for short-term institutions. We present the findings in Panel B of Table 4. The portfolio of stocks heavily bought by short-term institutions outperforms the portfolio of stocks heavily sold by short-term institutions by an average of 1.67% (t -statistic = 6.91) over the subsequent quarter. More importantly, unlike the previous analysis, the stock price adjustments following short-term institutional herding appear to persist over three quarters. The difference in abnormal returns between these

²³ The absence of return continuation following quarter $t+1$ contrasts with the findings of Wermers (1999) and Sias (2004). Unlike these studies, we compute DGTW characteristic-adjusted abnormal returns to examine the price impact of institutional herding. More recent studies (i.e., Brown et al. (2009) and Dasgupta et al. (2011)) are consistent with the short-lived stabilizing effect of institutional herding.

portfolios is 0.01% (t -statistic = 0.03) over the second quarter and -0.21% (t -statistic = -0.97) over the third quarter. Although the stabilizing effect of short-term institutional herding is followed by a return reversal during the fourth quarter, the difference in cumulative abnormal returns between portfolios in the *extreme buy herding* and the *extreme sell herding* is positive 1.86% (t -statistic= 6.02) over two quarters and 0.88% (t -statistic = 1.84) over four quarters. These findings suggest that the stabilizing effect of institutional herding documented by previous studies is mainly driven by short-term institutions. Unlike Panel A of Table 4, the stabilizing effect is more permanent than the one observed in herding by all institutions as a group.

The price impact of long-term institutional herding in Panel C shows a stark contrast with our earlier findings. The difference in abnormal returns between portfolios in the extreme buy herding and the extreme sell herding portfolios is -0.89% (t -statistic= -2.83) in the subsequent quarter. More importantly, the return reversal following long-term institutional herding persists and is significant up to the end of fourth quarter. Panel C shows that the difference between the portfolios in the extreme buy herding and the extreme sell herding portfolios becomes -0.89% (t -statistic= -2.83) in the subsequent quarter. The strong return reversal following long-term institutional herding suggests that herding by these institutions drives stock prices away from fundamentals. Both cumulative and calendar-time abnormal returns confirm a destabilizing effect of long-term institutional herding on future stock prices.

3.2.3. Herding Driven by Short- and Long-term Institutions and Abnormal Returns

We next use the marginal herding measures for short- and long-term institutions. The marginal herding measure gauges the extent to which short- and long-term institutions' trades contribute to the overall LSV herding measure. Similar to the previous section, for each quarter we rank stocks traded by at least five institutions into quintile portfolios based on the marginal adjusted herding measure for short-term institutions ($MADJHERD^{ST}$) and the marginal adjusted herding measure for long-term institutions ($MADJHERD^{LT}$), respectively. For sorting based on $MADJHERD^{ST}$ ($MADJHERD^{LT}$), the top quintile is denoted as the extreme short-term (long-term) driven buy-herding, while the bottom quintile is denoted as the extreme short-term (long-term) driven sell-herding.

Overall Table 5 is consistent with our previous findings and reinforces the differential impact of short- and long-term institutional herding on future stock prices. Panel A presents result for stocks sorted by $MADJHERD^{ST}$. Stock portfolios in the extreme short-term driven buy herding outperform those in the extreme short-term driven sell herding by an average of 1.21% (t -statistic = 5.02) over the subsequent quarter. The lack of return reversal over the subsequent three quarters suggests that short-term institutions driven herding promotes price discovery. The difference in abnormal returns between these portfolios is 0.13% (t -statistic = 0.69) over the second quarter and -0.11% (t -statistic = -0.57) over the third quarter. Similarly, the difference in cumulative DGTW characteristics-adjusted abnormal returns between the stock portfolios of the extreme short-term driven buy herding and of the extreme short-term driven sell herding is

positive both over two quarters (1.57% with t -statistic= 5.50 during quarters $[t+1, t+2]$) and four quarters (0.65% with t -statistic= 1.47 during the quarters $[t+1, t+4]$).

Panel B shows a significant return reversal over the quarters following long-term institutions driven herding. Once again, the destabilizing effect persists up to four quarters. The difference in abnormal returns between stock portfolios in the extreme long-term driven buy herding and the extreme long-term driven sell herding is -0.56% (t -statistic= -2.05) in the subsequent quarter. The extreme buy herding portfolios underperform the extreme sell herding portfolios by an average of -0.54% with a t -statistic of -2.23 over the second quarter and by -0.85% with t -statistic of -3.58 over the fourth quarter. Further, the difference in cumulative DGTW characteristic-adjusted abnormal returns between the portfolios in the extreme buy herding and the extreme sell herding is -1.05% (t -statistic = -2.45) over the subsequent two quarters and -2.69% (t -statistic = -4.23) over subsequent four quarters.

4. Cross-sectional Results

4.1. Regression Analysis

In this section we employ a multivariate framework and test the link between herding by all, short- and long-term institutional investors and future stock prices. In particular, we estimate cross-sectional regressions of future stock returns on institutional herding measures constructed for all, short-term and long-term institutions, past returns and a number of stock characteristics including size and book-to-market value. For each stock, we implement following regression model:

$$\begin{aligned}
Ret_{i,t+1:t+k} = & \alpha + \beta_1 ADJHERD_{i,t} + \beta_2 ADJHERD_{i,t}^{ST} (MADJHERD_{i,t}^{ST}) \\
& + \beta_3 ADJHERD_{i,t}^{LT} (MADJHERD_{i,t}^{LT}) + \beta_4 Size_{i,t-1} \\
& + \beta_5 (B/M)_{i,t-1} + \beta_6 Ret_{i,t} + \beta_7 Ret_{i,t-3:t-1} + \varepsilon_{i,t}
\end{aligned} \tag{15}$$

where the dependent variable, $Ret_{t:t+k}$ is the raw return for stock i , cumulated over quarters $t + 1$ to $t + k$, with k varying from one to four. The explanatory variables $ADJHERD$, $ADJHERD^{ST}$, and $ADJHERD^{LT}$ are herding measures constructed for all, short-term and long-term institutions respectively. $MADJHERD^{ST}$ and $MADJHERD^{LT}$ denotes marginal herding measures for short- and long-term institutions respectively. The positive coefficients of these variables indicate the return continuation (i.e., a price stabilizing effect), while the negative coefficients indicate the existence of return reversal following herding (i.e., a price destabilizing effect). $Size$ is the logarithm of market capitalization at the end of quarter $t-1$. B/M is the logarithm of book-to-market value of equity as of the prior December. Variable Ret_t is the raw return of the stock during quarter t , and $Ret_{t-3,t-1}$ is the raw return over the quarters $[t-3, t-1]$. We estimate the above regressions using 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 heteroskedasticity and autocorrelation following Newey and West (1987).

Table 6 reports the results of the regression analysis based on $ADJHERD$, $ADJHERD^{ST}$, and $ADJHERD^{LT}$. In specification (1) of Table 6, while we find that one-quarter-ahead stock returns continue in the same direction as all institutional herding,

herding by all institutions is negatively related to future stock returns over a four-quarter period. These results are consistent with our portfolio results suggesting that any stabilizing effect of herding by all institutions as a group is short lived and the return reversal following subsequent quarter is strong enough to offset return continuation during quarter $t+1$.

Specifications (2), (3) and (4) show the stark differences between the effects of short- and long-term institutional herding on future stock prices. While short-term institutional herding is positively related to both one-quarter- and four-quarter-ahead stock returns, we find a strong negative association between long-term institutional herding and future stock prices. The price impacts of short- and long-term institutional herding are also economically significant in all specifications. For example, in specification (4), a one-standard deviation increase in $ADJHERD^{ST}$ is associated with 2.3% increase in next quarter's stock return, while a one-standard deviation increase in $ADJHERD^{LT}$ decreases in next quarter's stock return by about -1.6%.

The regression results using the marginal herding measures ($MADJHERD^{ST}$, and $MADJHERD^{LT}$) are reported in Table 7. Short-term driven institutional herding is positively related to future stock returns (i.e., a stabilizing effect). The magnitude of coefficients for $MADJHERD^{ST}$ ranges from 0.007 to 0.012 and is significant in all specifications while those for $MADJHERD^{LT}$ are negative and significant in all specifications varying from -0.021 to -0.024.

Consistent with our portfolio results, the findings in Table 6 and Table 7 suggest that short- and long-term institutional herding has a differential impact on future stock returns. Specifically, one- and four-quarter stock returns are positively related to short-term institutional herding, suggesting that short-term institutions promote price discovery by speeding up the price adjustment process. However, the negative relation between future stock returns and long-term institutional herding suggests that these institutions herd due to reasons unrelated to new information, which in effect drives stock prices away from fundamentals.

