Investors' Horizons and the Amplification of Market Shocks

Cristina Cella
Stockholm School of Economics

Andrew Ellul
Indiana University

Mariassunta Giannetti
Stockholm School of Economics, CEPR and ECGI

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Abstract

After negative shocks, investors with short trading horizons are inclined or forced to sell their holdings to a larger extent than investors with longer trading horizons. This may amplify the effects of market-wide shocks on stock prices. We test the relevance of this mechanism by exploiting the negative shock caused by Lehman Brothers' bankruptcy in September 2008. Consistent with our conjecture, we find that short-term investors sell significantly more than long-term investors around and after the Lehman Brothers' bankruptcy. Most importantly, we show that stocks held by short-term institutional investors experience more severe price drops and larger price reversals than those held by long-term investors. Since they are obtained after controlling for the stocks' exposure to volatility, various firms' and investors' characteristics, including the momentum effect and the propensity of institutional investors to follow an index, our results cannot be explained by characteristics of the institutions' investment styles other than their investment horizons. We also show that the effect of shareholder trading horizon emerges during other large market declines. Overall, the empirical evidence strongly indicates that investors' short horizons amplify the effects of market-wide negative shocks.

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* Cella (email address: cristina.cella@hhs.se) is at the Stockholm School of Economics, Ellul (email address: anellul@indiana.edu) is at Indiana University (Bloomington), and Giannetti (email address: mariassunta.giannetti@hhs.se) is at the Stockholm School of Economics, CEPR and ECGI.

1. Introduction

Investors' trading horizons may depend on preferences, specialization, or external constraints, such as margin constraints and the responsiveness of funds under management to previous returns. When stock prices fall dramatically, investors with short trading horizons are inclined or forced to sell to a larger extent than investors with longer trading horizons (De Long, Shleifer, Summers and Waldmann (1990)). This may amplify the effects of market-wide shocks on the prices of stocks held mostly by short-term investors. In this paper, we investigate to what extent the horizons of the institutional investors holding stocks in a firm affect the share price reaction to severe market-wide bad news, which should, naturally, bear a direct impact on the fundamental value.

Existing theories provide a variety of mechanisms that –more or less directly– lead to this relationship. In limits-to-arbitrage models (Shleifer and Vishny (1997)), institutional investors whose assets under management are highly responsive to previous returns are concerned about short-term returns and sell after stock price declines even if they are aware that prices are below their fundamental values. In coordination failure models (Bernardo and Welch (2003), Morris and Shin (2004)), a run on financial markets occurs because short-horizon traders sell in anticipation of the sales of other market participants resulting in panic selling. Since a short trading horizon implies that the investor will have to sell in the immediate future with high probability, not selling right away may involve selling behind the rest of the market at even lower prices (i.e., at prices that are even further below their fundamental values). Hence, for a short-term investor, the optimal strategy is to beat the rest of the market by selling immediately to avoid having to sell after a market run. Finally, in collateral-based models (Brunnermeier and Pedersen (2009), amongst others), levered investors exhibit short trading horizons because when stock prices decline considerably they hit their margin constraints and are forced to sell.

Setting aside the specific mechanism implied by different theories, all of them imply that investors with longer trading horizons have the possibility of holding onto their shares and "waiting out the storm" for stock prices to slowly recover to their fundamental values. Thus, during episodes of severe market declines, the selling pressure experienced by different stocks may vary depending on the length of their shareholders' investment horizons.

During these episodes, it may also be hard to find potential buyers. As Shleifer and Vishny (1992) show, when a distressed seller tries to sell an asset, she will face two types of potential buyers: (a) from the same industry, for whom the value of the asset is high, and (b) outside the industry, for whom the value of the asset is presumably lower than the seller's. If buyers in the same industry are distressed, the seller will obtain fire sale prices. Although stocks are fungible, fire sales have been shown to happen also in stock markets (Coval and Stafford (2007)) because other

investors may not have sufficient buying capital when selling pressure is highest or because the stocks sold may have different characteristics from their preferred set. The frictions preventing buying capital to move quickly to temporary undervalued stocks are most significant during episodes of severe market declines, precisely because financial intermediaries and other market participants have problems in raising capital (Duffie (2010) and Duffie and Strulovici (2009)). Thus, when panic selling occurs, there may be both supply and demand effects driving prices below their fundamental values. Crucially, these same forces should draw a wedge between the price reaction of shares held by short-term and long-term investors.

Our strategy to explore the empirical relevance of this argument is the following. First, we ask whether stocks held by short-term investors experience larger drops subsequently to market-wide shocks. Second, we identify whether the selling pressure of short-horizon investors indeed drives prices below their fundamental values, by evaluating whether the stocks held by short-term investors experience larger price reversals.

We investigate the maintained hypothesis by exploring the negative shock caused by Lehman Brothers' (henceforth, Lehman) bankruptcy in September 2008 on all market participants. Following this event, there were massive and widespread price drops with the S&P500 losing close to 30% from the day of Lehman's bankruptcy up to the end of December. This prompted withdrawals from hedge funds and mutual funds, which consequently started to sell billion of dollars of securities to meet redemptions. In the business press, these large sales have often been indicated as the determinants of an "overhang for the market".[1] Just a few months after the market low, firms such as Bank of America or Dow Chemicals, were up by over 100%.[2]

We exploit differences in ownership across firms to evaluate to what extent the length of their shareholders' horizon affects the reaction of transaction prices and the subsequent reversals. We measure the horizon of investors' holding each stock in the CRSP sample. Our main finding can be vividly summarized in Figure 1 (which we describe in detail in Section 4). Comparing the evolution of the cumulative abnormal returns of stocks held by short- and long-term investors around the Lehman shock, it emerges clearly that the stocks held to a larger extent by short-term investors experience more severe price drops and larger price reversals.

[Insert Figure 1 here]

The mean cumulative abnormal returns up to the first five (ten) weeks following Lehman's bankruptcy are almost -9% (-10%) for stocks held by short-term investors compared to

[1] See the Wall Street Journal, November, 7, 2008.
[2] See, for instance, the Financial Times, March 18, 2010.

approximately 4% (3%) for stocks held by long-term investors. These severe price drops are then completely reversed by week +25. Both price declines and price reversals are smaller for stocks held to a larger extent by long-term investors. These results are fully consistent with our maintained hypothesis that the trading horizon of the institutions holding the stocks acts as an amplifying mechanism.

In the empirical analysis, we ascertain that this result does not depend on the firms' different exposure to market factors, on firm characteristics, including past returns, size, market-to-book, return volatility, industry, liquidity (and possible changes in liquidity during the crisis period itself), on the momentum effect, or on characteristics of the investors' trading strategies other than their horizon. Furthermore, our results are unaffected once we consider the stocks' exposure to innovations in market-wide implied volatility as measured by changes in the CBOE Volatility Index (VIX). Innovations in time-varying market volatility, often considered to reflect the probability of a market-wide meltdown, may either change the risk-return trade-off, or the expectations of future returns (Campbell (1996) and Chen (2002)). Thus it can be argued that the price dynamics we uncover can just reflect differences in the stocks' exposure to the probability of a meltdown. However, since our results are robust to controlling for the stocks' exposure to innovations in the VIX index, we can conclude that this alternative channel cannot explain our findings.

Another concern is that active investors trade to generate profits based on valuation beliefs. These may generate two types of problems for our interpretation of the empirical evidence. First, active trading strategies, instead of investors' short trading horizons, may generate selling pressures. Put differently, our proxy for investor horizon may be correlated with omitted factors characterizing a firm's shareholders. Second, investors may sell because of rational beliefs on the future performance of the stocks they hold. This could lead to reverse causality.

To test the causal mechanism, we control for differences in shareholders' trading strategies, such as how actively a firm's investors manage their portfolios on average. Most importantly, we recognize that investors trade not only because of valuation beliefs but also because of unanticipated changes of the assets under management. The latter trades do not contain much information and allow a cleaner identification of the effects of investor horizons on the amplification of shocks. We measure the extent to which the market decline may have shortened the investors' horizon by using the correlation between the investor's previous performance and its trading behavior before our sample period. We surmise that institutional investors with a higher correlation between assets under management and previous performance expect to experience larger outflows during market declines. The expected outflows would significantly shorten these investors' trading horizons. Using this correlation measure as an instrument for investor turnover, we exploit only the variation in investor turnover that is less likely to be driven by inside

information and other features of the active trading strategy. Using different methodologies, we always find that stocks held to a larger extent by short-term investors experience, first, a significantly larger price drop, and, then, a larger price reversal relative to stocks held by long-term investors.

We also investigate whether the mechanism behind our interpretation of the results is supported. If our maintained hypothesis is valid, then we should find that short-term investors sell significantly more than long-term investors during our event period. We find clear evidence of such trading behavior: For example, in the last quarter of 2008, and when the largest price declines were experienced, short-term investors sell almost 21% of their portfolio holdings compared to 7% of the holdings sold by long-term investors. Importantly, short-term investors exhibit a higher propensity to sell all the stocks they hold (even the ones mostly held by long-term investors), suggesting that their behavior is not driven by the different characteristics of the stocks in their portfolios.

Finally, we find that investors' short trading horizons amplify market-wide negative shocks not only after Lehman's bankruptcy but also during other periods when U.S. markets experience severe declines, indicating the generalizability of our results.

This paper is related to several strands of literature. First, our results contribute to the literature on asset fire sales, which has shown that transaction prices may temporarily deviate from fundamental values (Pulvino (1998), Mitchell, Pulvino, and Stafford (2004), Coval and Stafford (2007), Mitchell, Pedersen and Pulvino (2007), Campbell, Giglio and Pathak (2008), Ellul, Jotikasthira and Lundblad (2009) and Jotikasthira, Lundblad and Ramadorai (2009)). We investigate a new channel that may induce fire sales, the trading horizons of institutional investors.

Second, a growing literature explores whether after negative shocks, investor trading behavior may cause prices to drop below their fundamental value. Most of the papers in this literature are theoretical with a few notable exceptions. Hameed, Kang and Viswanathan (2010) show that stock liquidity decreases during stock market declines. Furthermore, Manconi, Massa and Yasuda (2010) show that investors more exposed to securitized bonds, which experienced large price declines, sold more bonds and contributed to depress their prices.

Finally, our paper is related to a stream of literature exploring the effects of investor horizon on corporate policies. Bushee (1998), Gaspar, Massa, and Matos (2005), Cella (2009) and Derrien, Kecskes, and Thesmar (2009) show that investors' short horizons affect different aspects of corporate policies. Even more closely related to us, Bushee and Noe (2000) and Bushee (2001) suggest not only that short-term investment may be valued more in firms' whose shareholders have short horizons, but also that increases in disclosure, associated to an increase in short-term investors' shareholdings, increase stock price volatility. While these papers suggest that investors'

trading horizons may have asset pricing implications, none of them explores whether the trading horizon amplifies negative shocks as we do.

The remainder of the paper is organized as follows. Section 2 discusses the sample construction and describes the summary statistics of the data. Section 3 describes our main empirical analysis. Section 4 presents and discusses the results. Section 5 concludes.

2. Data and Sample

2.1 The Event

To explore whether investors' short trading horizons may magnify negative shocks, we exploit the severe market decline surrounding the bankruptcy of Lehman on September 15, 2008. Financial turbulence predated the Lehman's events and started in the residential mortgage sector in August 2007. The impact of the financial crisis, however, was limited to the valuations of financial firms until the first half of 2008. Stock market valuations of non-financial firms and the S&P500 started to decline during the summer 2008.

The market decline was largely connected to the anticipation of Lehman's difficulties: Lehman's top management made repeated moves to attract potential partners during the summer. These moves were unsuccessful.[3] Moreover, the credit default swaps of Lehman started spiking well before September 15, 2008 and increased by 66% in the first two weeks of September.

To fully capture the market decline that started in anticipation of Lehman's difficulties, and that should have produced significant impacts on institutional investors' portfolios, we start our event window from June 1, 2008, i.e., 15 weeks before Lehman's actual bankruptcy, up to the third week in April 2009, i.e., 30 weeks after the event. During the period under consideration, the S&P500 index experienced a severe decline. The S&P500 stood at around 1,280 at the beginning of our sample period, dropped to almost 1,100 in the week of Lehman's bankruptcy, continued to fall and reached a level of around 700 after 23 weeks, and still stood at over 900 after 30 weeks. From the broad movements of the S&P500 index, we can deduce that the shock related to Lehman's bankruptcy caused an abrupt price reaction that was protracted through time. Figure A in Appendix A illustrates the dramatic movements of the S&P500. As shown in Figure B in the same Appendix, the market decline was accompanied by a sharp increase in the VIX index, a measure of implied volatility in the S&P500 index options, often considered a proxy for fear in the market (Adrian and Shin, 2010). Although we show the VIX index graphically only during our event window, it is worthwhile to mention that it increased appreciably in June relative to the levels in May 2008. In fact, while the VIX index had an average value of around 18 in May 2008, its average value over

[3] One important potential investor was Korea Development Bank, which put talks on hold on September 9, 2008.

the period 1 June to 12 September 2008 reached a value of 22.5, an almost 19 percentage point increase, indicating a significantly higher level of market fears in the summer 2008.

These large market movements were accompanied by massive outflows from the stock market. In what follows, we explore how the outflows affected different stocks depending on the trading horizons of the shareholders.

2.2 Sample Construction

We obtain data from a variety of sources. First, we use data on the quarterly holdings of institutional investors that have discretion over 13F securities that are worth $100 million or more from Thomson Financial.[4] We extract data on the holdings of all common stocks traded on New York Stock Exchange (NYSE), NASDAQ and the American Stock Exchange (AMEX) for the period from the first quarter of 1990 to the second quarter of 2009. We have no information on short-selling positions. From Thomson Financial, we also obtain insiders' holdings.

Second, we obtain data on share prices, number of shares outstanding, turnover, and liquidity from the Center for Research in Security Prices (CRSP). Finally, information on firm characteristics, such as return on assets, leverage, book value of equity, and cash dividend, is from COMPUSTAT.

2.3 Investor Horizon

Institutional investors with short-term horizons should buy and sell frequently, while long-term investors should have longer holding periods. We capture investor horizon using a proxy for investors' portfolio turnover. The churn ratio of institutional investor *i* holding an investment set made up of firms denoted as *Q* is calculated as follows:

$$CR_{i,t} = \frac{\sum_{j \in Q} \left| N_{j,i,t} P_{j,t} - N_{j,i,t-1} P_{j,t-1} - N_{j,i,t} \Delta P_{j,t} \right|}{\sum_{j \in Q} \frac{N_{j,i,t} P_{j,t} + N_{j,i,t-1} P_{j,t-1}}{2}},$$

where $P_{j,t}$ and $N_{j,i,t}$ are the price and number of shares of stock *j* held by institution *i* at quarter *t*. The value of the churn ratio can range from 0 to 2. This measure was formalized by Gaspar et al (2005) and is similar to measures of institutional investors' trading horizons used by Carhart (1997), Barber and Odean (2000), Bushee (1998, 2000 and 2001), and Yan and Zhang (2009).

Here, we compute institutional investors' trading horizon starting from the first quarter of 1990 until the last quarter of 2006. In untabulated results, we find that the churn ratio is very stable

[4] The SEC requires that all investment managers with discretion over 13F securities worth $100 million or more report all equity positions greater than 10,000 shares or $200,000 to the SEC at the end of each quarter.

for institutions across time, giving us comfort that the trading horizon should be considered as a permanent characteristic, rather than a transitory characteristic.

2.4 Institutional Investors' Characteristics

Table 1 provides descriptive statistics for our proxy of institutional investors' trading horizons and other major characteristics of their portfolios.

[Insert Table 1 here]

The average (median) churn ratio of all institutional investors is 0.34 (0.22). Importantly for our analysis, there is large variation in institutional investors' churn ratios. For example, institutions with a churn ratio in the 5th percentile on average turn over less than 1% of their portfolio in a quarter, while institutions in the 95 percentile turn over more than 50% of their holdings. It is precisely this variation in the investors' horizons that we conjecture to matter for the impact of market-wide shocks on stock prices.

There are other differences in institutional investors' portfolios, which have been shown to be more or less related to their trading horizon. For instance, institutions are believed to take a longer view on their investments and engage in monitoring firms if they take large stakes (Chen Harford and Li (2007), and Giannetti and Laeven (2009)). In our sample, individual institutional investors' shareholdings represent very small stakes (the 95th percentile is only 0.45% of the firm's capital). In untabulated correlations, we find that investors' churn ratios are positively correlated with the size of their stakes, suggesting that long-term investors are unlikely to monitor more in our sample.

Nor does the individual firm account for a large percentage of investors' portfolios: The median stock accounts for 1.41% of the portfolios of institutional investors. Differences in the portfolio weight of stocks appear unrelated to the churn ratios. Also portfolio sizes, both the dollar size and the number of shares held, appear to be unrelated to the institutional investors' trading horizons. The average (median) size of the portfolio of institutions with churn ratios above the median (short-term institutions) is more than $2,270 million ($359 million) and they hold on average 211 stocks, while the average (median) size of the portfolio of institutions with churn ratio below the median (long-term institutions) is more than $2,120 million ($282 million) and they also hold on average about 210 stocks.

Institutional investors' horizons may also be related to characteristics of their trading strategies, which may potentially affect the relation with stock prices. For instance, investors with low churn ratios are unlikely to attempt to actively manage their portfolios and may hold portfolios closer to the index. In other words, investors with long trading horizons may be more likely to be

index funds or behave very similarly to them. Cremers and Petajisto (2009) show that an investor's portfolio turnover has low correlation with the proportion of the portfolio that deviates from the relevant index. Therefore, our measure of investor horizon should be unlikely to capture how actively investors manage their funds. To be able to control for this portfolio characteristic in our multivariate analysis we construct the Active Share Measure, a proxy for how much an investor's portfolio deviates from the Russell 1,000 index, similarly to Cremers and Petajisto (2009).We find that the average portfolio in our sample deviates by about 30% from the Russell 1,000 Index.

Finally, Chen, Jegadeesh and Wermers (2000) and Yan and Zhang (2009) suggest that investors with high portfolio turnover may have better stock picking ability. This can be a serious concern for the interpretation of our findings as stock picking ability may lead to reverse causality: Instead of amplifying negative shocks through their selling pressure, high churn ratio investors could anticipate the drop in stock prices and, for this reason, sell more. Such an explanation would be consistent with the reversals to the extent to which these are unanticipated. An investor with significant stock picking ability is expected to have an active management style and she can add value by deviating from an index (Cremers and Petajisto (2009)). As such, our Active Share Measure, which precisely measures such deviations, will control for this possible channel.

Furthermore, our measure of churn ratio captures not only trades whose motivation is to generate trading profits based on valuation beliefs, but also trades motivated by other reasons, such as unanticipated investor flows. Trading induced by investors' flows has been shown not to contain much information (Alexander, Cici, and Gibson (2007)). For this reason, for each investor, we construct a correlation between previous performance and assets under management over the period spanning from 1990 to 2006 (Trading Performance Sensitivity 1). Since existing literature has shown that there are non-linearities in the flow-performance relation (e.g., Chevalier and Ellison (1997)), we also compute the correlation between previous performance and assets under management using only the quarters in which the performance of the S&P500 is classified in the bottom decile of the distribution of all quarterly S&P500 returns over the period from 1990 to 2006 (Trading Performance Sensitivity 2). Although in Table 1 the correlations between previous performance and assets under management are small (and even negative), they are positive and large in the right tail of their distributions: It is precisely this large variation that helps us to identify exogenous differences in trading. As we explain in Subsection 4.3, used as instruments, these correlations help to capture forced trades due to expected outflows and redemptions following the financial turmoil surrounding the Lehman's bankruptcy.

2.5 Classification of Firms' Ownership Structure

Depending on the churn ratio of the investors holding their stocks, firms have different investor turnovers. We use the average churn ratio of the institutional investors holding stocks in each firm to measure the investor turnover for each stock in our sample. This statistic measures the average investment horizon of the institutional investors with an investment position in each firm. Denote S as the set of institutional investors in our sample and $w_{j,i,t}$ as the weight that institutional investor i has in quarter t in stock j as a percentage of the total positions held by all institutional investors. Then, in each quarter, the investor turnover of stock j is measured as the weighted average of the total portfolios churn ratios of its investors over the previous four quarters:

$$\text{Turnover of Firm } j = \sum_{i \in S} w_{j,i,t} \left(\frac{1}{4} \sum_{r=1}^{4} CR_{i,t-r+1} \right)$$

Below, for each firm, we consider the average institutional investors' turnover starting from the first quarter of 1990 until the last quarter of 2006.[5]

Overall, our sample includes 3,949 firms. Table 2 provides descriptive statistics for investor turnover (henceforth "IT") at the stock level. Firms exhibit large differences in the horizons of their investors. The average firm's investor turnover is 0.27, but this ranges from 0.16 for firms in the 5th percentile to 0.44 for firms in the 95th percentile of investor turnover.

It is crucial for the design of the empirical analysis and the interpretation of our findings to evaluate whether turnover is systematically associated to firm characteristics. For this reason, we proceed to classify the ownership structure depending on whether a firm's shares are held by short-term institutions or long-term institutions. We classify stocks with investor turnover in the lowest tercile as those held by long-term investors (Low IT firms) and those with values in the highest tercile as held by short-term institutions (High IT firms).[6] Table 2 provides descriptive statistics about the main ownership, stock, and firm characteristics. We use data for 2007. In addition, Panel B of Table 2 describes the time-series averages of the cross-sectional correlation between institutional ownership and various firm characteristics.

[Insert Table 2 here]

The median (average) Investor Turnover of a high IT firm is 0.34 (0.37) and that of a low IT firm is 0.20 (0.19) with the difference being statistically significant. An average turnover of 0.37 (0.19) implies that institutional investors holding these stocks rotate almost 19% (9.5%) of a

[5] For robustness, we also use (i) the average institutional investors' turnover starting from the first quarter of 2006 until the last quarter of 2007, and (ii) the institutional investors' turnover in the first quarter of 2007. Results are very similar to the ones we report hereafter.

[6] We classify firms in high and low IT also using the median investor turnover and compute investor turnover using different periods. Results are very similar to the ones we report hereafter.

portfolio in each quarter, and 76% (37%) in each year. This means that on average investors in high turnover firms hold their position for less than 16 months (12 months/0.76), while investors in a low turnover firms hold their position for almost 33 months (12 months/0.37).

Table 2 describes additional variables characterizing the firms' ownership structure and their shareholders' portfolios. These are important controls in our analysis, because investor turnover may be related to shareholders' characteristics other than the trading horizon. On average, low and high IT firms have the same proportion of institutional ownership. Importantly, although as noted before individual institutions hold small stakes, collectively, institutions own on average over 20% of the firms' capital. This means that whereas the action of one institution may not have significant impact, the collective action of investors is likely to have important pricing consequences.

While low and high IT firms appear to have similar ownership stakes owned by institutional investors, insider ownership is significantly larger in firms mostly held by long-term institutions. Since insider owners normally keep a long-term ownership presence, this may just reflect that low IT firms have shareholders with longer trading horizons. Nevertheless, in the empirical analysis, we check that our results are robust to differences of insider ownership across our sample of stocks.

Turning to the main stock and firm characteristics, there are some differences between high and low IT firms that we need to take into account in designing our tests. While the market capitalization of firms held by short-term and long-term investors is very similar (a median value of $298 million for low IT firms and $301 million for high IT firms), high IT firms tend to be (a) more growth-oriented than value-oriented (a median market-to-book ratio of 1.89 versus 1.56), (b) more liquid (a median share turnover of 0.59 versus 0.38 and a quoted spread of 0.28% versus 0.30%), and (c) more volatile (a median value of return variability of 1.82% versus 1.62%). On the other hand, it is useful to highlight that the average value of the beta of high IT firms is statistically undistinguishable and only slightly larger relative to low IT firms (0.99 vs. 0.97), suggesting that it is unlikely that the higher return volatility of firms with high investor turnover derives from higher exposure to market risk. Furthermore, for given selling pressure, the higher liquidity of high IT stocks should make less likely to find larger drops and reversals for these stocks.

Finally, it appears that firms with higher investor turnovers have lower leverage, which should mitigate the negative effects of market shocks on these firms. While the capital structure of firms with higher investor turnover should bias the results against our maintained hypothesis, we also find that firms with higher IT have lower return on assets (ROA), indicating that it is important to control for these and other firm characteristics, as we do in the multivariate analysis.

3. Empirical Methodology

The Lehman's bankruptcy represents a market-wide shock that clearly should be expected to affect stock prices even in the absence of any selling pressure generated by different categories of investors because it should also influence firms' fundamentals. To test the hypothesis that short-term investors may have amplified the shock, we compare each firm's actual return with alternative benchmarks capturing the return that the firm would have experienced, given the market-wide shock, but in the absence of any selling pressure. Importantly, the identification comes not from the measurement of firms' abnormal returns relative to the different benchmarks, which we describe below, but from comparing whether firms with short-term investors have systematically lower abnormal returns in the immediate aftermath of the market-wide shock compared to firms with long-term investors. Put differently, we test whether the high IT stocks experience larger drops first in a univariate setting and then in a multivariate one.

However, systematic differences in abnormal returns could be justified by different fundamentals that are not adequately captured by our benchmarks. For this reason, similarly to Coval and Stafford (2007) and Mitchell, Pedersen and Pulvino (2007), in an attempt to identify the price pressure generated by short-term investors relative to long-term investors, we then look for evidence of larger price reversals for firms experiencing more severe price drops.

We use two alternative methodologies to obtain stocks' abnormal returns. First, we use the market model to compute stocks' normal returns. We estimate $R_{jt} - R_{ft} = \alpha + \beta\left(R_{Mt} - R_{ft}\right) + \varepsilon_{jt}$, where R_{jt}, R_{Mt}, R_{ft} are respectively stock *j*'s weekly return, the weekly return of the market portfolio and the risk free interest rate, and ε_{jt} is an error term. We estimate each stock's beta with the market portfolio using weekly returns from the beginning of 2003 until the end of the first quarter of 2008. We measure the return of the market portfolio with the return of the S&P500 index and the risk free interest rate with the Discount Window Primary Credit rate. The abnormal returns of stock *j* during week *t* are then computed as $AR_{jt} = R_{jt} - \hat{\beta}R_{Mt}$.