4.2. Information Content of Institutional Herding versus Institutional Demand

A growing body of literature examines whether institutional investors are better informed. By investigating the relationship between institutional demand (i.e., changes in institutional ownership) and future stock returns, Gompers and Metricks (2001) do not find any cross-sectional relationship between institutional demand and future stock returns. However, Yan and Zhang (2009) argue that the lack of evidence on the informational advantage of institutional investors is due to the fact that previous studies consider all institutions as a homogenous group in terms of their informational roles. They show that institutional investors with different investment horizons are differentially informed. Specifically, they show that short-term institutional demand predicts future stock return. In contrast, long-term institutional demand is not related to future stock returns. To analyze the robustness of the return predictive power of the short- and long-term institutional herding measures, in our cross-sectional regression test, we

follow the previous studies and further control for institutional demand and a large set of stock characteristics. In particular, for each stock, we estimate the following regression:

$$\begin{aligned}
 Ret_{i,t+1:t+k} = & \alpha + \beta_1 ADJHERD_{i,t} + \beta_2 ADJHERD_{i,t}^{ST} (MADJHERD_{i,t}^{ST}) \\
 & + \beta_3 ADJHERD_{i,t}^{LT} (MADJHERD_{i,t}^{LT}) + \beta_4 \Delta SIO_{i,t} + \beta_5 \Delta LIO_{i,t} \\
 & + \beta_6 SIO_{i,t-1} + \beta_7 LIO_{i,t-1} + \beta_8 Size_{i,t} + \beta_9 B/M_{i,t} + \beta_{10} AGE_{i,t} \\
 & + \beta_{11} D/P_{i,t} + \beta_{12} PRC_{i,t} + \beta_{13} TURNOVER_{i,t} + \beta_{14} RETVOL_{i,t} \\
 & + \beta_{15} DUM_{i,t}^{S\&P500} + \beta_{16} Ret_{i,t} + \beta_{17} Ret_{i,t-3:t-1} + \varepsilon_{i,t}
 \end{aligned} \tag{16}$$

where the dependent variable, $Ret_{t:t+k}$ is the raw return for stock i , cumulated over quarters $t+1$ to $t+k$, with k varying from one to four. The explanatory variables are $ADJHERD$, $ADJHERD^{ST}$, and $ADJHERD^{LT}$, herding measures constructed for all, short-term and long-term institutions respectively. $MADJHERD^{ST}$ and $MADJHERD^{LT}$ denotes marginal herding measures for short-term and long-term institutions respectively. ΔSIO (ΔLIO) is the change in short-term (long-term) institutional ownership during the quarter t . SIO_{t-1} (LIO_{t-1}) is the short-term (long-term) institutional ownership at the end of quarter $t-1$. $Size$ is the logarithm of market capitalization at the end of quarter $t-1$. B/M is the log of book-to-market value of equity as of the prior December. AGE is the logarithm of the number of months since a stock i 's returns first appear in the CRSP file. D/P is the dividend yield of stock i for the year ended before the most recent June 30, divided by stock price as of December 31. PRC is price per share at the end of quarter $t-1$.

TURNOVER is the volume divided by shares outstanding, measured for the month prior to beginning of the quarter t . *RET VOL* is the logarithm of the standard deviation of monthly returns over the previous two years. $DUM^{S\&P500}$ is dummy variable for S\&P500 index membership. Variable Ret_t is the raw return of the stock during quarter t , and $Ret_{t-3:t-1}$ is the raw return over the quarters $[t-3, t-1]$. 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 heteroskedasticity and autocorrelation following Newey and West (1987).

Specification (1) of Table 8 confirms the findings of Yan and Zhang (2009). That is, short-term institutional demand (ΔSIO) forecasts both one-quarter-ahead and four-quarter-ahead stock returns, while long-term institutional demand does not have any predictive power on future stock returns. These results underline the differences in the informational role between short- and long-term institutions in financial markets and are consistent with the view that short-term institutions are better informed than long-term institutions. We then turn to the predictive power of the overall herding measure. Specification (2) shows that there is a positive and significant relation between overall institutional herding and one-quarter-ahead stock returns. The overall herding measure subsumes the predictive power of short-term institutional demand. This suggests that institutional herding is a better proxy for informed institutional trading than institutional demand (Bennett, Sias, and Starks (2003)). However, the predictive power of the overall herding measure becomes insignificant for four-quarter-ahead stock returns. The lack of

explanatory power of herding by all institutions is due to the fact this measure does not capture the differential price impact of short- and long-term institutional herding. This, in turn, diminishes its predictive power for future returns.

When we examine the information content of herding measures constructed for short- and long-term institutions in our cross-sectional regression, the positive (negative) return predictability of short-term (long-term) institutional herding remains significant in specifications (3) through (6). On the other hand, short-term institutional demand no longer predicts either one-quarter- or four-quarter-ahead stock returns. These findings reinforce our main conclusion of the differential price impact of short- and long-term institutional herding. Overall, the institutional herding measures for short- and long-term institutions provide stronger proxies for the level of informed and uninformed institutional trading than the institutional demand measures of Yan and Zhang (2009).

4.3. Reconciling Short- and Long-horizon Effect of Institutional Herding

So far, we document significant evidence on the differential effect of short- and long-term institutional herding over a short horizon period. Our findings suggest that the stabilizing effect in the existing literature is mainly driven by short-term institutions; long-term institutional herding has a destabilizing effect on stock prices. On the other hand, recent studies on the price impact of institutional herding find a long-horizon return reversal after institutional herding. In particular, Dasgupta, Prat, and Verardo (2011) argue that since herding leads to persistence, persistent institutional herding provides a stronger test for the price impact of institutional herding. Consistently, over a long

horizon, they find that stocks persistently sold by institutional investors outperform those persistently bought by institutions. In this section, we investigate the implication of short- and long-term institutional herding over longer horizons. Specifically, we follow a methodology similar to Dasgupta, Prat, and Verardo (2011) and estimate the following regression during each quarter:

$$Ret_{i,t:t+8} = \alpha + \beta_1 Persist_{i,t}^{All} + \beta_2 Persist_{i,t}^{ST (MST)} + \beta_3 Persist_{i,t}^{LT (MLT)} + \beta_4 Turnover_{i,t} + \beta_5 IOWN_{i,t} + \beta_6 Ret_{i,t-15:t}(Ret_{i,t-15:-4}) + \varepsilon_{i,t} \quad (17)$$

where the dependent variable $Ret_{i,t+1:t+8}$ is the raw return for stock i , cumulated over eight quarters. The explanatory variable $Persist_{i,t}^{All}$ is overall institutional herding persistence based on adjusted herding measures constructed for all institutions, measured by the number of consecutive quarters in which institutions buy (positive $ADJHERD$) or sell (negative $ADJHERD$) for a given stock. A value of -5 (5) indicates that $ADJHERD$ is negative (positive) for five or more consecutive quarters for a given stock. Similarly, $Persist_{i,t}^{ST}$ ($Persist_{i,t}^{MST}$) is persistent short-term institutional herding based on $ADJHERD^{ST}$ ($MADJHERD^{ST}$), and $Persist_{i,t}^{LT}$ ($Persist_{i,t}^{MLT}$) is persistent long-term institutional herding based on $ADJHERD^{LT}$ ($MADJHERD^{LT}$).

Similar to Dasgupta, Prat, and Verardo (2011), we use the past four-year returns measured up to quarter t ($Ret_{t-15:t}$) or three-year returns skipping a year before quarter t ($Ret_{t-15:-4}$). $Ret_{t-15:t}$ and $Ret_{t-15:-4}$ capture the reversal effect in returns documented by DeBondt and Thaler (1985). Finally, $Size$ is the logarithm of market capitalization at

the end of quarter $t-1$. B/M is the logarithm of the book-to-market value of equity as of the prior December. $TURNOVER$ is the volume divided by shares outstanding, measured for the month prior to beginning of the quarter t . IO_t is the institutional ownership at the end of quarter t . We estimate the above regression with 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 heteroskedasticity and autocorrelation following Newey and West (1987).

Table 9 reports the results from the regression analysis. Consistent with Dasgupta, Prat, and Verardo (2011), the coefficient estimates show that overall institutional herding persistence is negatively associated with future stock returns at long horizons in specifications (1) and (2). We then examine the predictive power of the herding persistence of short-term and long-term institutions for future stock returns in specifications (3) through (10). While the coefficients of persistent herding based both on separate and marginal herding measures for short-term institutions do not have predictive power for future stock returns, those for long-term institutions are associated with reversals in returns. These findings suggest that the negative association between persistent institutional herding and future stock returns is mainly due to long-term institutional persistence. The long-horizon results complement our previous findings on the price impact of institutional herding over a short-term horizon and provide further evidence that the differential impact of short- and long-term institutional herding holds for longer horizons.

4.4. Robustness Considerations

To analyze the robustness of our results to firm size, we repeat our analysis after excluding all stocks with prices less than \$5 or all stocks with a market capitalization in the lowest NYSE decile, and find no substantial changes. This result suggests that our findings are not driven by microcaps. Further, we conduct sub-period analysis on the price impact of short- and long-term institutional herding and divide our sample into two 56-quarter periods (1981 to 1994 and 1995 to 2008). Although the price impact on short-term and long-term institutional herding is stronger in the more recent half of the sample period, the differential predictability of herding by short- and long-term institutional herding is statistically significant in both periods. A stronger price impact of institutional herding on average in the recent half of the sample period supports the notion that institutional trading is higher during this period due to increased institutionalization (Dasgupta, Prat, and Verardo (2011)). We also compute quarterly-rebalanced DGTW characteristic-adjusted returns for equally weighted portfolios (instead of value-weighted) and repeat our portfolio analysis. The differential impact of short-term and long-term institutional herding on future stock prices is robust.

5. Conclusion

The increasing prevalence and trading activities of institutional investors raises important questions about the consequences of institutional herding in U.S. markets. Prior studies extensively investigate the effect of institutional herding on future stock prices either among mutual funds (i.e. Wermers (1999)) or among all institutions as a

homogenous group (i.e. Sias (2004)). Regarding the price impact of institutional herding and why institutional herding occurs, these studies investigate the outcomes of herding on future stock prices. For instance, if herding is information-driven (i.e., Froot, Scharfstein, and Stein (1992) and Hirshleifer, Subrahmanyam, and Titman (1994)), then institutional herding would not have a destabilizing effect on stock prices. On the other hand, if institutional herding is driven largely by any reason unrelated to new information (i.e. a desire to imitate or reputational concern (Scharfstein and Stein (1992) and Trueman (1994)); their preferences for specific stock characteristics (Falkenstein (1996), Del Guercio (1996), Gompers and Metrick (2001), and Bennett, Sias, and Starks (2001)); or fads (Barberis and Shleifer (2001))), then such herding behavior could potentially introduce noise to stock prices - driving them away from fundamentals. To date, the herding behavior of institutional investors is shown to be price stabilizing over a short horizon.