Second, similarly to Ikenberry, Lakonishok and Vermaelen (1995), we use a size-and book-to-market-based benchmark. We first sort our sample firms in deciles based on their market capitalization on May 30, 2008; then we further sort each decile of firms in deciles based on their book-to-market ratio on the same date. This sorting results in 100 benchmark portfolios, whose returns are computed as the equally weighted returns of the stocks belonging to each portfolio. Abnormal performance for each stock is then calculated by subtracting from the stock's actual return during week *t*, the return of the appropriate size and book-to-market benchmark during the same week.

Finally, we compute cumulative abnormal returns for each stock as the sum of the abnormal returns in the relevant event window.

4. Results

We start by exploring the mean cumulative abnormal returns of stocks held by institutions with different trading horizons in a univariate setting and then proceed to investigate the robustness of the results in a multivariate setting to control for firm, stock, and ownership characteristics.

4.1 Univariate Analysis

In the first three columns of Table 3 we show the mean cumulative abnormal returns calculated from the market model (henceforth "MCAR") for high and low IT firms.

[Insert Table 3]

As shown in Figure 1 and Table 3, the patterns and magnitude of the difference in the MCARs around the Lehman's bankruptcy for stocks held by short-term and long-term investors is striking. In Table 3 and starting from the period before week 0, we find that the *MCAR*s turn, first, negative several weeks before Lehman's bankruptcy for both sets of stocks and, then, they become slightly positive *only* for stocks held by long-term investors. Specifically, MCARs reach about -7.53% for high IT stocks and are instead positive and equal to 3.36% for low IT stocks in week 0, with the difference being almost 11% and carrying statistically significance at the 1% confidence level.

These differences in the price declines between the two groups of stocks and before week 0 may be consistent with the model of Bernardo and Welch (2003) where investors, seeing signs of possible market declines in the near future (the VIX index indicate an increase in financial market risk in the summer of 2008), start re-positioning their portfolios away from stock holdings and into cash positions. Importantly, our maintained hypothesis that stocks held by short-term investors experience larger drops is corroborated by the evidence.

Following week 0, the difference in the MCARs between the two sets of stocks continues to widen but with a somewhat volatile pattern, reaching almost 15% in week +2, 13% in week +4 and remaining in this range until week +11. Most importantly, the difference in the MCARs starts declining from week +13 onwards as the MCARs for both sets of stocks become less negative and especially the MCARs for stocks held by short-term investors quickly recover. The difference in MCARs decreases to -9.44% in week +15 and -4.31% in week +19. Following week +20, the

difference in MCARs becomes statistically insignificant and economically small by week +23. Thus, prices seem to stabilize and stop reversing from their drops from week +20 onwards. At this time, as Coval and Stafford (2007) and Mitchell, Pedersen and Pulvino (2007) argue in a similar context, prices may be considered to have converged to their fundamental values. This same pattern in the difference between MCARs can be visually seen in Figure 1.

To investigate the robustness of our results, we also calculate mean cumulative abnormal returns using the size- and book-to-market-based benchmark (FFCARs). The results are shown in the last three columns of Table 3 and in Figure 2. In Figure 2, we also present results excluding financial firms (firms with SIC codes between 6000 and 6799), which may have been more exposed to Lehman's bankruptcy and may affect our results if they attract investors with systematically shorter trading horizon. The pattern and magnitude in the difference of FFCARs of stocks held by short-term and long-term investors is robust to this alternative methodology and across samples, thus confirming the hypothesis that trading horizon acts as amplification mechanism during market shocks. Taken together, the evidence in Table 3 and Figures 1 and 2 indicates that the MCARs reach a minimum in the period spanning from week +8 to week +11 and thus suggests that the reversals may have started around that time.

[Insert Figure 2 here]

In Table 4, we explore more directly whether the empirical evidence is consistent with larger drops and reversals. Our maintained assumption that price drops should be larger for high IT stocks implies that in the interval surrounding the Lehman's bankruptcy, the mean cumulative abnormal returns of stocks held by short-term investors should be significantly lower than those of stocks held by long-term investors. If the differential MCARs between the two groups of stocks are not due to changes in fundamentals, but rather caused by short-term investors forced selling, then we should expect investors to slowly return and buy such stocks. In such a case, during the reversal period, which the data indicate to start approximately around week +9, we expect stocks held by short-term investors to experience significantly larger (positive) abnormal returns compared to stocks held by long-term investors.

[Insert Table 4 here]

Panels A and B of Table 4 present the results using MCARs and FFCARs respectively and support our conjecture. For robustness, we consider the whole sample as well as a subsample excluding the financial firms and use alternative windows that are consistent with the drop and

reversal periods. We start showing that in the weeks surrounding Lehman's bankruptcy and up to week +8, stocks held by short-term investors clearly underperform stocks held by long-term investors. This result does not depend on the specific interval we choose because the underperformance of high IT stocks is obtained for both a window that starts 10 weeks before the event up to week +8 (the difference in the cumulative abnormal returns of low and high IT stocks using the MCARs is of almost 11% and almost 8% when using the FFCARs) and also for a window that starts in week 0 up to week +8 (the difference in returns using both MCARs and FFCARs is of more than 4%).

To investigate price reversals, we use alternative intervals starting from week +9, when the price decline of high IT stocks start bottoming-out, and measure mean cumulative abnormal returns in subsequent weeks. We construct intervals for the reversals periods starting at +9 up to week +25 and another up to week +35. In all cases, it appears that in the weeks subsequent to Lehman's bankruptcy, high IT stocks experience higher abnormal returns than low IT stocks. For example, from week +9 to the period that ranges from week +25 (week +35), high IT firms have 6.04% (9.12%) higher abnormal returns, when we use MCARs.[7]

The evidence presented so far points clearly to the heterogeneity of price responses across stocks depending on the trading horizon of the investors holding the stocks. Not only the initial declines but also the reversals are influenced by the trading horizon of the investors. This is consistent with our maintained hypothesis that the institution's trading horizon defines its *exposure* to any panic selling that occurs with severe market declines and is directly related to any forced selling that happens in such events.

Next we explore to what extent the heterogeneous price response of the two groups of stocks can be explained by firm and stock characteristics rather than the trading horizon of the institutions holding the stock. For example, statistics shown in Table 2 indicate that stocks held by short-term investors are more liquid and exhibit higher volatility than those held by long-term investors. It is then plausible to argue that the driving mechanism of the difference in MCARs is the set of firm and stock characteristics that attract certain type of investors because of their preferences, and not the trading horizon itself.

To start investigating this line of argument, we first sort firms in quintile portfolios based on each of the characteristics that could most likely differentiate the returns of high and low IT stocks. Thus, we create quintile portfolios using, in turn, stock liquidity, measured by the share turnover; the volatility of stock returns; and the stock past returns. Then, for each of the above quintile

[7] Note that the deviation of the firms' return from the size and market-to-book portfolios we use here can all be negative, because we are censoring cumulative abnormal returns at the 5% level and the CRSP sample from which we calculate portfolio returns is larger than the sample of firms for which we can measure investor turnover.

portfolios, we compare the MCARs (and the FFCARs) of low and high IT firms in the intervals corresponding to drops and reversals.

[Insert Table 5 here]

The results in Table 5 are broadly consistent with larger drops and reversals for stocks held by short-term investors compared to stocks held by long-term investors, thus confirming that investors' horizons remain crucial even after considering firm characteristics. Even though in a few instances the differences between high and low IT stocks are not statistically significant at conventional levels, the sign of the differences is almost always consistent with our hypotheses.

Importantly, stock liquidity does not appear to reduce the differences in drops and reversals between high and low IT stocks. Selling and buying pressures should be more easily absorbed in liquid stocks. However, short-term investors that need to liquidate their positions may be more likely to sell highly liquid stocks to reduce the negative price impact. Table 5 shows that the differences in the magnitude of drops and reversals between high and low IT stocks is larger for stocks with intermediate levels of liquidity. While the market may have been able to absorb the larger selling pressure for the most liquid stocks, it is also possible that as the theoretical model of Brown, Carlin and Lobo (2010) suggests, investors may have decided to hold on to the most liquid stocks for precautionary reasons and thus the selling pressure concentrated in stocks with intermediate levels of liquidity.

Furthermore, larger drops and reversals for high IT stocks emerge clearly also when we sort stocks on the basis of their past returns. This is comforting because short-term institutional investors –as opposed to the ones with long horizons– are known to be momentum traders (Yan and Zhang, 2009). The robustness of the results across different quintile portfolios sorted on past returns indicates that our results are not driven by the momentum effect.

Since when we use the FFCARs the benchmarks are constructed on the basis of size and book-to-market portfolios, in Table 5, we do not report the comparison for quintiles based on size and book-to-market ratios as these effects are already controlled for. The un-tabulated results for MCARs, available from the authors, are qualitatively similar to those obtained for the other portfolio sorts. Interestingly, our results appear to be stronger both economically and statistically for larger firms. This is encouraging for the following reason. Yan and Zhang (2009) argue that short-term institutions possess superior information about future returns. Any informational advantage should be greater for small firms. If our results were stronger for small firms, it could be possible to argue that short-term institutions' sales are prompted by their informational advantage predicting

the more severe drops (albeit not the large reversals). The empirical evidence, however, does not support this alternative explanation.

4.2 Multivariate Analysis

So far the univariate analysis suggests striking differences between the performance of stocks held by short and long-term investors, even in subsamples of firms that are more similar on the basis of some selected observable characteristics. In this section, we investigate in a multivariate setting whether investor horizons affect firm returns after controlling for firm, stock and ownership characteristics that can potentially affect the exposure of firms to the market shock. In this way, we can also consider that investor turnover varies continuously across the sample firms.

The results for price drops are shown in Table 6. We consider as the drop period the interval [-10, +8], i.e. from the week when stocks start to experience negative abnormal returns until the week when the cumulative abnormal returns of the two groups of stocks appear to bottom-out.

[Insert Table 6 here]

In columns 1 and 2 in Panel A of Table 6, we investigate the effect of the investor turnover on the price change during the drop period. Using this dependent variable, we make sure that the results we have shown so far are not an artifact of the specific benchmarks we use to measure normal returns. It clearly emerges that stocks with higher investor turnover experience larger price declines. For instance, in column 2, a one-standard deviation increase in investor turnover is associated with over 6% lower returns.

In the remaining columns of Panel A of Table 6, we use the cumulative abnormal return over the same period as before (from week -10 to week +8), instead of price changes. In this way, we fully control for the firms' exposure to market shocks using the two different benchmarks discussed in Section 3 and for firm, stock, and investor characteristics. Also in this case, the estimates show a consistently negative effect of investor turnover on firms' stock market performance. Once again the effect is economically large: In column 4, increasing investor turnover by one standard deviation leads to more than 2.5% lower cumulative abnormal returns.

The effect of the trading horizon channel is robust to the inclusion of variables aimed at controlling for competing hypotheses, specifically differences in shareholders' investment style (as proxied by the Active Share Measure), and the possibility that institutional investors pursue momentum trading strategies (as captured by Past Returns). Also, controlling for insider ownership, a feature that in Table 2 appears to differentiate low and high IT stocks, leaves the estimates unaffected. The coefficient of the variable capturing insider ownership is statistically insignificant,

confirming our conjecture that insider ownership is somewhat related to investors' trading horizon. Furthermore, the effects that we document are not driven by financial firms which had a central role during the crisis. In fact, the results are equally significant when we investigate non-financial firms only (in columns (6) and (10)) indicating clearly that the horizon effect is not confined to the financial industry.

So far we have shown that our results are robust to controlling for time-invariant firm characteristics, and in particular to ex ante differences in firm liquidity. During periods of market-wide turmoil, however, stock characteristics such as liquidity, may dramatically change. Although this channel would not be necessarily inconsistent with our maintained hypothesis, in Panel B, we revisit our tests in order to be able to control for contemporaneous changes in stock characteristics, such as liquidity. Instead of considering cross-sectional regressions of firms' CARs, we explore the effects of investors' turnover in a panel of firm weekly abnormal returns defined for the period [-10, +8]. We cluster the errors at the firm level to account for the possible correlation of returns for the same firm and include week fixed effects to account for systematic shocks affecting all firms at a given date. In these specifications, we also include firms' previous returns over different intervals to control more carefully for the possibility that our results are due to the momentum effect.

The estimates in Panel B of Table 6 show that even controlling for contemporaneous changes in firm liquidity and past returns over different intervals, investor turnover is still associated to lower abnormal returns. A one-standard deviation increase in investors' turnover appears to lead to almost 0.2% lower abnormal returns on average for each week during the drop period. Interestingly, share turnover does not appear to be associated with firm abnormal returns, while the bid-ask spread is positive and marginally significant only in a few regressions. Thus, the price effects we detect appear not to be driven by changes in liquidity.

In Table 7, we perform the same steps as in Table 6 to explore the effects of investor turnover on price reversals. We use the interval from week +9, the week when cumulative abnormal returns appear to bottom-out, to week +25, the week when prices appear to stop their reversal process.