Motivated by the heterogeneity in the level of informed trading among institutions with different investment horizons, this study extends the existing literature on institutional herding and examines the price impact of short- and long-term institutional herding. Through the use of both portfolio tests and cross-sectional regressions, we find that short- and long-term institutional herding have different effects on future stock prices. In particular, while stock prices continue in the same direction as herding by short-term institutions over the one to three quarters after portfolio formation, a strong return reversal follows long-term institutional herding over the same horizon. These results suggest that a stabilizing effect of institutional herding documented in the previous

literature is mainly driven by short-term institutions. Contrary to existing studies, a strong return reversal following long-term institutional herding provides new evidence that herding by these institutions has a destabilizing effect on stock prices over a short horizon.

Consistent with the notion that institutional herding (i.e., number of institutions buying or selling the same stock at the same time) represents a stronger signal about stock valuation than institutional demand, we show that herding measures used in this study completely subsume the predictive power of institutional demand variables of Yan and Zhang (2009). In other words, the information revealed by institutional herding provides a stronger proxy for the level of informed (as well as uninformed) institutional trading than changes in institutional ownership of that stock. The differential price impact of short- and long-term institutional herding also holds for longer horizons. In particular, we do not find any evidence that persistence in short-term institutional herding is related to future stock prices over eight quarters. However, persistent long-term institutional herding forecasts a reversal in stock returns over the same time period. Overall, the analyses of this study not only show the differential price impact of short- and long-term institutional herding but also provide evidence to reconcile conflicting findings in the existing literature on the price impact of institutional herding over short and long horizons.

APPENDIX A. TABLES

Table 1: Portfolio and Legal/Style Characteristics of All, Short-term and Long-term Institutional Investors

This table reports descriptive statistics for all, short-term and long-term institutional investors. An institutional investor is classified as a *short-term* (*long-term*) investor if its past four-quarter turnover rate ranks in the top (bottom) tercile. Panel A reports the time-series mean and median of the quarterly cross-sectional averages for all, short-term and long-term institutions' portfolio characteristics. *No of Security* denotes the number of stocks held by an institution. *MV of Portfolio* is the market value of an institution's portfolio. Stocks listed in CRSP are grouped into respective quintiles according to their market value of equity at the end of June with break points based on NYSE stock only, book-to-market value, prior twelve-month return. Using quintile information, *Size rank*, *B/M Rank*, and *Mom Rank* are computed as value weighted size, book-to-market, and prior twelve month quintiles respectively. *Average Churn* denotes the portfolio turnover of an institution. *N* denotes the number of institutions. Panel B and Panel C present the time-series mean of the percentage of institutions that belong to a particular legal/style classification. *BNK* is bank trusts, *INS* is insurance companies, *INV* is the investment companies, *IIA* is independent investment advisor and *OTHER* includes corporate (private) pension funds, public pension funds, university and foundation endowments, and miscellaneous. Institutional investor style classifications are obtained from Abarbanell, Bushee, and Ready (2003) to partition institutions into four capitalization/valuation dimensions. *LVA* is large-capitalization value institutions, *LGR* is large-capitalization growth institutions, *SVA* is small-capitalization value institutions, and *SGR* is small-capitalization growth institutions. The sample period is from 1981:Q1 to 2008:Q4.

Panel A: Time-series Statistics of Cross-sectional Averages of Institutions' Portfolio Characteristics

	All Institutions		Long-Term Institutions		Short-Term Institutions	
	Mean	Median	Mean	Median	Mean	Median
No of Security	260	124	267	116	230	126
MV of Portfolio (\$million)	2,899	416	3,206	369	1,721	421
Size Rank	3.67	3.63	4.01	3.97	3.13	3.21
B/M Rank	2.76	2.68	2.72	2.63	2.78	2.69
Mom Rank	3.24	3.32	3.08	3.10	3.63	3.70
Average Churn	0.10	0.09	0.03	0.03	0.21	0.18
N	1,263	1,096	420	365	421	365

Panel B: Percentage Legal Type Composition of Institutional Investors: Time-series Mean of Cross-sectional Averages of Percentage of the Legal Type of Institutions

	BNK	INS	INV	IIA	OTHER
All institutions (%)	18.84	6.31	4.97	60.14	9.20
Long-term institutions (%)	31.18	7.25	3.41	43.41	13.88
Short-term institutions (%)	4.65	5.62	6.19	76.17	7.02

Panel C: Percentage Capitalization/Style Dimension Composition of Institutional Investors. Time-Series Mean of Cross-sectional Averages of Capitalization/Style Dimensions of Institutional Investors

	LVA	LGR	SVA	SGR
All institutions (%)	27.45	24.15	21.11	26.25
Long-term institutions (%)	41.69	32.28	13.34	11.27
Short-term institutions (%)	11.43	14.95	27.36	45.45

Table 2: Stock Characteristics and Institutional Herding Measures

This table reports descriptive statistics of stock characteristics and institutional herding measures. Panel A presents time-series mean, median, minimum, maximum and standard deviation of the quarterly cross-sectional averages for stock characteristics. An institutional investor is classified as a *short-term* (*long-term*) investor if its past four-quarter turnover rate ranks in the top (bottom) tercile. *IO* is the total institutional ownership at the end of quarter *t*. *SIO* (*LIO*) is the short-term (long-term) institutional ownership at the end of quarter *t*. ΔSIO (ΔLIO) denotes the change in short-term institutional ownership. *MKTCAP* is market capitalization at the end of quarter *t*. *B/M* is book-to-market value. Ret_t denotes the return over quarter *t*. $Ret_{t-3:t-1}$ denotes the lagged three-quarter return preceding the beginning of the quarter *t*. *N* denotes the number of stocks. Panel B reports the time-series mean, median, minimum, maximum and standard deviation of the quarterly cross-sectional averages for herding measures. For all institutions as a group, institutional herding measures are constructed for stocks traded at least five institutional investors. *HM* denotes unsigned herding measure. *BHM* (*SHM*) denotes buy (sell) herding measure. For short-term (long-term) institutions, short-term (long-term) institutional herding measures constructed for stocks traded at least five short-term (long-term) institutional investors. HM^{ST} , BHM^{ST} , and SHM^{ST} (HM^{LT} , BHM^{LT} , and SHM^{LT}) denote unsigned herding measure, buy herding measure, and sell herding measure for short-term (long-term institutions) institutions respectively. Panel C presents the time-series average of the correlations between institutional herding and institutional demand variables. $ADJHERD$ ($ADJHERD^{ST}$ and $ADJHERD^{LT}$) combines buy herding and sell herding measures for all (short-term and long-term) institutions. $MADJHERD^{ST}$ ($MADJHERD^{LT}$) is the marginal herding measure for short-term (long-term) institutions and represents the contribution of short-term (long-term) institutional trades to all institutional herding measure (HM_{it}) respectively. The sample period is from 1981:Q1 to 2008:Q4.

Panel A: Time-series Statistics of Cross-sectional Averages for Stock Characteristics , Institutional Ownership, and Change in Institutional Ownership

	Mean	Median	Min	Max	Std. Dev
Total Institutional Ownership-IO (%)	37.14	36.47	24.69	52.34	8.41
Short-term Institutional Ownership-SIO(%)	10.70	10.71	7.08	13.34	1.31
Long-term Institutional Ownership-LIO(%)	11.11	10.88	5.35	18.96	3.15
Change in Short-term Institutional Ownership- ΔSIO (%)	0.34	0.30	-1.71	6.63	0.96
Change in Long-term Institutional Ownership- ΔLIO (%)	0.35	0.29	-3.15	3.24	1.02
Market Capitalization-MKTCAP(\$million)	1,762	1,087	568	4,198	1,114
Book-to-Market-B/M	0.74	0.73	0.50	1.12	0.16
Lagged one-quarter Return(%)- Ret_t	3.65	3.29	-30.75	34.34	11.99
Lagged three-quarter Return (%) - $Ret_{t-3:t-1}$	9.06	9.73	-25.88	57.03	16.90
Price-PRC(\$)	21.92	21.82	13.70	31.42	3.19
N	3,392	3,612	1,478	5,503	922

Panel B: Time-series Statistics of Cross-sectional Averages of Institutional Herding Measures

	Mean	Median	Min	Max	Std. Dev.
All Institutions					
<i>HM</i> (%)	0.97	0.73	-1.70	4.09	1.22
<i>BHM</i> (%)	2.13	2.11	-1.21	5.09	1.41
<i>SHM</i> (%)	-0.58	-0.84	-3.99	3.55	1.67
Short-Term Institutions					
<i>HM</i> ST (%)	0.50	0.65	-2.51	5.59	1.31
<i>BHM</i> ST (%)	1.59	1.78	-0.46	7.51	1.65
<i>SHM</i> ST (%)	-0.55	-0.49	-3.83	3.32	1.50
Long-Term Institutions					
<i>HM</i> ^{LT} (%)	0.29	-0.06	-1.29	9.65	2.67
<i>BHM</i> ^{LT} (%)	1.13	-1.39	-1.23	11.53	3.16
<i>SHM</i> ^{LT} (%)	-0.97	-0.47	-5.12	7.17	2.36

Panel C: Time-series Mean of Cross-sectional Correlations between Herding and Institutional Demand Measures