[Insert Table 7 here]

The effect of the investors' trading horizon is robust to the inclusion of various time-invariant (Panel A of Table 7) and time-varying (Panel B of Table 7) control variables and confirms that the more short-term investors hold a stock, the larger is the price reversal. The effect of investor turnover on firms' returns during the reversals is not only statistically but also economically significant: In column 4 of Panel A of Table 7, a one-standard deviation increase in investor turnover increases firms' cumulative abnormal returns by about 2.25%.

Overall, it appears that since our results are robust after controlling for various stock characteristics, they cannot be explained by short-term institutions following certain investment styles that have been shown to explain cross-sectional stock returns.

Some of the control variables in Table 6 and Table 7 also provide interesting information and additional support for our maintained hypothesis. For instance, it does not appear that the extent to which institutional investors actively manage their portfolios (as opposed to following an index) is related to the firm's return during drops or reversals (only in column 2 of Panel A of Table 6, we find a marginally significant and negative coefficient of the Active Share Measure variable). This suggests that the return patterns we observe are unlikely to be related to active investors' expectations on firms' future performance.

Interestingly, stocks of firms with high institutional ownership perform better during the drop period, possibly because these stocks are more likely to attract the few financially unconstrained buyers during market turmoil. This interpretation is also supported by the finding that firms whose shareholders experienced smaller negative shocks to their portfolios between 2007 and 2008 (larger change in portfolio value) experience less severe price drops as well as smaller reversals (although the evidence is weaker in the latter case).

Finally, it is comforting to find that stocks' abnormal returns after the market decline are related to firms' fundamentals in a plausible way. The market turmoil surrounding the Lehman's bankruptcy determines lower returns for high leverage firms, which are likely to have higher demand for commercial and investment banking services. Also, unsurprisingly, firms with high profitability perform better during the market decline.

4.3 Exogenous Variation in Investor Turnover

As discussed before, investor turnover may capture both the trades whose motivation is to generate profits (or limit losses) and the trades forced by other reasons such as capital constraints and investor flows. Forced trades, being unlikely to be related to the institution's investment style or information, directly capture that investor horizon is shortened by external constraints. This allows us to more directly test the mechanism behind our maintained hypothesis.

To capture the variation in investor horizon due to forced trades, we compute the correlation between institutions' previous portfolio performance (generated *solely* by the price changes of the stocks held in their portfolios) and change in assets under management. We call this measure as the Trading-Performance Sensitivity 1. Since we are particularly interested in the relation between previous price performance and assets under management during severe market declines, we also

compute this same correlation only for periods of poor market performance.[8] We call this measure Trading-Performance Sensitivity 2. Both in good and in bad times, the correlation between previous performance and assets under management may differ depending on the institution's reputation, nature of investment etc. Especially during bad times, investors with lower correlation between assets under management and previous performance have the possibility to take a longer horizon on their investment and are expected to have lower investor turnover.

Since we observe ownership at a quarterly frequency, we compute the correlation using the returns on the assets under management at the quarter *t-1* and the subsequent change in assets under management between *t* and *t+1*, net of any price changes of assets already in the portfolio at *t-1*.

We average Trading-Performance Sensitivity 1 and Trading-Performance Sensitivity 2, weighing each of them with the ownership stakes of the different investors, as we do for obtaining the investor turnover. We use these averages as instruments in our cross-sectional regressions (with a slight abuse of notation, we continue to refer to them using the same labels).[9] It is useful to recall that, as shown in Panel B of Table 2, the correlation between Trading-Performance Sensitivity 1 and the investor turnover is positive and statistically significant at the 10% level. Trading-Performance Sensitivity 2 is even more highly related to the firm's investor turnover.

Based on the test developed by Staiger and Stock (1997), Trading-Performance Sensitivity 1 and 2 are strong instruments for investor turnover as in the first stage, after controlling for all other regressors included in the second stage, the instruments appear to be strongly significant and their joint F test is 36.32. In addition, in all cases, but one, the test of over-identifying restrictions does not allow us to reject the null that the instruments are valid.

[Insert Table 8 here]

The results of the instrumental variables estimates presented in Table 8 confirm our previous findings that stocks with high investor turnover experience more severe drops and then larger reversals in periods of large market declines. In all cases, the coefficient increases in absolute value suggesting that the measurement errors in the ordinary least squares estimates reduce the magnitude of the coefficients.

[8] We define such periods as those when the quarterly performance of the S&P 500 index is in the bottom decile of the distribution of all quarterly performances over the period from the first quarter of 1990 until the last quarter of 2006.

[9] Since previous literature explores the correlation between previous performance and assets under management considering one-year intervals, in alternative specifications that we do not report for brevity, we use as instruments also other three correlations using the contemporaneous correlation between assets under management and performance during the same quarter and the correlation between assets under management and performance at t-2 and t-3, respectively. The results are qualitatively similar to the ones we report in Table 8.

4.4 Trading Activity of Institutional Investors

Our maintained hypothesis implies that during severe market declines, short-term investors are more likely to engage in panic selling than long-term investors. It is precisely this massive selling that should be the driving factor of the differences in the MCARs that we have documented so far. In unreported regressions, we find that stocks mostly held by short-term investors indeed had higher share turnover during our sample period. To provide more direct evidence on the channel, we investigate the buying and selling activity of short-term and long-term institutions over our event window. We start our analysis from the first quarter of 2007. This allows us to investigate trading activity during normal times and compare it to what happens during our event. Figure 3 visually investigates selling pressure of short-term and long-term investors from the first quarter of 2007 until the second quarter of 2009.

[Insert Figure 3 here]

A number of striking results emerge from Figure 3 where we investigate institutional investors' net share volume. If we focus on the quarters included in our event window, i.e. from the third quarter of 2008 until the second quarter of 2009, we see a dramatic increase in the selling activity of short-term investors. This large selling pressure is evident when we compare the behavior of short-term investors with (a) long-term investors during the same period, and (b) the normal trading pattern exhibited by short-term investors in most of the quarters outside our event window. In fact, with the possible exception of the fourth quarter of 2007, which itself could be the direct impact of the credit crunch crisis that started earlier in that same year, the net selling positions of short-term investors in the second and third quarter of 2008 and first quarter of 2009 are by far larger than the selling pressure recorded during any other quarter under investigation.[10]

Importantly, starting from the first quarter of 2009, long-term investors are net buyers. This helps us to evaluate the mechanisms leading to price reversals. Most theoretical models (e.g., Grossman and Miller (1988), Shleifer and Vishny (1997)) imply that prices converge back to fundamentals because of the resolution of fundamental uncertainty. In this case, the price reversal would not involve large turnover. Another possibility is that fundamental uncertainty does not vary much, but new arbitrage capital arrives or long-term investors significantly expand their positions. We find evidence of capital inflows in stocks held by short-term investors, but these are modest, implying that reversals partially occur also because of the resolution of fundamental uncertainty.

[10] Note that this does not depend (only) on the fact that short-term investors manage more assets. As mentioned in the introduction, short-term investors sold on average 21% of their portfolios, while long-tern investors sold only 7%.

An alternative interpretation of the empirical evidence, which we tend to exclude on the basis of the results of the portfolio sorting and the multivariate analysis, is that short-term investors sold more in the aftermath of the market decline not because of their trading strategy, but because they held stocks that on some unobservable dimensions –not included and not correlated with our long list of controls– may have justified their sales. One way to investigate this possibility is to examine the trading behavior of short-term institutions in stocks mostly held by their peers (high IT firms) and in stocks held mostly by long-term investors (low IT firms). If we found that short-term investors sold more than long-term investors in an indiscriminate way, i.e., across all the stocks held in their portfolios, irrespective whether they are low or high IT stocks, then this alternative interpretation could be ruled out.

Figure 4 investigates visually the selling propensity of both types of investors. To obtain this figure, we first sort stocks on the basis of their investor turnover and, then, institutional investors on the basis of their churn ratio. For each type of institutional investor, we report the total dollar value of shares purchased of high (low) IT firms minus the dollar value of shares sold of high (low) IT firms divided by the total dollar value of their investment in high (low) IT firms. It clearly shows that short-term investors exhibit very similar propensities to liquidate both high and low IT stocks. For example, in the third and fourth quarter of 2008, short-term investors had a net selling position equivalent to more than 8% of both high IT stocks and low IT stocks they held in their portfolio.[11]

[Insert Figure 4 here]

The empirical evidence indicates that massive selling did take place and it originated mostly from short-term investors' trading strategy, not from the characteristics of the stocks they weighted more in their portfolios. This evidence is fully consistent with the hypothesis that selling pressure generated by short-term investors amplified the shock for the stocks they held to a larger extent in their portfolios.

4.5 Other Market Factors

The market decline surrounding the Lehman's bankruptcy coincides with a sharp increase of the VIX index which reflects implied volatility, thus giving us the price of the risk of market

[11] Recall that the net selling pressure is obtained for each type of institutional investor and for a particular group of stocks (low IT vs. high IT) as a proportion of the dollar amount invested in that group of stocks. Hence, while the selling pressure of short-term investors as measured here is roughly similar between high IT and low IT stocks, the *absolute* dollar amount of selling is much larger for high IT stocks because the amount invested in these stocks by short-term investors is larger than what they invest in low IT stocks.

volatility.[12] It can be expected that the volatility risk premium becomes larger in times of high uncertainty and when panic selling occurs. To this extent, it is perfectly consistent with our maintained hypothesis that the wedge in returns between high and low IT stocks we observe is large when the VIX index increases.

However, Ang, Hodrick, Xing, and Zhang (2006) show that innovations in aggregate volatility risk help explain the cross-section of stock returns. Because of their different exposure to aggregate volatility risk, low and high IT stocks could have different return skewness. In turn, this channel, rather than the trading behavior of institutional investors, could explain the differences in returns we uncover. Furthermore, since the VIX index measures the investors' assessed probability of a market meltdown (Adrian and Shin (2010)), which itself changed dramatically during our event period, it can be argued that the price patterns we observe just reflect the stocks' exposure to the (time-varying) probability of a meltdown. To evaluate the merit of these criticisms, in what follows, we re-estimate normal returns using the multifactor model suggested by Ang, Hodrick, Xing, and Zhang (2006). In practice, we augment the market model that we have used to estimate normal returns so far by including the changes in the VIX index as an additional factor. We then obtain abnormal returns using the deviations of the actual returns of each firm from its normal returns computed using the multifactor model.[13]

Figure 5 replicates Figure 1 but the CARs are obtained after controlling for stocks' exposure to the VIX index. Our main findings are unaffected. Thus we can conclude that neither differences in skewness nor the stocks' exposure to the varying probability of a market meltdown can explain the larger drops and reversals of high IT stocks relative to low IT stocks, thus confirming that investor trading horizon plays a significant role as an amplifying mechanism.

4.6 Other Events

Our findings so far strongly indicate that the trading behavior of short-term investors amplifies the negative effects of market-wide shocks. One may wonder whether these patterns are confined to the period surrounding the Lehman's bankruptcy or instead emerge also in the aftermath of other large market declines.

To explore the generality of our findings, we consider two other major negative events that drove down market valuations during the 2007-2008 financial crisis (the market decline surrounding the bailout of Bear Stearns in March 2008 and the Quant crisis in August 2007) and

[12] The VIX index represents the implied volatility of a synthetic at-the-money option on the S&P 100 with a maturity of 1 month.

[13] Another way to capture the probability of a market meltdown would be using the CDX index. However, there are no models that use the CDX index as a pricing factor for stocks. For this reason, we use the VIX index instead.

two events during which the S&P500 declined by more than 15% in one month (the October 1987 market crash, and the stock market crash following the Russian default in August 1998).

Figure 6 reports differences in the MCARs of high and low IT stocks for each of these four events. The results strongly support the notion that around significant market declines, stocks held to a larger extent by short-horizon investors experience larger drops and reversals. Thus, our findings do not appear to be specific to the events of the fall 2008, but more generally indicate that investors' short trading horizons amplify the impact of market-wide shocks.

5. Conclusions

This paper investigates whether institutional investors' short horizons amplify the effects of market-wide shocks on stock prices. Short-term and long-term institutional investors have different incentives and constraints that should have direct impacts on their trading behavior during severe market declines and may consequently affect the prices of the stocks they hold. Since short-term returns are more important for investors with short-term horizons, we expect short-term investors to sell the stocks they hold during severe market declines to a larger extent than long-term investors who have the possibility of waiting out the storm and hold onto their shares. Thus, during these episodes, the selling pressure experienced by different firms may vary depending on the length of their shareholders' investment horizons. We find that indeed short-term investors sell significantly more than long-term investors around and after the Lehman' bankruptcy.

We show that, as a consequence, the stocks that are mostly held by short-term investors experience more severe price drops and larger price reversals than those held by long-term investors even after controlling for firm characteristics, such as liquidity, volatility, size and book-to-market. Neither are the results driven by the characteristics of the investors' trading styles, such as active management or momentum trading strategies. Importantly, the effects of investor horizons on stock prices we highlight are not confined to the period after the Lehman's bankruptcy but emerge also during other periods when U.S. markets experienced severe declines. Overall, this empirical evidence indicates that investors' short horizons amplify the effects of severe stock market declines.

References

Adrian, Tobias and Hyun Song Shin, 2010, Liquidity and Leverage, *Journal of Financial Intermediation* forthcoming.

Alexander, G. J., Gjergji Cici and Scott Gibson, 2007, Does Motivation Matter When Assessing Trade Performance? An Analysis of Mutual Funds, *Review of Financial Studies* 20, 126-150.

Ang, Andrew, Robert J. Hodrick, Yuhang Xing, and Xiaoyan Zhang, 2006, The Cross-Section of Volatility and Expected Returns, *Journal of Finance* 66, 259-299.

Barber, B., and T. Odean, 2000, Trading is hazardous to your wealth: the common stock investment performance of individual investors, *Journal of Finance* 55, 773-806.

Bernardo, A.E., and I. Welch, 2004, Liquidity and financial market runs, *The Quarterly Journal of Economics 119*, 135-158.

Brown, David B., Bruce Ian Carlin, and Miguel Sousa Lobo, 2010, Optimal Portfolio with Distress Risk, forthcoming *Management Science.*

Brunnermeier, M. K., and L. H. Pedersen, 2005, Predatory trading, *Journal of Finance* 60, 1825-1863.

Bushee, B., J., 1998, The influence of institutional investors on myopic R&D investment behavior, *Accounting Review* 73, 305-333.

Bushee, B. J., 2000, Corporate disclosure practices, Institutional Investors, and Stock Return Volatility, *Journal of Accounting Research* 38, 171-202.

Bushee, B., J., 2001, Do Institutional Investors Prefer Near Term Earnings of Long Time Value, *Contemporary Accounting Research* 18, 207-246.

Campbell, J. Y., 1996, Understanding risk and return, *Journal of Political Economy* 104, 298-345.

Campbell, J. Y., S. Giglio, and P. Pathak, 2008, Forced sales and house prices, Working paper, Harvard University.

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

Cella, C., 2009, Institutional investors and corporate investment, Working paper, Indiana University.

Chen, H. L., N. Jegadeesh and R. Wermers, 2000, The Value of Active Mutual Fund Management: An Examination of the Stockholdings and Trades of Fund Managers, *Journal of Financial and Quantitative Analysis* 35, 343-368.

Chen, J., 2002, Intertemporal CAPM and the cross-section of stock returns, Working paper, University of Southern California.

Chen, X., J. Harford and K. Li. 2007, Monitoring: Which Institutions Matter?, *Journal of Financial Economics* 86, 279-305.

Chevalier, J. and G. Ellison, 1997, Risk Taking by Mutual Funds as a Response to Incentives, *Journal of Political Economy* 105, 1167-1200.

Coval, J., and E. Stafford, 2007, Asset fire sales (and purchases) in equity markets, *Journal of Financial Economics* 86, 479-512.

Cremers, M. K. J. and A. Petajisto, 2009, How Active is Your Fund Manager? A New Measure that Predicts Performance, *Review of Financial Studies* 22, 3329-3365.

De Long, J. B., A. Shleifer, L. H. Summers, R. J. Waldmann, 1990, Noise Trader Risk in Financial Markets, *Journal of Political Economy* 98, 703-738.

Duffie, D., 2010, Presidential Address: Asset Price Dynamics with Slow Moving Capital, *Journal of Finance* 65, 1237-1268.

Duffie, D., and B. Strulovici, 2009, Capital mobility and asset pricing, Working paper, Stanford University.

Ellul, A., C. Jotikasthira, and C. Lundblad, 2009, Regulatory Pressure and Fire Sales in the Corporate Bond Market, Working paper, Indiana University.

Fama, E. F., and K. R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.

Garleanu, N., and L. H. Pedersen, 2007, Liquidity and risk management, *American Economic Review* 97, 193-197.

Gaspar, J., M. Massa, and P. Matos, 2005, Shareholder investment horizons and the market for corporate control, *Journal of Financial Economics* 76, 135-165.

Giannetti, M. and L. Laeven, 2009, Pension Reforms, Ownership Structure and Corporate Governance: Evidence from a Natural Experiment, *Review of Financial Studies* 22, 4091-4127.

Grossman, S., and M. Miller, 1988, Liquidity and market structure, *Journal of Finance* 43, 617-633.

Hameed A., W. Kang, and S. Viswanathan, 2010, Stock market declines and liquidity, *Journal of Finance* 65 (1), 257-292.

Ikenberry, D., J. Lakonishok, and T. Vermaelen, 1995, Market underreaction to open market share repurchases, *Journal of Financial Economics* 39, 181-208.

Jotikasthira, C., C. Lundblad, and T. Ramadorai T., 2009, Asset Fire Sales and Purchases and the International Transmission of Financial Shocks, Working paper, University of North Carolina.

Manconi, A., M. Massa and A. Yasuda, 2010, The Behavior of Intoxicated Investors: The role of institutional investors in propagating the crisis of 2007-2008, Working paper, INSEAD.

Mitchell, M., L. H. Pedersen, and T. Pulvino, 2007, Slow moving capital, *American Economic Review* 97, 215-220.

Mitchell, M., T. Pulvino, and E. Stafford, 2004, Price pressure around mergers, *Journal of Finance* 59, 31-63.

Morris, S., and H.S. Shin, 2004, Liquidity black holes, *Review of Finance* 8, 1-18.

Pulvino, T. C., 1998, Do asset fire sales exist? An empirical investigation of commercial aircraft transactions, *Journal of Finance* 53, 939-978.

Shleifer, A., and R. W. Vishny, 1992, Liquidation values and debt capacity: A market equilibrium approach, *Journal of Finance* 47, 1343-1366.

Shleifer, A., and R. W. Vishny, 1997, The limits of arbitrage, *Journal of Finance* 52, 35-55.

Staiger, D. and J. Stock, 1997, Instrumental Variables Regression with Weak Instruments, *Econometrica* 65, 557-586.

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.

Appendix A

Figure A
The S&P 500 Movements Before and After Lehman Brothers' Bankruptcy

The graph shows the cumulative abnormal returns of the S&P 500 Index from June 1, 2008 until April 17, 2009. Week 0 is the week when Lehman Brothers' bankruptcy occurred (the week beginning on Monday September 15, 2008).

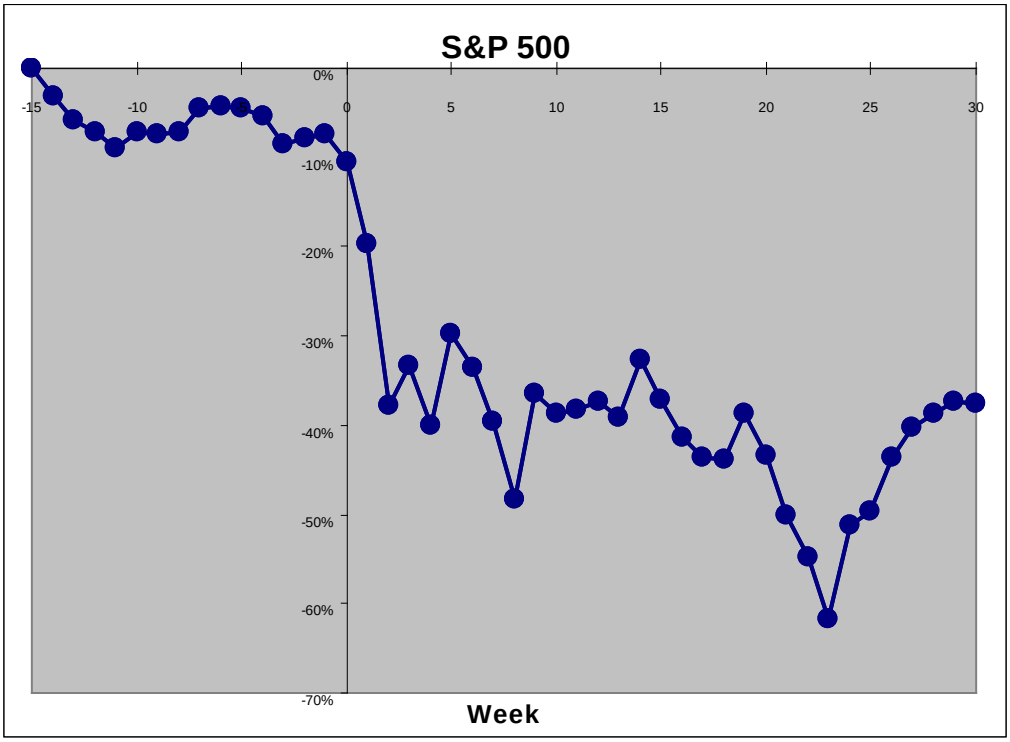
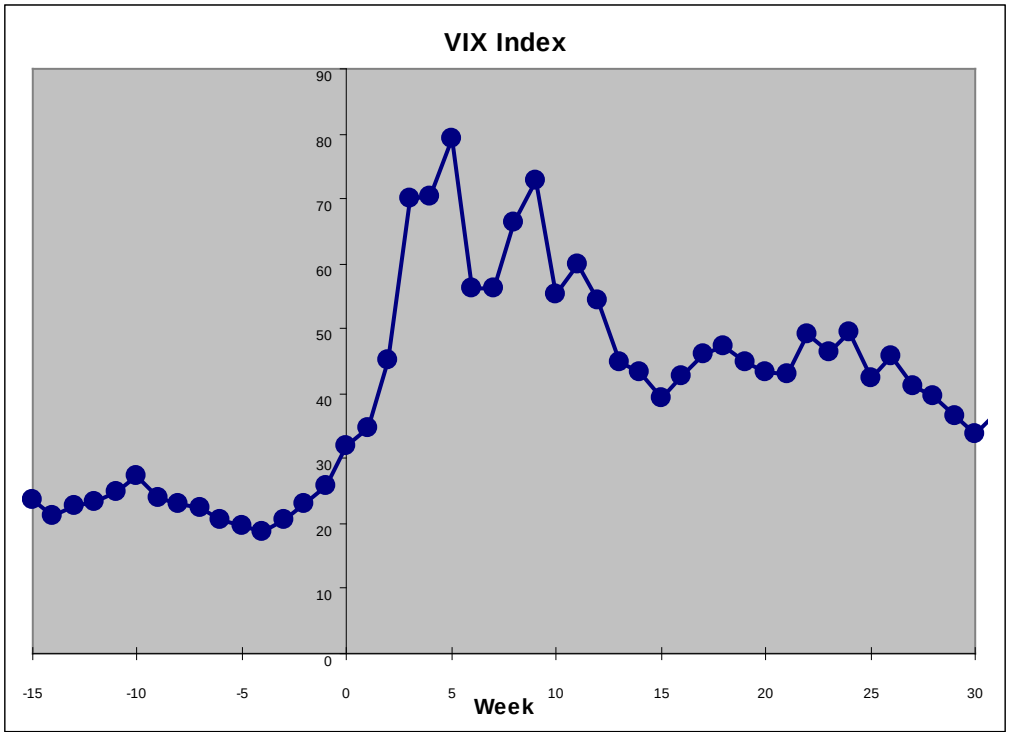


Figure B
CBOE Volatility Index (VIX) Movements

The graph shows the movements in the CBOE Volatility Index from June 1, 2008 until April 17, 2009. Week 0 is the week when Lehman Brothers' bankruptcy occurred (the week beginning on Monday September 15, 2008).



Appendix B
Variable Definitions

Panel A. Investors' Portfolios Characteristics	
Churn Ratio	The churn ratio measures how frequently institutional investors rotate their positions on all the stocks of their portfolio and is constructed as in Gaspar *et al.* (2005), p. 9.
Change in Portfolio Value	For each institutional investor, we calculate the difference between the value of the investor's portfolio at the end of the year 2007 and at the end of February 2008, as follows: $$c_i = \sum_{j \in Q} N_{j,i}(p_{feb08} - p_{dec07}).$$ Then, we capture changes in portfolio value of the investors in each firm using the following weighted average: $$\text{Change in Portfolio Value}_i = \sum_{i \in Q} w_{i,j} c_i$$ where $w_{i,j}$ is given by the total number of shares held by investor i in firm j divided by the total number of shares held by all investors in the last quarter of the year 2007.
Active Share Measure	The active share measures the proportion of an institutional investor's portfolio that deviates from the benchmark index (see p. 3335 of Cremers and Petajisto (2009) for details). We use the Russell 1000 for the year 2006 as the benchmark index. The Russell 1000 is usually rebalanced the last Friday in June; therefore our active share measure is computed over the period from the third quarter of 2006 until the first quarter of 2007.
Trading-Performance Sensitivity 1	The correlation for each institutional investor i between the portfolio performance in quarter t and net trading (buying less selling) in quarter t+1. Portfolio performance is computed in the following way. First, we compute the change in the price for each stock j held by each institutional investor i between beginning of quarter t and end of quarter t. Second, we multiply the price change of each stock j with the dollar weight of stock j in the portfolio of investor i at the beginning of the quarter t. In this way, we obtain the portfolio performance due to price changes of the stocks held by investor i. We measure the net trading of investor i as the number of shares bought during quarter t multiplied with the price at the end of quarter t less the number of shares sold during quarter t multiplied with the price at the end of quarter t. Computed over the period from the first quarter of 1990 until the fourth quarter of 2006.
Trading-Performance Sensitivity 2	This correlation measure is calculated similarly to Trading-Performance Sensitivity 1 but it is only calculated using quarters during which the S&P 500 Index experiences the largest declines. We first calculate and then sort the quarterly performance of the S&P 500 from 1990 to 2006 and use exclusively the quarters with index performances in the bottom decile. Each of these quarters represents quarter t. Then, we measure the correlation for each institutional investor i between the portfolio performance in quarter t and net trading (buying less selling) in quarter t+1 as explained for the Trading-Performance Sensitivity 1 above.