	<i>ADJHERD</i>	<i>ADJHERD</i> ^{LT}	<i>ADJHERD</i> ST	<i>MADJHERD</i> ^{LT}	<i>MADJHERD</i> ST	ΔLIO	ΔSIO
<i>ADJHERD</i>	1.00						
<i>ADJHERD</i> ^{LT}	0.61	1.00					
<i>ADJHERD</i> ST	0.60	0.13	1.00				
<i>MADJHERD</i> ^{LT}	0.58	0.86	0.15	1.00			
<i>MADJHERD</i> ST	0.57	0.16	0.85	0.19	1.00		
ΔLIO	0.25	0.07	0.37	0.06	0.29	1.00	
ΔSIO	0.09	0.15	0.02	0.12	0.02	0.03	1.00

Table 3: Determinants of Institutional Herding

This table reports the results of cross-sectional regressions of contemporaneous all institutional herding, short-term and long-term institutional herding on lagged institutional herding and other stock characteristics. An institutional investor is classified as a *short-term* (*long-term*) institutions if its past four-quarter turnover rate ranks in the top tercile. For each quarter, stocks traded at least five institutional investors are included in the sample. $ADJHERD_t$ is contemporaneous adjusted herding by all institutions as a group. $ADJHERD_{t-i}$ is lagged values of adjusted herding measure for all institutions as group, with i varying from one to four. $ADJHERD_t^{ST}$ ($ADJHERD_t^{LT}$) is contemporaneous adjusted short-term (long-term) institutional herding. $ADJHERD_t^{ST}$ ($ADJHERD_t^{LT}$) is the lagged values of adjusted short-term (long-term institutions) with i varying from one to four. $Size$ is the log of the beginning of quarter t market capitalization. B/M is the log of book value to market value of equity as of the prior December. PRC is price per share at the beginning quarter t . $TURNOVER$ is volume divided by shares outstanding, measured for the month prior the beginning of the quarter t . $RET VOL$ is the log of standard deviation of monthly returns over the previous two years. $S\&P500^{add,drop}$ is dummy variable, which equal “1” (-1) if the stock has been added to (dropped from) the S&P 500 index. Ret_{t-1} is the lagged one-quarter return. $Ret_{t-4:t-2}$ is the lagged three-quarter return preceding the beginning of the quarter $t-1$. This table presents time-series average regression coefficients and Fama-MacBeth t-statistics (in parentheses) adjusted following Newey-West (1987). *, **, *** indicates statistical significance at the 10%, 5%, and 1% level respectively. The sample period is from 1981:Q1 to 2008:Q4.

	$ADJHERD_t$	$ADJHERD_t^{ST}$			$ADJHERD_t^{LT}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<i>Intercept</i>	0.131*** (6.21)	0.020 (1.42)	0.014 (1.02)	0.002 (0.17)	0.162*** (6.08)	0.167*** (6.31)	0.167*** (6.30)
$ADJHERD_{t-1}$	0.160*** (45.88)						
$ADJHERD_{t-2}$	0.089*** (28.88)						
$ADJHERD_{t-3}$	0.060*** (20.77)						
$ADJHERD_{t-4}$	0.051*** (17.40)						
$ADJHERD_t^{ST}$							0.058*** (13.11)
$ADJHERD_{t-1}^{ST}$		0.072*** (8.36)	0.071*** (8.29)	0.070*** (8.11)		0.021*** (8.52)	0.017*** (6.90)
$ADJHERD_{t-2}^{ST}$		0.019*** (5.93)	0.019*** (5.72)	0.018*** (5.32)		0.021*** (8.28)	0.020*** (8.09)
$ADJHERD_{t-3}^{ST}$		0.003 (1.25)	0.003 (1.17)	0.001 (0.52)		0.022*** (9.19)	0.022*** (9.22)
$ADJHERD_{t-4}^{ST}$		-0.011*** (-4.86)	-0.012*** (-5.11)	-0.013*** (-5.67)		0.019*** (8.47)	0.020*** (8.79)
$ADJHERD_t^{LT}$				0.065*** (14.11)			
$ADJHERD_{t-1}^{LT}$			0.007*** (2.77)	-0.004 (-1.62)	0.180*** (26.79)	0.176*** (26.45)	0.175*** (26.57)
$ADJHERD_{t-2}^{LT}$			0.001 (0.38)	-0.007*** (-2.72)	0.116*** (28.58)	0.114*** (27.53)	0.113*** (27.51)
$ADJHERD_{t-3}^{LT}$			0.003 (1.20)	-0.002 (-0.55)	0.077*** (19.38)	0.075*** (18.48)	0.075*** (18.53)

Table 3- Continued

	$ADJHERD_t$	$ADJHERD_t^{ST}$			$ADJHERD_t^{LT}$		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$ADJHERD_{t-4}^{LT}$			0.004 (1.27)	-0.001 (-0.22)	0.068*** (14.82)	0.067*** (14.72)	0.067*** (14.56)
<i>SIZE</i>	-0.034*** (-12.68)	-0.022*** (-9.92)	-0.021*** (-10.28)	-0.019*** (-9.32)	-0.033*** (-9.01)	-0.031*** (-8.12)	-0.029*** (-7.72)
<i>B/M</i>	-0.014*** (-5.90)	0.003 (1.63)	0.004* (1.95)	0.005*** (2.73)	-0.021*** (-7.49)	-0.020*** (-7.12)	-0.020*** (-7.37)
<i>PRC</i>	0.026*** (4.50)	0.008** (2.03)	0.007* (1.82)	0.005 (1.26)	0.032*** (5.91)	0.030*** (5.62)	0.029*** (5.64)
<i>TURNOVER</i>	-0.019*** (-8.51)	-0.020*** (-9.92)	-0.020*** (-9.92)	-0.020*** (-9.88)	-0.002 (-1.21)	-0.003 (-1.47)	-0.002 (-0.86)
<i>RET VOL</i>	0.008** (2.26)	-0.004 (-1.59)	-0.005* (-1.85)	-0.006** (-2.45)	0.015*** (3.87)	0.016*** (4.30)	0.016*** (4.41)
<i>S&P500^{add_drop}</i>	0.292*** (13.68)	0.024 (1.02)	0.025 (1.03)	0.000 (0.02)	0.371*** (18.31)	0.373*** (18.65)	0.371*** (18.66)
Ret_{t-1}	0.302*** (26.21)	0.355*** (24.50)	0.355*** (24.49)	0.347*** (22.87)	0.107*** (10.43)	0.106*** (10.39)	0.086*** (8.90)
$Ret_{t-4:t-2}$	0.140*** (15.62)	0.159*** (16.92)	0.159*** (17.11)	0.154*** (16.56)	0.079*** (10.66)	0.069*** (8.97)	0.060*** (8.08)
<i>Avg. N</i>	2,876	2,876	2,876	2,876	2,876	2,876	2,876
<i>Adj. R²</i>	0.185	0.102	0.103	0.107	0.189	0.192	0.196

Table 4: Institutional Herding and Abnormal Stock Returns

This table reports quarterly, cumulative, and calendar-time abnormal returns (in percent) for all, short-term and long-term institutional herding sorted portfolios. An institutional investor is classified as a *short-term* (*long-term*) institution if its past 4-quarter turnover rate ranks in the top (bottom) tercile. The quarterly abnormal returns of stocks in each quintile are calculated by subtracting the return of the matching size, book-to-market equity, and prior one year return using 5x5x5 value-weighted quarterly-rebalanced *DGTW* portfolios. Panel A reports the price impact of all institutional herding on stock prices. Each quarter t , all stocks traded at least five institutional investors are sorted according to their adjusted herding measure $ADJHERD$. This procedure results in five portfolios (Q1 to Q5) where Q1 is denoted as *extreme sell herding* and includes the portfolio of stocks heavily sold by institutional investors in herds. Q5 is denoted as *extreme buy herding* and includes those stocks heavily bought by institutional investors in herds. Panel B (Panel C) presents the price impact of short-term (long-term) institutional herding on stock prices. Each quarter t , all stocks traded at least five short-term (long-term) institutional investors are sorted according to their adjusted herding measure, $ADJHERD^{ST}$ ($ADJHERD^{LT}$). This procedure results in five portfolios (Q1 to Q5) where Q1 is denoted as *extreme sell herding* and includes portfolios of stocks heavily sold by short-term (long-term) institutional investors in herds and Q5 is denoted as *extreme buy herding* and includes portfolios of stocks extremely bought by short-term (long-term) institutional investors in herds. The sample period is from 1981:Q1 to 2008:Q4.