Panel A. Continued - Investors' Portfolios Characteristics

Percentage Ownership	The percentage ownership of a 13-F institutional investor in a firm.
Portfolios Size	The total value, in million of dollars, of the institutional investor's portfolio at the end of each quarter.
Portfolio Weight	The weight that each stock has in the institutional investor's portfolio at the end of each quarter. This variable is constructed as: $$w_{i,j,t} = \frac{N_{j,i,t} * p_{j,t}}{\text{portfolio size}_{i,t}}$$ where $N_{j,i,t}$ represents the number of shares of stock j held by investor i at the end of the quarter t and $p_{j,,t}$ represents the price of stock j at the end of quarter t. Portfolio size is the size, in million of dollars, of the portfolio of investor i at the end of the quarter t.
Number of Stocks	For each quarter, the total number of stocks for which an institutional investor filed a 13F.

Panel B. Ownership Characteristics

Investor Turnover	A firm's investors turnover is measured as the weighted average of the total portfolios churn ratios of its investors over the previous four quarters. In our analysis, for each firm, we consider the average institutional investors' turnover starting from the first quarter of 1990 until the last quarter of 2006.
Institutional Ownership	The percentage of the shares held by all institutional investors.
Insider Ownership	The percentage of the shares held by insiders (founders, CEOs, etc) in 2006.
Ownership Concentration	The Herfindal index of the institutional investors' ownership in each firm.
Number of Institutional Investors	The number of institutional investors in each firm.

Panel C. Stock Characteristics

Market Cap	The company's shares outstanding multiplied by current market price (in million of dollars).
Market-to-Book	The market value of equity divided by the book value of common equity.
Share Turnover	The daily volume of shares transacted divided by the number of shares outstanding.
Bid-Ask Spread	The average difference between bid and ask quotes divided by the daily price.
Beta	The beta of stock j is calculated using the market model and weekly returns of the stock and the S&P 500 index starting from 2003 to the end of the first quarter of 2008.

Panel C. Continued - Stock Characteristics	
Past Returns	The daily stock returns over the 180 days before June 1, 2008.
Return Variability	The standard deviation of daily stock returns over the preceding two years.
Dividend Yield	The dividends per share divided by share price.

Panel D. Firm Characteristics	
Firm Size	The natural logarithm of total assets as of December 2007.
Return on Assets	Net income at time *t* divided by total assets at time *t-1*.
Leverage	The book value of debt divided by the book value of total assets as of December 2007.

Table 1
The Portfolios of Institutional Investors

This table describes the main characteristics of the institutional investors' portfolios. All variables are defined in Appendix B and are winsorized at the 5% level. Active Share Measure is an average computed over the period from the third quarter of 2006 up to and including the first quarter of 2007. Trading-Performance Sensitivity 1 and 2 are measured for the entire period from 1990 to 2006. All other variables are computed as averages for each quarter of 2007.

	N	Mean	SD	P05	Median	P95
Churn Ratio	2,622	0.34	0.35	0.02	0.22	1.08
Active Share Measure	2,055	29.00%	10.11%	9.14%	29.96%	43.97%
Trading-Performance Sensitivity 1	1,812	-0.08	0.19	-0.37	-0.09	0.25
Trading-Performance Sensitivity 2	2,038	-0.05	0.23	-0.40	-0.06	0.36
Percentage Ownership	2,622	0.16%	0.15%	0.01%	0.11%	0.45%
Portfolio Size	2,622	2,190	7,340	23	315	9,420
Portfolio Weight	2,622	4.47%	12.37%	0.11%	1.41%	16.67%
Number of Stocks	2,622	211	465	6	71	922

Table 2
Descriptive Statistics

This table presents descriptive statistics about the main ownership, stock, and firm characteristics of the stocks held by institutional investors. For the last quarter of the year 2007, we obtain ownership data from Thompson Reuters, stock information from CRSP and accounting information from COMPUSTAT. We divide the entire sample in terciles using firms' investor turnover measured by the average investor turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. Panel A reports descriptive statistics for the firms' ownership characteristics, their institutional investors' portfolio characteristics, the stock and firm characteristics of the entire sample, High IT Firm and Low IT Firms. We also report the Wilcoxon test for the difference in the medians of the various variables between low and high IT firms. Panel B provides the time-average of the cross-sectional pairwise correlation coefficients between the ownership characteristics, the stock and firm characteristics for the entire sample. We report the significance level of correlation coefficients using the Bonferroni adjustment. In Panel B, * indicates significance at 10% or less. All variables shown are described in Appendix B and are winsorized at the 5% level.

Panel A.Ownership Characteristics and Investors' Portfolio Characteristics

		Whole Sample					High IT Firms			Low IT Firms			Test
Variable	N	Mean	SD	P05	Median	P95	Mean	Median	SD	Mean	Median	SD	p-value
Ownership Characteristics													
Investor Turnover	3,949	0.27	0.09	0.16	0.26	0.44	0.37	0.34	0.09	0.19	0.20	0.03	0.000
Active Share Measure	3,941	26.04%	3.90%	19.50%	26.40%	31.20%	25.74%	26.08%	4.10%	26.22%	26.55%	4.19%	0.003
Trading-Performance Sensitivity 1	3,936	-0.09	0.07	-0.16	-0.10	0.02	-0.07	-0.08	0.08	-0.10	-0.11	0.07	0.000
Trading-Performance Sensitivity 2	3,940	-0.06	0.08	-0.15	-0.07	0.06	-0.04	-0.05	0.08	-0.07	-0.08	0.08	0.000
Institutional Ownership	3,923	21.57%	16.16%	1.82%	18.51%	50.88%	19.90%	15.43%	16.02%	19.10%	15.62%	14.99%	0.319
Insider Ownership	3,218	22.09%	22.21%	0.80%	13.07%	72.72%	22.13%	11.88%	23.38%	23.32%	14.80%	21.51%	0.000
Ownership Concentration	3,934	6.67%	11.20%	1.00%	2.81%	24.73%	7.05%	3.50%	10.53%	8.09%	3.19%	13.36%	0.252
Number of Institutional Investors	3,946	74	74	5	51	223	57	40	54	77	46	87	0.029
Investors' Portfolio Characteristics													
Portfolios Size	3,949	31,400	12,100	16,700	29,100	54,300	30,500	28,700	10,100	35,200	32,900	15,000	0.000
Portfolio Weight	3,949	0.18%	0.21%	0.01%	0.13%	0.51%	0.21%	0.15%	0.24%	0.14%	0.09%	0.18%	0.000
Number of Stocks	3,949	1,962	587	1,172	1,888	3,050	1,957	1,884	533	2,087	2,020	667	0.000

Panel A. Continued - Stock Characteristics and Firm Characteristics

		Whole Sample					High IT Firms			Low IT Firms			Test
Variable	N	Mean	SD	P05	Median	P95	Mean	Median	SD	Mean	Median	SD	p-value
Stock Characteristics													
Market Cap	3,948	1,040	1,840	35	365	4,380	704	301	1,220	1,210	298	2,300	0.612
Market-to-Book	3,160	2.19	1.59	0.51	1.70	5.78	2.46	1.89	1.78	1.94	1.56	1.39	0.000
Share Turnover	3,934	0.69%	0.57%	0.06%	0.53%	1.87%	0.78%	0.59%	0.62%	0.50%	0.38%	0.46%	0.000
Bid-Ask Spread	3,937	0.52%	0.68%	0.10%	0.26%	1.80%	0.50%	0.28%	0.62%	0.66%	0.30%	0.83%	0.098
Beta	3,949	0.99	0.23	0.65	0.99	1.32	0.99	0.97	0.29	0.97	0.97	0.20	0.145
Price	3,949	19.76	14.02	3.55	15.41	49.04	16.48	13.53	12.00	22.22	17.79	15.03	0.000
Past Returns	3,521	-12.45%	20.10%	-49.81%	-10.20%	20.02%	-14.90%	-11.61%	20.67%	-11.49%	-9.70%	19.49%	0.000
Return Variability	3,949	1.62%	0.44%	0.71%	1.70%	2.20%	1.67%	1.82%	0.50%	1.58%	1.62%	0.37%	0.000
Dividend Yield	1,038	1.46%	3.50%	0.16%	0.67%	3.72%	1.83%	0.71%	3.81%	1.11%	0.70%	2.65%	0.413
Firm Characteristics													
Firm Size	3,418	5,262	56,689	31	639	10,401	1,256	391	2,899	9,354	840	82,873	0.000
Return on Assets	3,117	1.69%	10.08%	-19.19%	2.76%	14.16%	-0.29%	2.04%	12.52%	2.91%	2.58%	7.14%	0.000
Leverage	3,254	18.35%	17.46%	0.00%	14.42%	52.57%	16.58%	10.00%	18.43%	18.68%	15.83%	15.93%	0.000

Panel B. - Correlation Matrix

	Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Ownership Characteristics								
(1)	Investor Turnover	1.00						
(2)	Active Share Measure	-0.06*	1.00					
(3)	Trading-Performance Sensitivity 1	0.15*	-0.17*	1.00				
(4)	Trading-Performance Sensitivity 2	0.20*	-0.15*	0.93*	1.00			
(5)	Institutional Ownership	-0.03	0.24*	-0.22*	-0.18*	1.00		
(6)	Insider Ownership	-0.02	-0.04	0.00	0.01	-0.04	1.00	
(7)	Ownership Concentration	0.01	-0.14*	0.22*	0.17*	-0.49*	0.02	1.00
Stocks' Characteristics								
(8)	Market Cap	-0.11*	0.26*	-0.12*	-0.11*	0.49*	-0.05	-0.23*
(9)	Market-to-Book	0.13*	0.02	-0.08*	-0.06*	0.22*	0.03	-0.10*
(10)	Share Turnover	0.14*	0.11*	-0.10*	-0.06*	0.57*	-0.07*	-0.31*
(11)	Bid-Ask Spread	-0.04	-0.17*	0.21*	0.16*	-0.50*	0.09*	0.57*
(12)	Beta	0.00	0.06*	-0.09*	-0.07*	0.32*	-0.01	-0.23*
(13)	Price	-0.16*	0.24*	-0.14*	-0.12*	0.51*	-0.02	-0.27*
(14)	Past Returns	-0.07*	0.01	-0.01	-0.02	0.05	-0.01*	-0.03
(15)	Return Variability	0.09*	-0.05	-0.02	0.02	0.21*	0.15	-0.06*
(16)	Dividend Yield	0.08	-0.03	0.05	0.04	-0.04	-0.04	-0.04
Firms' Characteristics								
(17)	Firm Size	-0.04	-0.01	-0.01	-0.02	0.02	-0.07*	-0.03
(18)	Return on Assets	-0.14*	0.06	-0.04	-0.04	0.27*	0.03	-0.11*
(19)	Leverage	-0.06*	0.14*	-0.03	-0.02	0.13*	-0.04	-0.08*

Panel B. Continued - Correlation Matrix

	Variable	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Stocks' Characteristics													
(8)	Market Cap	1.00											
(9)	Market-to-Book	0.17*	1.00										
(10)	Share Turnover	0.18*	0.13*	1.00									
(11)	Bid-Ask Spread	-0.29*	-0.14*	-0.39*	1.00								
(12)	Beta	0.09*	0.02	0.39*	-0.21*	1.00							
(13)	Price	0.57*	0.20*	0.21*	-0.41*	0.05	1.00						
(14)	Past Returns	0.13*	0.09*	-0.13*	-0.12*	-0.07*	0.22*	1.00					
(15)	Return Variability	-0.09*	0.18*	0.32*	0.12*	0.40*	-0.12*	-0.20*	1.00				
(16)	Dividend Yield	-0.03	0.04	0.10	-0.02	0.12*	0.04	-0.16*	0.15*	1.00			
Firms' Characteristics													
(17)	Firm Size	0.11*	-0.07*	0.02	-0.05	0.02	0.07*	0.02	-0.06*	0.00	1.00		
(18)	Return on Assets	0.21*	0.05	0.01	-0.17*	-0.02	0.36*	0.19*	-0.22*	0.01	0.00	1.00	
(19)	Leverage	0.15*	-0.08*	0.09*	-0.11*	0.03	0.14*	0.00	-0.18*	0.15	0.03	0.00	1.00

Table 3
Mean Comparison test of Weekly Cumulative Abnormal Returns

This table reports mean cumulative abnormal returns of high and low IT stocks. We divide the entire sample in terciles using firms' investment horizons measured by the average investors' turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. The first three columns show the weekly cumulative abnormal returns calculated using the market model (MCAR) while the last three columns present the weekly cumulative abnormal returns calculated using the Fama and French's methodology (FFCAR). We report a mean comparison test for the difference of mean between the two groups. The average number of observations per week is 3,095 in the test that uses MCAR and 1,742 observations per week in the test that uses FFCAR. * indicates significance at 1% (***), 5% (**), 10% (*). Cumulative abnormal returns are winsorized at the 5% level.