Panel A: Price Impact of All Institutional Herding. Stocks traded at least five institutional investors between 1981 and 2008

	Abnormal Returns							Cumulative AR		Calendar AR	
	Quarter (-2)	Quarter (-1)	Quarter (0)	Quarter (+1)	Quarter (+2)	Quarter (+3)	Quarter (+4)	Quarter (+1,+2)	Quarter (+1,+4)	Quarter (+1,+2)	Quarter (+1,+4)
Q5 (Extreme Buy Herding)	4.75 (15.62)	6.48 (14.78)	7.84 (13.86)	0.51 (2.57)	-0.26 (-1.75)	-0.66 (-3.86)	-0.88 (-4.99)	0.29 (2.57)	-0.86 (-1.89)	0.12 (0.84)	-0.34 (-2.41)
Q4	2.33 (12.80)	2.45 (16.22)	2.81 (18.17)	0.21 (2.33)	0.05 (0.50)	-0.01 (-0.11)	0.06 (0.61)	0.19 (1.21)	0.12 (0.41)	0.12 (1.51)	0.76 (1.19)
Q3	0.15 (1.01)	0.06 (0.48)	-0.12 (-0.85)	-0.04 (-0.32)	0.02 (0.13)	-0.02 (-0.16)	-0.02 (-0.13)	0.06 (0.27)	0.68 (1.69)	-0.01 (-0.12)	-0.03 (-0.34)
Q2	-0.31 (-2.28)	-1.20 (-10.87)	-1.89 (-15.32)	-0.09 (-0.84)	0.10 (1.03)	0.11 (0.91)	0.39 (3.57)	-0.19 (-1.07)	0.20 (0.51)	0.00 (0.02)	0.12 (1.61)
Q1 (Extreme Sell Herding)	-2.21 (-10.13)	-3.61 (-13.29)	-4.86 (-17.06)	0.02 (0.09)	0.31 (2.03)	0.71 (4.24)	0.80 (4.76)	0.15 (0.10)	1.70 (2.97)	0.15 (1.04)	0.46 (3.33)
Difference: Q5-Q1	6.96 (15.70)	10.08 (15.95)	12.70 (16.23)	0.49 (1.75)	-0.56 (-2.56)	-1.37 (-4.95)	-1.68 (-6.07)	0.14 (0.36)	-2.56 (-3.79)	-0.02 (-0.10)	-0.81 (-3.76)

Panel B: Price Impact of Short-term Institutional Herding. Stock traded at least five short-term institutional investors between 1981 and 2008

	Abnormal Returns							Cumulative AR		Calendar AR	
	Quarter (-2)	Quarter (-1)	Quarter (0)	Quarter (+1)	Quarter (+2)	Quarter (+3)	Quarter (+4)	Quarter (+1,+2)	Quarter (+1,+4)	Quarter (+1,+2)	Quarter (+1,+4)
Q5 (Extreme Buy Herding)	4.49 (16.73)	7.47 (18.04)	10.48 (16.87)	1.11 (5.84)	0.01 (0.04)	-0.23 (-1.36)	-0.48 (-2.64)	1.04 (3.97)	0.19 (0.43)	0.56 (3.56)	0.09 (0.73)
Q4	2.64 (11.71)	3.70 (14.59)	3.96 (15.33)	0.35 (2.77)	0.14 (1.10)	0.09 (0.71)	-0.17 (-1.31)	0.38 (1.78)	0.08 (0.24)	0.23 (2.09)	0.09 (0.94)
Q3	0.58 (3.60)	0.47 (2.57)	0.18 (1.12)	0.11 (0.90)	0.02 (0.18)	0.00 (-0.01)	0.19 (1.41)	-0.05 (-0.26)	0.18 (0.44)	0.05 (0.53)	0.07 (0.88)
Q2	1.30 (7.34)	0.05 (0.34)	-1.63 (-12.05)	-0.21 (-1.84)	-0.02 (-0.19)	0.02 (0.16)	0.17 (1.29)	-0.41 (-2.25)	-0.45 (-1.38)	-0.10 (-1.13)	0.01 (0.17)
Q1 (Extreme Sell Herding)	0.38 (1.62)	-3.40 (-15.74)	-6.55 (-18.71)	-0.56 (-3.50)	0.00 (0.02)	-0.02 (-0.14)	0.45 (2.77)	-0.82 (-3.80)	-0.70 (-1.77)	-0.28 (-2.01)	-0.06 (-0.51)
Difference: Q5-Q1	4.11 (13.44)	10.87 (20.89)	17.02 (19.20)	1.67 (6.91)	0.01 (0.03)	-0.21 (-0.97)	-0.93 (-3.49)	1.86 (6.02)	0.88 (1.84)	0.84 (4.82)	0.15 (1.20)

Panel C: Price Impact of Long-term Institutional Herding. Stocks traded at least five long-term institutional investors between 1981 and 2008

	Abnormal Returns							Cumulative AR		Calendar AR	
	Quarter (-2)	Quarter (-1)	Quarter (0)	Quarter (+1)	Quarter (+2)	Quarter (+3)	Quarter (+4)	Quarter (+1,+2)	Quarter (+1,+4)	Quarter (+1,+2)	Quarter (+1,+4)
Q5 (Extreme Buy Herding)	3.80 (8.59)	3.16 (8.46)	3.03 (9.24)	-0.41 (-2.12)	-0.34 (-2.16)	-0.58 (-2.98)	-0.52 (-2.94)	-0.84 (-3.07)	-1.93 (-4.14)	-0.38 (-2.40)	-0.48 (-3.15)
Q4	1.83 (10.07)	1.60 (7.53)	1.54 (9.47)	-0.08 (-0.70)	-0.07 (-0.66)	-0.25 (-2.47)	0.11 (0.98)	-0.31 (-1.71)	-0.75 (-2.31)	-0.07 (-0.82)	-0.08 (-1.04)
Q3	1.04 (6.20)	0.77 (5.99)	0.40 (3.18)	0.16 (1.34)	0.11 (1.01)	0.26 (2.30)	0.16 (1.20)	0.12 (0.62)	0.35 (0.91)	0.12 (1.20)	0.17 (2.19)
Q2	0.21 (1.43)	0.13 (0.87)	-0.43 (-2.99)	0.38 (2.60)	0.32 (2.65)	0.46 (3.35)	0.35 (2.88)	0.50 (2.60)	1.16 (2.55)	0.36 (3.12)	0.38 (3.65)
Q1 (Extreme Sell Herding)	-1.55 (-7.91)	-1.18 (-4.98)	-1.24 (-5.87)	0.48 (3.05)	0.46 (2.61)	0.70 (4.02)	0.51 (2.75)	0.83 (2.79)	1.79 (3.41)	0.47 (3.02)	0.54 (3.48)
Difference: Q5-Q1	5.35 (9.10)	4.34 (7.69)	4.28 (8.45)	-0.89 (-2.83)	-0.80 (-2.78)	-1.29 (-3.89)	-1.03 (-3.34)	-1.67 (-3.30)	-3.72 (-4.77)	-0.85 (-3.02)	-1.03 (-3.67)

Table 5: Herding driven by Short- and Long-term Institutional Investors and Abnormal Stock Returns

This table reports quarterly, cumulative, and calendar-time abnormal returns (in percent) for short-term, and long-term driven herding sorted portfolios (the contribution of short- and long-term institutions to the herding measure). An institutional investor is classified as a *short-term (long-term)* institutions if its past 4-quarter turnover rate ranks in the top (bottom) tercile. The quarterly abnormal returns of stocks in each quintile are calculated by subtracting the return of the matching size, book-to-market equity, and prior twelve-month return using 5x5x5 value-weighted quarterly-rebalanced *DGTW* portfolios. Panel A (Panel B) reports the price impact of *short-term (long-term) institutional driven herding* on stock prices. Each quarter t , all stocks traded at least five institutional investors are sorted according to their *marginal* adjusted herding measure, $MADJHERD^{ST}(MADJHERD^{LT})$. This procedure results in five portfolios (Q1 to Q5) where Q1 is denoted as *extreme short-term (long-term) driven sell-herding* and includes portfolios of stocks heavily sold by short-term institutional investors relative to all other institutions in herd. Q5 is denoted as *extreme short-term (long-term) driven buy-herding* and includes those portfolios of stocks heavily bought by short-term (long-term) institutional investors relative to all other institutional investors in herds. The sample period is from 1981:Q1 to 2008:Q4

Panel A: The Price Impact of Short-term Institutions Driven Herding. Stocks traded at least five institutional investors between 1981 and 2008

	Abnormal Returns							Cumulative AR		Calendar AR	
	Quarter (-2)	Quarter (-1)	Quarter (0)	Quarter (+1)	Quarter (+2)	Quarter (+3)	Quarter (+4)	Quarter (+1,+2)	Quarter (+1,+4)	Quarter (+1,+2)	Quarter (+1,+4)
Q5 (Extreme Short-term driven Buy-Herding)	4.05 (15.58)	6.30 (18.67)	8.47 (18.53)	0.89 (5.02)	0.12 (0.74)	-0.01 (-0.09)	-0.38 (-2.88)	0.93 (3.72)	0.41 (1.03)	0.51 (3.42)	0.16 (1.39)
Q4	2.47 (11.74)	3.56 (13.17)	3.98 (15.07)	0.36 (2.80)	0.09 (0.74)	-0.04 (-0.35)	-0.19 (-1.82)	0.27 (1.25)	-0.23 (-0.69)	0.21 (2.02)	0.04 (0.57)
Q3	2.91 (11.85)	1.87 (7.34)	0.79 (3.50)	-0.03 (-0.20)	-0.25 (-1.72)	-0.33 (-2.03)	0.00 (0.01)	-0.25 (-1.16)	-0.52 (-1.19)	-0.15 (-1.21)	-0.16 (-1.29)
Q2	-0.27 (-2.35)	-1.07 (-8.24)	-1.78 (-13.02)	-0.15 (-1.24)	0.21 (2.03)	0.16 (1.24)	0.27 (1.91)	-0.23 (-1.08)	-0.09 (-0.25)	0.03 (0.32)	0.12 (1.30)
Q1 (Extreme Short-term driven Sell-Herding)	0.27 (1.18)	-2.63 (-12.63)	-5.65 (-19.81)	-0.33 (-2.05)	-0.01 (-0.09)	0.09 (0.67)	0.48 (2.97)	-0.64 (-3.01)	-0.25 (-0.58)	-0.16 (-1.23)	0.05 (0.43)
Difference: Q5-Q1	3.78 (13.23)	8.92 (21.33)	14.12 (21.01)	1.21 (5.38)	0.13 (0.69)	-0.11 (-0.57)	-0.86 (-4.34)	1.57 (5.50)	0.65 (1.47)	0.68 (4.12)	0.11 (1.00)