	MCAR			FFCAR		
	(1)	(2)	(3)	(4)	(5)	(6)
Week	High IT Firms	Low IT Firms	(1)-(2)	High IT Firms	Low IT Firms	(4)-(5)
-15	-1.78%	-1.43%	-0.35%	-0.22%	0.09%	-0.31%
-14	-0.71%	-0.82%	0.11%	-0.21%	-0.21%	-0.01%
-13	-1.80%	-1.74%	-0.06%	-0.26%	-0.42%	0.16%
-12	-4.14%	-4.32%	0.17%	0.04%	-0.49%	0.53%
-11	-3.77%	-3.40%	-0.37%	-0.64%	-0.17%	-0.47%
-10	-3.79%	-2.17%	**-1.62%*** **	-0.85%	0.49%	**-1.34%** **
-9	-2.35%	0.19%	**-2.55%*** **	-1.92%	1.34%	**-3.26%*** **
-8	-2.16%	0.84%	**-3.00%*** **	-1.64%	1.59%	**-3.23%*** **
-7	-4.39%	-0.08%	**-4.31%*** **	-1.97%	1.67%	**-3.64%*** **
-6	-3.20%	1.39%	**-4.59%*** **	-2.11%	1.93%	**-4.04%*** **
-5	-3.85%	0.33%	**-4.19%*** **	-1.49%	1.50%	**-2.99%*** **
-4	-2.26%	1.64%	**-3.90%*** **	-1.40%	1.37%	**-2.77%*** **
-3	-2.15%	3.00%	**-5.16%*** **	-2.24%	2.29%	**-4.53%*** **
-2	-5.07%	2.60%	**-7.67%*** **	-2.79%	3.35%	**-6.13%*** **
-1	-5.54%	4.90%	**-10.44%*** **	-4.23%	5.18%	**-9.41%*** **
0	-7.53%	3.36%	**-10.89%*** **	-4.36%	5.29%	**-9.65%*** **
1	-8.55%	3.98%	**-12.53%*** **	-4.51%	6.87%	**-11.38%*** **
2	-10.65%	4.12%	**-14.77%*** **	-4.58%	8.11%	**-12.69%*** **
3	-8.18%	4.71%	**-12.90%*** **	-3.97%	8.25%	**-12.23%*** **
4	-9.36%	3.55%	**-12.91%*** **	-3.12%	8.37%	**-11.49%*** **
5	-8.92%	3.69%	**-12.61%*** **	-3.67%	8.47%	**-12.14%*** **
6	-7.81%	4.12%	**-11.93%*** **	-3.05%	8.35%	**-11.40%*** **
7	-9.64%	2.41%	**-12.05%*** **	-3.43%	9.21%	**-12.64%*** **
8	-12.44%	0.37%	**-12.81%*** **	-3.86%	8.67%	**-12.54%*** **
9	-10.06%	2.28%	**-12.34%*** **	-3.35%	8.62%	**-11.97%*** **
10	-9.99%	2.87%	**-12.86%*** **	-1.67%	9.93%	**-11.59%*** **
11	-8.28%	3.78%	**-12.06%*** **	-2.50%	8.77%	**-11.28%*** **
12	-5.34%	6.00%	**-11.34%*** **	-2.34%	8.89%	**-11.22%*** **
13	-4.92%	6.64%	**-11.56%*** **	-2.76%	8.65%	**-11.41%*** **
14	-4.11%	6.76%	**-10.87%*** **	-4.06%	4.65%	**-8.72%*** **
15	0.08%	9.52%	**-9.44%*** **	-5.30%	2.57%	**-7.87%*** **
16	0.88%	9.30%	**-8.42%*** **	-4.85%	3.19%	**-8.04%*** **
17	0.63%	7.45%	**-6.82%*** **	-4.21%	3.12%	**-7.33%*** **
18	2.39%	7.50%	**-5.11%*** **	-3.48%	2.43%	**-5.91%*** **
19	2.50%	6.80%	**-4.31%** **	-2.51%	2.27%	**-4.78%*** **
20	4.57%	7.02%	-2.45%	-2.49%	2.04%	**-4.53%*** **
21	4.08%	5.91%	-1.83%	-1.73%	2.04%	**-3.77%** **
22	5.29%	7.52%	-2.22%	-0.55%	1.80%	-2.35%
23	5.22%	4.77%	0.46%	-0.55%	2.00%	-2.55%
24	4.88%	6.09%	-1.21%	-0.14%	2.58%	**-2.72%* **
25	7.03%	8.01%	-0.98%	-0.68%	1.81%	-2.48%
26	5.94%	8.96%	-3.02%	-2.84%	0.86%	**-3.71%** **
27	7.25%	10.34%	-3.09%	-2.70%	-0.02%	**-2.68%* **
28	7.66%	11.94%	**-4.28%** **	-2.39%	-0.42%	-1.97%
29	8.54%	13.47%	**-4.93%** **	-2.59%	-1.60%	-0.99%
30	9.31%	13.65%	**-4.34%** **	-2.41%	-2.45%	0.03%
31	9.81%	13.74%	**-3.93%** **	-2.67%	-3.88%	1.21%
32	10.25%	14.40%	**-4.15%** **	-4.79%	-5.22%	0.43%
33	12.16%	13.96%	-1.80%	-3.92%	-5.64%	1.72%
34	12.73%	14.03%	-1.30%	-3.27%	-6.33%	**3.06%** **
35	13.42%	12.77%	0.65%	-2.40%	-7.11%	**4.70%** **

Table 4
Drops and Reversals

This table compares the cumulative abnormal returns of stocks held by short term investors and stocks held by long-term investors over different intervals (windows). We divide the entire sample in terciles using the average investors' turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. Panel A shows the cumulative abnormal returns calculated from the market model (MCAR), while Panel B shows the cumulative abnormal returns calculated using the Fama and French's methodology (FFCAR). The last column of both Panel A and Panel B reports cumulated average sample abnormal returns over the event window for the entire sample. In each panel, we report the result of a mean comparison test for the difference of the mean between the two groups. * indicates significance at 1% (***), 5% (**), 10% (*). Abnormal returns are winsorized at the 5% level.

Panel A: Cumulated Abnormal Returns calculated using the Market Model (MCAR)

	Whole Sample			Non- Financial Firms Only			Entire Market
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Windows	High IT Firms	Low IT Firms	(1)-(2)	High IT Firms	Low IT Firms	(4)-(5)	$\overline{CAR}(\tau_1,\tau_2)=\sum_{\tau=\tau_1}^{\tau_2}\overline{AR}_\tau$
Drop							
[-10,8]	-7.87%	2.79%	**-10.66%*** **	-10.99%	-1.48%	**-9.51%*** **	-4.94%
[0,8]	-5.48%	-1.22%	**-4.26%*** **	-7.28%	-2.72%	**-4.56%*** **	-5.05%
Reversal							
[9, 25]	4.42%	-1.62%	**6.04%*** **	-0.20%	-2.38%	**2.18%** **	1.96%
[9,35]	8.57%	-0.55%	**9.12%*** **	0.39%	-1.93%	**2.32%***	4.50%

Panel B: Cumulated Abnormal Returns calculated using the Fama and French Methodology (FFCAR)

	Whole Sample			Non- Financial Firms Only			Entire Market
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Windows	High IT Firms	Low IT Firms	(1)-(2)	High IT Firms	Low IT Firms	(4)-(5)	$\overline{CAR}(\tau_1,\tau_2)=\sum_{\tau=\tau_1}^{\tau_2}\overline{AR}_\tau$
Drop							
[-10,8]	-2.23%	5.68%	**-7.91%*** **	-3.61%	2.88%	**-6.49%*** **	1.16%
[0,8]	-0.27%	3.87%	**-4.14%*** **	-0.91%	2.72%	**-3.62%*** **	2.66%
Reversal							
[9, 25]	-2.19%	-7.87%	**5.67%*** **	-1.93%	-5.47%	**3.54%*** **	-9.24%
[9,35]	-6.82%	-15.72%	**8.90%*** **	-6.70%	-11.70%	**5.00%*** **	-19.68%

Table 5
Drops and Reversals across Firms with Different Characteristics

This table reports and compares the cumulative abnormal returns of low and high IT stocks over different windows. We divide the entire sample in terciles using firms' investment horizons measured by the average investors' turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. Stocks are sorted in quintiles based on their characteristics measured at the end of the year 2007 (1 indicates the lowest quintile; 5 indicates the highest quintile). We sort firms in quintiles based on their share turnover, volatility, and past returns. Stock characteristics are described in Appendix B. We report the result of a mean comparison test for the difference of mean between the between high and low IT firms. Panel A shows results using cumulative abnormal returns calculated from the market model (MCAR), while Panel B shows results using the cumulative abnormal returns calculated using the Fama and French's methodology (FFCAR). * indicates significance at 1% (***), 5% (**), 10% (*).When the statistical significance of the mean comparison test differs from that of the Wilcoxon rank-sum test, the latter is reported in parentheses. Abnormal returns are winsorized at the 5%

Panel A: Cumulated Abnormal Returns calculated using the Market Model (MCAR)

		Share Turnover			Return Volatility			Past Returns		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Drop		High IT Firms	Low IT Firms	(1)-(2)	High IT Firms	Low IT Firms	(4)-(5)	High IT Firms	Low IT Firms	(7)-(8)
	1	2.25%	8.72%	**-6.47%*** **	2.66%	14.10%	**-11.44%*** **	-4.18%	-2.64%	-1.54%
	2	-0.67%	5.42%	**-6.09%*** **	-0.81%	10.44%	**-11.25%*** **	-5.22%	6.99%	**-12.20%*** **
[-10, 8]	3	-8.96%	3.46%	**-12.41%*** **	-3.65%	3.54%	**-7.19%*** **	-4.56%	8.27%	**-12.83%*** **
	4	-9.31%	0.50%	**-9.80%*** **	-9.33%	-2.17%	**-7.15%*** **	-0.15%	7.96%	**-8.11%*** **
	5	-12.76%	-3.09%	**-9.66%*** **	-15.56%	-12.56%	-3.00%	-17.37%	3.20%	**-20.57%*** **
	1	2.72%	5.07%	**-2.35%* **	1.51%	6.95%	**-5.44%*** **	-5.62%	-6.20%	0.58%
	2	-2.02%	0.16%	**-2.18%* **	-2.91%	1.60%	**-4.51%*** **	-8.01%	-1.77%	**-6.23%*** **
[0,8]	3	-5.51%	-3.58%	-1.93%	-3.43%	-3.14%	-0.29%	-5.18%	1.07%	**-6.25%*** **
	4	-10.28%	-6.27%	**-4.01%** **	-8.30%	-5.78%	**-2.52%* **	0.11%	2.36%	**-2.25%* **
	5	-9.64%	-10.30%	0.66%	-10.82%	-8.94%	-1.88%	-8.45%	1.39%	**-9.84%*** **
Reversal										
	1	8.98%	2.09%	**6.89%*** **	29.36%	10.85%	**18.51%*** **	0.84%	-6.07%	**6.91%*** **
	2	16.21%	-0.89%	**17.10%*** **	3.46%	-2.02%	**5.48%*** **	-0.44%	-5.18%	**4.75%** **
[9, 25]	3	8.23%	-3.91%	**12.14%*** **	1.50%	-6.15%	**7.65%*** **	11.14%	2.72%	**8.42%*** **
	4	1.66%	-5.29%	**6.95%*** **	-0.27%	-6.69%	**6.42%*** **	15.49%	6.12%	**9.37%*** **
	5	-3.78%	-7.67%	**3.89%* **	-4.45%	-7.14%	2.69%	2.44%	-3.55%	**5.99%*** **
	1	15.00%	5.91%	**9.09%*** **	50.29%	18.02%	**32.27%*** **	3.86%	-4.81%	**8.68%*** **
	2	28.85%	0.13%	**28.72%*** **	9.90%	0.28%	**9.62%*** **	3.50%	-2.71%	**6.21%** **
[9, 35]	3	16.50%	-6.56%	**23.05%*** **	0.15%	-7.05%	**7.20%** **	21.30%	2.67%	**18.63%*** **
	4	4.69%	-6.27%	**10.96%*** **	1.05%	-10.02%	**11.07%*** **	23.70%	10.21%	**13.50%*** **
	5	-7.77%	-5.47%	-2.30%	-6.64%	-9.42%	2.78%	2.58%	-5.09%	**7.67%*** **

Panel B: Cumulated Abnormal Returns calculated using the Fama and French's Methodology (FFCAR)