Panel B: The Price Impact of Long-term Institutions Driven Herding. Stocks traded at least five institutional investors between 1981 and 2008

	Abnormal Returns							Cumulative AR		Calendar AR	
	Quarter (-2)	Quarter (-1)	Quarter (0)	Quarter (+1)	Quarter (+2)	Quarter (+3)	Quarter (+4)	Quarter (+1,+2)	Quarter (+1,+4)	Quarter (+1,+2)	Quarter (+1,+4)
Q5 (Extreme Long-term driven Buy-Herding)	2.38 (10.00)	2.49 (10.54)	2.79 (13.62)	-0.06 (-0.42)	-0.13 (-1.08)	-0.26 (-1.99)	-0.32 (-2.39)	-0.25 (-1.13)	-0.86 (-2.23)	0.00 (-0.04)	-0.20 (-2.08)
Q4	3.31 (12.81)	3.36 (9.48)	3.52 (13.37)	0.24 (1.64)	0.04 (0.27)	-0.28 (-2.07)	-0.19 (-1.39)	0.15 (0.74)	-0.05 (-1.55)	0.14 (1.15)	-0.06 (-0.58)
Q3	0.54 (2.64)	-0.25 (-1.69)	-0.89 (-4.76)	-0.31 (-2.40)	-0.07 (-0.59)	0.08 (0.73)	0.27 (2.46)	-0.57 (-2.93)	-0.47 (-1.15)	-0.21 (-1.87)	0.00 (-0.04)
Q2	0.26 (1.71)	-0.02 (-0.12)	-0.50 (-3.76)	0.22 (1.60)	0.27 (2.05)	0.30 (2.36)	0.34 (2.54)	0.23 (1.07)	0.61 (1.49)	0.24 (2.07)	0.25 (2.31)
Q1 (Extreme Long-term driven Sell-Herding)	-1.48 (-7.83)	-1.29 (-6.11)	-1.76 (-8.90)	0.49 (3.15)	0.41 (2.56)	0.77 (4.55)	0.53 (2.94)	0.80 (2.75)	1.82 (3.65)	0.45 (3.07)	0.57 (3.87)
Difference: Q5-Q1	3.86 (9.85)	3.79 (9.54)	4.55 (12.37)	-0.56 (-2.05)	-0.54 (-2.23)	-1.03 (-4.06)	-0.85 (-3.58)	-1.05 (-2.45)	-2.69 (-4.23)	-0.45 (-2.93)	-0.77 (-3.60)

Table 6: Cross-sectional Regressions of Stock Returns on Herding Measures

This table reports the results of cross-sectional regressions of one-quarter-ahead or one-year-ahead returns on institutional herding and other stock characteristics. An institutional investor is classified as a *short-term* (*long-term*) institutions if its past four-quarter turnover rate ranks in the top (bottom) tercile. For each quarter, stocks traded at least five institutional investors are included in the sample. $Ret_{t:t+1}$ is one-quarter-ahead stock return. $Ret_{t:t+4}$ is four-quarter ahead stock return. $Size$ is the log of the beginning of quarter t market capitalization. B/M is the log of book value to market value of equity as of the prior December. Ret_t is the lagged one quarter return. $Ret_{t-3:t-1}$ is the lagged three-quarter return preceding the beginning of the quarter t . $ADJHERD$ is adjusted herding measure constructed for all institutions as a group. $ADJHERD^{ST}$ and $ADJHERD^{LT}$ are constructed for short-term and long-term institutions *separately*. This table presents time-series average regression coefficients and Fama-MacBeth t -statistics (in parentheses) adjusted following Newey-West (1987). *, **, *** indicates statistical significance at the 10%, 5%, and 1% level respectively. The sample period is from 1981:Q1 to 2008:Q4.

	$Ret_{t:t+1}$					$Ret_{t:t+4}$				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	0.039** (2.15)	0.040** (2.21)	0.041** (2.26)	0.041** (2.24)	0.040** (2.21)	0.204*** (2.95)	0.204*** (2.94)	0.211*** (3.03)	0.210*** (3.03)	0.210*** (3.02)
<i>ADJHERD</i>	0.005* (1.69)				0.009*** (2.87)	-0.016* (-1.80)				0.005 (0.63)
<i>ADJHERDST</i>		0.013*** (6.70)		0.014*** (6.97)	0.009*** (4.83)		0.010** (2.40)		0.013*** (3.36)	0.010** (2.42)
<i>ADJHERD^{LT}</i>			-0.009*** (-3.16)	-0.010*** (-3.48)	-0.015*** (-5.30)			-0.041*** (-4.04)	-0.042*** (-4.15)	-0.044*** (-4.60)
<i>SIZE</i>	-0.002 (-0.77)	-0.002 (-0.81)	-0.002 (-1.00)	-0.002 (-0.89)	-0.002 (-0.83)	-0.010 (-1.20)	-0.010 (-1.17)	-0.011 (-1.32)	-0.011 (-1.29)	-0.011 (-1.28)
<i>B/M</i>	0.008** (2.01)	0.007* (1.91)	0.007* (1.81)	0.007* (1.77)	0.007* (1.79)	0.032** (2.30)	0.032** (2.32)	0.030** (2.15)	0.030** (2.14)	0.030** (2.16)
<i>Ret_t</i>	0.012 (1.10)	0.009 (0.79)	0.014 (1.29)	0.010 (0.88)	0.009 (0.85)	0.086** (2.34)	0.077** (2.03)	0.086** (2.33)	0.081** (2.19)	0.080** (2.18)
<i>Ret_{t-3:t-1}</i>	0.029*** (4.83)	0.028*** (4.42)	0.032*** (5.12)	0.029*** (4.78)	0.029*** (4.76)	0.022 (0.85)	0.016 (0.61)	0.025 (0.96)	0.022 (0.86)	0.022 (0.85)
<i>Avg. N</i>	2,950	2,950	2,950	2,950	2,950	2,767	2,767	2,767	2,767	2,767
<i>Adj. R²</i>	0.050	0.050	0.050	0.051	0.051	0.055	0.054	0.055	0.056	0.056

Table 7: Cross-sectional Regressions of Stock Returns on Marginal Herding Measures

This table reports the results of cross-sectional regressions of one-quarter-ahead or one-year-ahead returns on institutional herding and other stock characteristics. An institutional investor is classified as a *short-term* (*long-term*) institutions if its past four-quarter turnover rate ranks in the top (bottom) tercile. For each quarter, stocks traded at least five institutional investors are included in the sample. $Ret_{t:t+1}$ is one-quarter-ahead stock return. $Ret_{t:t+4}$ is four-quarter ahead stock return. $Size$ is the log of the beginning of quarter t market capitalization. B/M is the log of book value to market value of equity as of the prior December. Ret_t is the lagged one quarter return. $Ret_{t-3:t-1}$ is the lagged three-quarter return preceding the beginning of the quarter t . $ADJHERD$ is adjusted herding measure constructed for all institutions as a group. $MADJHERD^{ST}$ ($MADJHERD^{LT}$) is the marginal herding measure for short-term (long-term) institutions and represents the contribution of short-term (long-term) institutions' trades to all institutional herding measure (HM_{it}). This table presents time-series average regression coefficients and Fama-MacBeth t -statistics (in parentheses) adjusted following Newey-West (1987). *, **, *** indicates statistical significance at the 10%, 5%, and 1% level respectively. The sample period is from 1981:Q1 to 2008:Q4.

	$Ret_{t:t+1}$					$Ret_{t:t+4}$				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
<i>Intercept</i>	0.039** (2.15)	0.041** (2.29)	0.040** (2.22)	0.041** (2.27)	0.040** (2.20)	0.204*** (2.95)	0.205*** (2.95)	0.206*** (2.98)	0.207*** (2.99)	0.207*** (2.97)
<i>ADJHERD</i>	0.005* (1.69)				0.006* (1.96)	-0.016* (-1.80)				-0.008 (-0.77)
<i>MADJHERDST</i>		0.008*** (6.66)		0.009*** (7.25)	0.007*** (5.05)		0.005** (2.15)		0.009*** (3.68)	0.012*** (3.06)
<i>MADJHERD^{LT}</i>			-0.004** (-2.27)	-0.006*** (-2.97)	-0.008*** (-5.01)			-0.023*** (-3.55)	-0.024*** (-3.73)	-0.021*** (-4.32)
<i>SIZE</i>	-0.002 (-0.77)	-0.002 (-0.95)	-0.002 (-0.90)	-0.002 (-0.94)	-0.002 (-0.81)	-0.010 (-1.20)	-0.010 (-1.20)	-0.010 (-1.23)	-0.010 (-1.24)	-0.010 (-1.22)
<i>B/M</i>	0.008** (2.01)	0.007* (1.94)	0.007* (1.88)	0.007* (1.86)	0.007* (1.90)	0.032** (2.30)	0.032** (2.32)	0.031** (2.22)	0.031** (2.21)	0.031** (2.21)
<i>Ret_t</i>	0.012 (1.10)	0.010 (0.87)	0.014 (1.26)	0.010 (0.93)	0.010 (0.90)	0.086** (2.34)	0.078** (2.06)	0.085** (2.27)	0.081** (2.16)	0.081** (2.21)
<i>Ret_{t-3:t-1}</i>	0.029*** (4.83)	0.028*** (4.47)	0.031*** (4.96)	0.029*** (4.68)	0.029*** (4.74)	0.022 (0.85)	0.017 (0.62)	0.023 (0.86)	0.020 (0.78)	0.021 (0.82)
<i>Avg. N</i>	2,950	2,950	2,950	2,950	2,950	2,767	2,767	2,767	2,767	2,767
<i>Adj. R²</i>	0.050	0.049	0.050	0.050	0.053	0.055	0.050	0.050	0.050	0.051

Table 8: Cross-sectional Regressions of Stock Returns on Institutional Herding and Demand Measures

This table reports the results of cross-sectional regressions of one-quarter-ahead or four-quarter-ahead returns on institutional herding and other stock characteristics. An institutional investor is classified as a *short-term* (*long-term*) institutions if its past four-quarter turnover rate ranks in the top tercile. For each quarter, stocks traded at least five institutional investors are included in the sample. $Ret_{t:t+1}$ is one-quarter-ahead stock return. $Ret_{t:t+4}$ is four-quarter ahead stock return. $Size$ is the log of the beginning of quarter t market capitalization B/M is the log of book value to market value of equity as of the prior December. AGE is the log of number of months since return first appears in CRSP file. D/P is dividend yield for fiscal year ended before the most recent June 30, divided by stock price as of December 31 in that fiscal year. PRC is price per share. $TURNOVER$ is volume divided by shares outstanding, measured for the month prior the beginning of the quarter t . $RET VOL$ is the log of standard deviation of monthly returns over the previous two years. $DUM^{S\&P500}$ is dummy variable for S&P500 index membership. Ret_t is the lagged one-quarter return. $Ret_{t-3:t-1}$ is the lagged three-quarter return preceding the beginning of the quarter t . $ADJHERD$ is adjusted herding measure constructed for all institutions as a group. $ADJHERD^{ST}$ and $ADJHERD^{LT}$ are constructed for short- and long-term institutions separately. $MADJHERD^{ST}$ ($MADJHERD^{LT}$) is the marginal herding measure for short-term (long-term) institutions and represents the contribution of short-term (long-term) institutions' trades to all institutional herding measure (HM_{it}). ΔSIO (ΔLIO) is the change in short-term (long-term) institutional ownership. SIO_t (LIO_t) is lagged one-quarter short-term (long-term) institutional holding. This table presents time-series average regression coefficients and Fama-MacBeth t-statistics (in parentheses) adjusted following Newey-West (1987). *, ** indicates statistical significance at the 5%, and 1% level respectively. The sample period is from 1981:Q1 to 2008:Q4.

	$Ret_{t:t+1}$						$Ret_{t:t+4}$					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
<i>Intercept</i>	0.017 (0.58)	0.015 (0.53)	0.017 (0.59)	0.017 (0.58)	0.018 (0.61)	0.016 (0.56)	0.168 (1.53)	0.167 (1.52)	0.175 (1.59)	0.174 (1.58)	0.172 (1.56)	0.168 (1.54)
<i>ADJHERD</i>		0.007** (2.96)		0.008** (3.20)		0.007* (2.41)		-0.006 (-1.04)		0.011 (1.78)		0.001 (0.18)
<i>ADJHERDST</i>			0.013** (7.72)	0.009** (5.79)					0.013** (3.83)	0.008* (2.20)		
<i>ADJHERD^{LT}</i>			-0.005* (-2.49)	-0.010** (-4.93)					-0.030** (-4.09)	-0.036** (-4.31)		
<i>MADJHERDST</i>					0.009** (7.78)	0.007** (5.51)					0.010** (3.84)	0.009** (2.98)
<i>MADJHERD^{LT}</i>					-0.003* (-2.10)	-0.005** (-4.36)					-0.017** (-4.24)	-0.017** (-4.06)
ΔSIO	0.040* (2.04)	0.029 (1.57)	0.006 (0.33)	0.005 (0.30)	0.014 (0.80)	0.011 (0.64)	0.099** (1.99)	0.105** (2.01)	0.068 (1.26)	0.067 (1.25)	0.076 (1.33)	0.075 (1.35)
ΔLIO	-0.016 (-1.06)	-0.020 (-1.36)	-0.010 (-0.69)	-0.010 (-0.70)	-0.013 (-0.90)	-0.014 (-0.97)	-0.020 (-0.46)	-0.013 (-0.32)	0.015 (0.38)	0.015 (0.38)	0.000 (0.01)	0.001 (0.04)
SIO_t	0.036** (2.86)	0.036** (2.84)	0.036** (2.84)	0.037** (2.88)	0.034** (2.69)	0.035** (2.74)	0.081 (1.60)	0.082 (1.61)	0.086 (1.68)	0.086 (1.68)	0.082 (1.61)	0.083 (1.61)

Table 8 - Continued

	$Ret_{t:t+1}$						$Ret_{t:t+4}$					
	(1)	(2)	(3)	(4)	(5)	(6)	(1)	(2)	(3)	(4)	(5)	(6)
LIO_t	0.009 (0.94)	0.012 (1.25)	0.009 (0.92)	0.009 (0.96)	0.009 (0.94)	0.010 (1.09)	0.035 (1.18)	0.034 (1.16)	0.026 (0.89)	0.026 (0.90)	0.030 (1.01)	0.030 (1.06)
AGE	0.004* (1.99)	0.004* (2.04)	0.004 (1.95)	0.004 (1.92)	0.004 (1.97)	0.004 (1.97)	0.012 (1.77)	0.012 (1.74)	0.011 (1.57)	0.011 (1.56)	0.011 (1.64)	0.012 (1.63)
$SIZE$	-0.002 (-1.62)	-0.002 (-1.44)	-0.002 (-1.45)	-0.002 (-1.38)	-0.002 (-1.64)	-0.002 (-1.44)	-0.005 (-0.94)	-0.005 (-0.94)	-0.005 (-0.93)	-0.005 (-0.91)	-0.005 (-0.90)	-0.005 (-0.88)
B/M	0.004 (1.54)	0.004 (1.65)	0.004 (1.52)	0.004 (1.58)	0.004 (1.53)	0.004 (1.59)	0.024* (2.46)	0.024* (2.47)	0.023* (2.41)	0.023* (2.43)	0.023* (2.43)	0.024* (2.44)
D/P	-0.026 (-0.67)	-0.025 (-0.65)	-0.030 (-0.76)	-0.029 (-0.74)	-0.030 (-0.75)	-0.028 (-0.72)	-0.111 (-0.94)	-0.112 (-0.94)	-0.118 (-0.99)	-0.119 (-1.00)	-0.124 (-1.03)	-0.121 (-1.01)
PRC	-0.005 (-1.32)	-0.005 (-1.36)	-0.005 (-1.29)	-0.005 (-1.31)	-0.005 (-1.31)	-0.005 (-1.33)	-0.033* (-2.00)	-0.032 (-1.97)	-0.031 (-1.94)	-0.031 (-1.94)	-0.032 (-1.96)	-0.032 (-1.96)
$TURNOVER$	-0.007** (-3.05)	-0.007** (-3.01)	-0.006** (-2.98)	-0.006** (-2.95)	-0.007** (-3.00)	-0.006** (-2.97)	-0.017** (-2.42)	-0.017* (-2.43)	-0.017* (-2.40)	-0.017* (-2.40)	-0.017* (-2.41)	-0.017* (-2.41)
$RET VOL$	-0.005 (-1.34)	-0.005 (-1.34)	-0.004 (-1.28)	-0.004 (-1.28)	-0.005 (-1.34)	-0.005 (-1.34)	-0.009 (-0.70)	-0.009 (-0.68)	-0.009 (-0.63)	-0.009 (-0.63)	-0.009 (-0.67)	-0.009 (-0.67)
$DUM^{S\&P500}$	0.006* (2.15)	0.006** (2.64)	0.005* (2.01)	0.005* (2.14)	0.005* (2.23)	0.005* (2.24)	0.027* (2.53)	0.026* (2.51)	0.021* (2.08)	0.020* (2.04)	0.023* (2.24)	0.022* (2.19)
Ret_t	0.006 (0.61)	0.004 (0.44)	0.003 (0.34)	0.003 (0.30)	0.004 (0.37)	0.003 (0.31)	0.058 (1.70)	0.059 (1.76)	0.058 (1.75)	0.056 (1.70)	0.057 (1.70)	0.056 (1.68)
$Ret_{t-3:t-1}$	0.033** (7.27)	0.032** (7.16)	0.032** (7.08)	0.031** (7.04)	0.032** (7.02)	0.031** (7.03)	0.048** (2.68)	0.049** (2.74)	0.048** (2.76)	0.048** (2.70)	0.048** (2.69)	0.048** (2.69)
$Avg. N$	2,854	2,854	2,854	2,854	2,854	2,854	2,678	2,678	2,678	2,678	2,678	2,678
$Adj. R^2$	0.081	0.082	0.082	0.082	0.082	0.082	0.083	0.083	0.083	0.083	0.083	0.083

Table 9: Cross-sectional Regressions of Stock Returns and Persistent Institutional Herding

This table reports the results of cross-sectional regressions of eight-quarter-ahead return on persistent institutional herding, stock characteristics and control variables. An institutional investor is classified as a *short-term* (*long-term*) institutions if its past four-quarter turnover rate ranks in the top tercile. For each quarter, stocks traded at least five institutional investors are included in the sample. $Ret_{t:t+8}$ is eight-quarter-ahead stock return. $Persist^{ALL}$ is persistent institutional herding based on $ADJHERD$ constructed for all institutions as a group. $Persist^{ST}$ and $Persist^{LT}$ are persistent short- and long-term institutional herding based on $ADJHERD^{ST}$ and $ADJHERD^{LT}$ respectively. $Persist^{MST}$ and $Persist^{MLT}$ are persistent short- and long-term institutional herding based on $MADJHERD^{ST}$ and $MADJHERD^{LT}$ respectively. Persistent herding measures vary between -5 and 5. A value of -5 (5) indicates negative (positive) $ADJHERD$, $ADJHERD^{ST}$, $MADJHERD^{ST}$, $MADJHERD^{LT}$ for five or more consecutive quarters. *Size* is the log of the beginning of quarter t market capitalization B/M is the log of book value to market value of equity as of the prior December. *TURNOVER* is volume divided by shares outstanding, measured for the month prior the beginning of the quarter t . IO is institutional ownership at the end of quarter t . $Ret_{t-15:t}$ is past returns during four years up to quarter t . $Ret_{t-15:t-4}$ is past returns during three years skipping a year before quarter t .

	$Ret_{t:t+8}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Intercept</i>	0.400** (4.28)	0.410** (4.31)	0.407** (4.36)	0.417** (4.39)	0.390** (4.30)	0.398** (4.36)	0.409** (4.36)	0.418** (4.39)	0.403** (4.30)	0.411** (4.34)
<i>Size</i>	-0.013 (-1.16)	-0.013 (-1.17)	-0.014 (-1.26)	-0.014 (-1.27)	-0.012 (-1.15)	-0.013 (-1.16)	-0.014 (-1.27)	-0.014 (-1.27)	-0.013 (-1.22)	-0.014 (-1.22)
<i>B/M</i>	0.057* (2.56)	0.059* (2.62)	0.057* (2.55)	0.059* (2.62)	0.057* (2.56)	0.059** (2.65)	0.056* (2.55)	0.058* (2.60)	0.056* (2.56)	0.059* (2.62)
<i>Persist^{ALL}</i>	-0.009** (-3.04)	-0.010** (-3.02)					-0.006* (-2.20)	-0.007* (-2.26)	-0.007* (-2.18)	-0.008* (-2.24)
<i>PersistST</i>			-0.004 (-1.39)	-0.005 (-1.66)			-0.001 (-0.39)	-0.002 (-0.78)		
<i>Persist^{LT}</i>			-0.009** (-3.74)	-0.009** (-3.71)			-0.005* (-2.49)	-0.005* (-2.62)		
<i>Persist^{MST}</i>					-0.003 (-1.24)	-0.004 (-1.59)			0.000 (0.02)	-0.000 (-0.28)
<i>Persist^{MLT}</i>					-0.008** (-3.64)	-0.009** (-3.67)			-0.004* (-2.11)	-0.004* (-2.21)
<i>TURNOVER</i>	-0.017 (-0.77)	-0.019 (-0.83)	-0.015 (-0.69)	-0.017 (-0.76)	-0.015 (-0.68)	-0.017 (-0.77)	-0.016 (-0.72)	-0.018 (-0.80)	-0.016 (-0.74)	-0.018 (-0.81)
<i>IO</i>	0.018 (0.50)	0.013 (0.38)	0.017 (0.49)	0.014 (0.39)	0.026 (0.73)	0.024 (0.66)	0.017 (0.48)	0.013 (0.37)	0.019 (0.55)	0.016 (0.46)

Table 9 (Continued)

	$Ret_{t:t+8}$									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$Ret_{t-15:t}$	-0.009 (-1.22)		-0.009 (-1.26)		-0.010 (-1.30)		-0.009 (-1.21)		-0.009 (-1.23)	
$Ret_{t-15:t-4}$		-0.005 (-0.80)		-0.005 (-0.77)		-0.004 (-0.76)		-0.004 (-0.75)		-0.004 (-0.73)
$Avg. N$	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098
$Adj R^2$	0.052	0.051	0.053	0.051	0.052	0.051	0.053	0.052	0.053	0.052

REFERENCES

- Abarbanell, J. S., B. J. Bushee, and J. S. Ready, 2003, Institutional investor preferences and price pressure: The case of corporate spin-offs, *Journal of Business* 76:233-261.
- Badrinath, S.G., and S. Wahal. 2002. Momentum trading by institutions, *Journal of Finance* 52: 2449- 2478.
- Banerjee, A. 1992. A simple model of herd behavior, *Quarterly Journal of Economics* 107: 797-817.
- Bennett J. A., R. W. Sias, and L. T. Starks, 2003, Greener pastures and impact of dynamic institutional preferences, *Review of Financial Studies* 16:1203-1238.
- Bikhchandani, S., and S. Sharma. 2001. Herd behavior in financial markets, *IMF Staff Papers* 49: 279-310.
- Brown, N. C., K. D. Wei, and R. Wermers. 2009. Analyst recommendations, mutual fund herding, and overreaction in stock prices, Working paper, University of Maryland.
- Bushee, B. 2004. Identifying and attracting the “right” investors: Evidence on the behavior of institutional investors, *Journal of Applied Corporate Finance* 16:28-35.
- Chan, L. K., J. Lakonishok. 1995. The behavior of stock prices around institutional trades, *Journal of Finance* 50:1147-1174.
- Coval J. D., E. Stafford. 2007. Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86:479-512.
- Daniel K., M. Grinblatt, S. Titman, and R. Wermers. 1997. Measuring mutual fund performance with characteristic-based benchmarks, *Journal of Finance* 52: 1035-1058.
- Dasgupta, A., A. Prat, and M. Verardo. 2011. Institutional trade persistence and long-term equity returns, Forthcoming, *Journal of Finance*.
- DeBondt, W. and R. Thaler, 1985, Does the stock market overreact? *Journal of Finance* 40:793-805.
- DelGuercio, D. 1996. The Distorting effect of the prudent-man laws on institutional equity investment, *Journal of Financial Economics* 40:31–62.

- Devenow, A. and I. Welch, 1996, Rational herding in financial economics, *European Economic Review* 40: 603-615.
- Dennis P.J, and D. Strickland. 2002. Who blinks in volatile markets, individuals or institutions? *Journal of Finance* 52: 1923-1949.
- Fama, E. F., and J. D. MacBeth, 1973. Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81:607-636.
- Falkenstein, E. 1996. Preferences for stock characteristics as revealed by mutual fund portfolio holdings. *Journal of Finance* 51:111-35.
- Froot, K., D. Scharfstein, and J. Stein. 1992. Herd on the street: Informational inefficiencies in a market with short-term speculation, *Journal of Finance* 47: 1461-1484.
- Gaspar, J., M. Massa, and P. Matos. 2005. Shareholder investment horizons and the market for corporate control, *Journal of Financial Economics* 76:135-65.
- Gompers, P., and A. Metrick. 2001. Institutional investors and equity prices, *Quarterly Journal of Economics* 116:229-59.
- Grinblatt, M., S. Titman, R. Wermers, 1995. Momentum investing strategies, portfolio performance and herding: a study of mutual fund behavior. *The American Economic Review* 85:1088-1105.
- Gutierrez, Jr., R. C., and E. K. Kelley. 2009. Institutional herding and future stock returns, Working paper, University of Oregon, University of Arizona.
- Hirshleifer, D., Subrahmanyam A., and S. Titman. 1994, Security analysis and trading patterns when some investors receive information before others, *Journal of Finance* 49: 1665-1698.
- Hotchkiss E. S., Strickland D., 2003. Does shareholder composition matter? Evidence from market reaction to corporate earnings announcements, *Journal of Finance* 53: 1469-1498.
- Jegadeesh, N. and S. Titman. 1993. Returns to buying winners and selling losers: Implications for stock market efficiency, *Journal of Finance* 48:65-91.
- Ke, B., and K. Petroni. 2004. How informed are actively trading institutional investors? Evidence from their trading behavior before a break in a string of consecutive earnings increases. *Journal of Accounting Research* 42: 895-927.

- Ke, B., and S. Ramalingegowda, 2005. Do institutional investors exploit the post-earnings announcement drift? *Journal of Accounting & Economics* 39: 25-53.
- Lakonishok, J., A. Shleifer, and R. Vishny. 1992. The impact of institutional trading on stock prices, *Journal of Financial Economics* 32:23-43.
- Lev, B., and D. Nissim. 2003. Institutional investors and share price accuracy, Working paper, New York University.
- Newey, W. K., and K. D. West. 1987, Simple, positive semidefinite, heteroskedasticity and autocorrelation consistent covariance-matrix, *Econometrica* 55:703-708.
- Nofsinger, J., and R. Sias. 1999. Herding and feedback trading by institutional and individual investors. *Journal of Finance* 54:2263-95.
- Puckett, A., and X. S. Yan. 2010. Short-term institutional herding and its impact on stock prices, Working Paper. University of Missouri.
- Scharfstein, D.S., and J. C. Stein, 1990. Herd behavior and investment, *American Economic Review* 80: 465-479.
- Sias, R. W., 2004. Institutional herding, *Review of Financial Studies* 17: 165-206.
- Sias, R. W., L. Starks, and S. Titman, 2006, Changes in institutional ownership and stock returns: Assessment and methodology, *Journal of Business* 79:2869-2910.
- Trueman, B., 1994. Analyst forecasts and herding behavior, *Review of Financial Studies* 7: 97-124.
- Wermers, R., 1999. Mutual fund trading and the impact on stock prices, *Journal of Finance* 54: 581-622.
- Wermers, R., 2000. Mutual fund performance: An empirical decomposition into stock-picking talent, style, transactions costs, and expenses, *Journal of Finance* 55: 1655-95.
- Wermers, R., 2004. Is money really “smart”? New evidence on the relationship between mutual fund flows, manager behavior, and performance persistence. Working paper, University of Maryland.
- Wylie, S., 2005, Fund manager herding: A test of the accuracy of empirical results using U.K. data, *Journal of Business* 78:381-403.

Yan, X. S., and Z. Zhang. 2009. Institutional investors and equity returns: Are short-term institutions better informed? *Review of Financial Studies* 22: 893-924.