		Share Turnover			Return Volatility			Past Returns		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Drop		High IT Firms	Low IT Firms	(1)-(2)	High IT Firms	Low IT Firms	(4)-(5)	High IT Firms	Low IT Firms	(7)-(8)
	1	-0.33%	7.33%	**-7.66%*** **	0.58%	13.87%	**-13.29%*** **	-5.69%	-3.31%	-2.38%
	2	-1.48%	8.68%	**-10.17%*** **	0.95%	10.69%	**-9.74%*** **	-2.13%	6.85%	**-8.98%*** **
[-10, 8]	3	-4.46%	10.63%	**-15.09%*** **	0.64%	7.46%	**-6.81%*** **	0.29%	9.81%	**-9.53%*** **
	4	-1.83%	5.71%	**-7.54%*** **	-4.24%	3.11%	**-7.35%*** **	2.24%	9.41%	**-7.17%*** **
	5	-4.99%	1.01%	**-6.00%** **	-8.59%	-7.37%	-1.22%	-4.81%	10.80%	**-15.61%*** **
	1	3.31%	7.22%	**-3.91%** **	1.31%	11.96%	**-10.64%*** **	-3.72%	-3.96%	0.24%
	2	0.48%	6.70%	**-6.22%*** **	3.47%	6.57%	**-3.10%* **	-1.25%	2.98%	**-4.23%*** **
[0,8]	3	-0.67%	6.66%	**-7.34%*** **	2.68%	4.51%	-1.83%	1.49%	6.51%	**-5.02%*** **
	4	0.39%	2.49%	-2.10%	-0.83%	0.41%	-1.23%	2.52%	7.95%	**-5.42%*** **
	5	-3.08%	-5.08%	2.00%	-4.71%	-4.74%	0.03%	0.77%	9.75%	**-8.98%*** **
Reversal										
	1	-3.62%	-8.81%	**5.19%*** **	-2.23%	-5.10%	**2.88%** **	-4.81%	-11.62%	**6.81%*** **
	2	-5.17%	-9.79%	**4.62%*** **	-4.60%	-9.49%	**4.90%*** **	-6.59%	-9.33%	**2.73%* **
[9, 25]	3	-2.55%	-8.99%	**6.44%*** **	-3.55%	-11.47%	**7.93%*** **	-1.48%	-4.62%	**3.14%** **
	4	-2.33%	-7.67%	**5.35%*** **	-1.54%	-7.72%	**6.18%*** **	-0.17%	-4.45%	**4.28%*** **
	5	-1.33%	-6.18%	**4.85%** **	-3.60%	-7.31%	**3.71%** **	-6.40%	-0.20%	**6.20%*** **
	1	-15.26%	-21.73%	**6.48%*** **	-5.13%	-17.53%	**12.40%*** **	-10.15%	-17.90%	**7.74%*** **
	2	-9.28%	-23.55%	**14.27%*** **	-14.87%	-22.68%	**7.81%*** **	-12.71%	-19.63%	**6.92%*** **
[9, 35]	3	-5.95%	-23.25%	**17.30%*** **	-12.10%	-22.74%	**10.65%*** **	-6.08%	-16.41%	**10.33%*** **
	4	-8.26%	-16.82%	**8.56%*** **	-8.94%	-19.04%	**10.10%*** **	-4.74%	-16.94%	**12.20%*** **
	5	-7.16%	-7.29%	0.13%	-7.12%	-14.47%	**7.35%*** **	-6.36%	-18.56%	**12.19%*** **

Table 6
Multivariate Analysis of Price Drops

This table presents OLS regressions for the entire sample. The variables are described in Appendix B. Panel A reports the results of OLS cross-sectional regressions. The dependent variable is the price change between week -10 and week +8 in column 1 and 2, the MCARs between week -10 and week +8 in columns 3 to 6, and the FFCARs between week -10 and week +8 in columns 7 to 10. Panel B reports the results of OLS panel regressions using as the dependent variable the abnormal return of firm j in week t where t is between week -10 and week +8. In these specifications, we are able to control for contemporaneous time-varying stocks characteristics. * indicates significance at 1% (***), 5% (**), 10% (*). P-values are in parenthesis.

Panel A: Cross-Sectional Regressions – Window [-10,+8]

	Price Change		MMCAR				FFCAR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Investor Turnover	**-0.598*** **	**-0.601*** **	**-0.252*** **	**-0.252*** **	**-0.213*** **	**-0.251*** **	**-0.380*** **	**-0.378*** **	**-0.347*** **	**-0.368*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.004)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)
Change in Portfolio Value	**0.369*** **	**0.354*** **	**0.275*** **	**0.268*** **	**0.305*** **	**0.174** **	**0.280*** **	**0.271*** **	**0.286*** **	**0.163** **
	(0.005)	(0.008)	(0.000)	(0.000)	(0.000)	(0.024)	(0.000)	(0.000)	(0.000)	(0.037)
Active Share Measure		**-0.416***		-0.200	-0.145	-0.153		-0.219	-0.222	-0.075
		(0.097)		(0.185)	(0.383)	(0.396)		(0.149)	(0.186)	(0.677)
Institutional Ownership	**0.189** **	**0.195** **	**0.102***	**0.104***	0.014	**0.153** **	**0.111***	**0.113***	0.070	**0.201*** **
	(0.049)	(0.041)	(0.070)	(0.063)	(0.822)	(0.017)	(0.055)	(0.052)	(0.273)	(0.003)
Insider Ownership					-0.016				-0.005	
					(0.539)				(0.843)	
Stock Characteristics										
Market-to-Book	0.004	0.005	0.006	0.006	0.003	0.002	**0.042*** **	**0.043*** **	**0.042*** **	**0.035*** **
	(0.578)	(0.530)	(0.173)	(0.160)	(0.441)	(0.617)	(0.000)	(0.000)	(0.000)	(0.000)
Past Returns	**0.087***	**0.086***	-0.041	-0.042	-0.042	**-0.102*** **	**0.091*** **	**0.090*** **	**0.098*** **	0.027
	(0.074)	(0.077)	(0.129)	(0.125)	(0.139)	(0.001)	(0.001)	(0.001)	(0.001)	(0.385)
Return Variability	**-15.596*** **	**-16.295*** **	**-22.535*** **	**-22.890*** **	**-20.846*** **	**-25.493*** **	**-15.591*** **	**-15.964*** **	**-14.237*** **	**-19.211*** **
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Share Turnover	**-10.507*** **	**-10.504*** **	-1.832	-1.836	-1.509	-1.579	-2.067	-2.085	**-2.873** **	-1.086
	(0.000)	(0.000)	(0.165)	(0.164)	(0.291)	(0.267)	(0.110)	(0.107)	(0.041)	(0.437)
Bid Ask Spread	**-4.339** **	**-4.515** **	0.253	0.076	-0.478	-2.004	-0.710	-0.987	-1.013	-2.395
	(0.031)	(0.025)	(0.837)	(0.950)	(0.719)	(0.247)	(0.583)	(0.442)	(0.486)	(0.130)
Firm Characteristics										
Firm Size	**-0.025*** **	**-0.023** **	-0.001	-0.000	0.009	**-0.023*** **	**0.020*** **	**0.021*** **	**0.027*** **	-0.004
	(0.014)	(0.024)	(0.836)	(0.937)	(0.196)	(0.003)	(0.002)	(0.001)	(0.000)	(0.633)
Leverage			**-0.184*** **	**-0.184*** **	**-0.194*** **	**-0.112*** **	**-0.326*** **	**-0.327*** **	**-0.341*** **	**-0.218*** **
			(0.000)	(0.000)	(0.000)	(0.010)	(0.000)	(0.000)	(0.000)	(0.000)
Return on Assets	**0.377*** **	**0.368*** **	**-0.110***	**-0.115***	-0.075	-0.073	0.081	0.076	**0.122***	**0.125***
	(0.001)	(0.002)	(0.094)	(0.081)	(0.279)	(0.286)	(0.198)	(0.228)	(0.066)	(0.055)
Ownership Concentration	0.017	0.009	0.078	0.076	0.088	-0.023	0.059	0.056	0.018	0.048
	(0.843)	(0.919)	(0.159)	(0.176)	(0.147)	(0.790)	(0.292)	(0.328)	(0.755)	(0.645)
Constant	0.100	0.207	**0.424*** **	**0.478*** **	**0.416*** **	**0.625*** **	**0.264*** **	**0.323*** **	**0.281*** **	**0.444*** **
	(0.406)	(0.131)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Industry Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**	**YES**	**YES**	**YES**	**NO**
Errors Clustered at Firm Level	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**YES**
Non-Financial Firms Only	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**YES**
N	2,342	2,339	2,350	2,347	2,113	1,735	2,350	2,347	2,113	1,735
Adjusted R^2	0.1677	0.1685	0.235	0.237	0.232	0.190	0.2112	0.2125	0.222	0.213

Panel B: Abnormal Returns – Window [-10,+8]

	Market Model			Fama and French's Methodology		
	(1)	(2)	(3)	(4)	(5)	(6)
Investor Turnover	**-0.016*** **	**-0.016*** **	**-0.018** **	**-0.027*** **	**-0.026*** **	**-0.030*** **
	(0.003)	(0.004)	(0.010)	(0.000)	(0.000)	(0.000)
Change in Portfolio Value	**0.015*** **	**0.015*** **	**0.009***	**0.017*** **	**0.017*** **	**0.011** **
	(0.003)	(0.003)	(0.079)	(0.000)	(0.001)	(0.032)
Active Share Measure		-0.003	-0.002		-0.006	0.004
		(0.740)	(0.863)		(0.549)	(0.733)
Institutional Ownership	-0.001	-0.001	0.001	0.0004	0.001	0.004
	(0.869)	(0.866)	(0.709)	(0.891)	(0.873)	(0.344)
Stock Characteristics						
Market-to-Book Weekly	0.000	0.000	0.000	**0.003*** **	**0.003*** **	**0.003*** **
	(0.379)	(0.356)	(0.782)	(0.000)	(0.000)	(0.000)
Past Returns	-0.000	-0.000	-0.003	**0.005** **	**0.005** **	0.001
	(0.990)	(0.972)	(0.130)	(0.014)	(0.015)	(0.696)
Past Returns over 1 Day	**-0.136*** **	**-0.137*** **	-0.017	**-0.119*** **	**-0.119*** **	-0.022
	(0.000)	(0.000)	(0.589)	(0.000)	(0.000)	(0.530)
Past Returns over 5 Days	0.008	0.009	-0.009	0.005	0.005	-0.008
	(0.282)	(0.255)	(0.294)	(0.581)	(0.560)	(0.417)
Past Returns over 15 Days	-0.006	-0.007	0.002	**-0.009***	**-0.009***	-0.001
	(0.146)	(0.140)	(0.712)	(0.062)	(0.060)	(0.879)
Past Returns over 30 Days	**0.009*** **	**0.009*** **	**0.007***	**0.008** **	**0.007** **	0.002
	(0.003)	(0.003)	(0.053)	(0.019)	(0.020)	(0.531)
Return Variability Weekly	-0.007	-0.007	0.049	**-0.126*** **	**-0.127*** **	**-0.127*** **
	(0.907)	(0.905)	(0.463)	(0.000)	(0.000)	(0.000)
Share Turnover Weekly	**0.049***	**0.049***	0.006	0.014	0.014	0.081
	(0.072)	(0.075)	(0.897)	(0.824)	(0.824)	(0.246)
Bid-Ask Spread Weekly	0.000	0.000	0.000	-0.039	-0.039	**-0.136*** **
	(0.379)	(0.356)	(0.782)	(0.176)	(0.180)	(0.003)
Firm Characteristics						
Firm Size	**0.001** **	**0.001** **	-0.000	**0.001*** **	**0.001*** **	0.00005
	(0.018)	(0.015)	(0.547)	(0.000)	(0.000)	(0.911)
Leverage	**-0.011*** **	**-0.011*** **	**-0.007** **	**-0.018*** **	**-0.018*** **	**-0.011*** **
	(0.000)	(0.000)	(0.021)	(0.000)	(0.000)	(0.000)
Return on Assets	-0.000	-0.000	0.003	**0.019*** **	**0.019*** **	**0.021*** **
	(0.993)	(0.990)	(0.531)	(0.000)	(0.000)	(0.000)
Ownership Concentration	0.003	0.003	-0.005	0.006	0.006	0.007
	(0.390)	(0.422)	(0.444)	(0.172)	(0.192)	(0.363)
Constant	-0.001	**-0.015*** **	-0.007	**-0.014*** **	**-0.013*** **	**0.020*** **
	(0.887)	(0.002)	(0.200)	(0.001)	(0.009)	(0.001)
Time Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Industry Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Errors Clustered at Firm Level	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Non-Financial Firms Only	**NO**	**NO**	**YES**	**NO**	**NO**	**YES**
N	36,192	36,145	26,644	35,716	35,686	26,035
R^2	0.056	0.056	0.048	0.0307	0.0307	0.0280

Table 7
Multivariate Analysis of Price Reversal

This table presents OLS regressions for the entire sample. The variables are described in Appendix B. Panel A reports the results of OLS cross-sectional regressions. The dependent variable is the price change between week +9 and week +25 in column 1 and 2, the MCARs between week +9 and week +25 in columns 3 to 6, and the FFCARs between week +9 and week +25 in columns 7 to 10. Panel B reports the results of OLS panel regressions using as the dependent variable the abnormal return of firm j in week t where t is between week +9 and week +25. In these specifications, we are able to control for contemporaneous time-varying stocks characteristics. * indicates significance at 1% (***), 5% (**), 10% (*). P-values are in parenthesis.

Panel A: Cross-Sectional Regressions – Window [+9,+25]

	Price Change		MMCAR				FFCAR			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Investor Turnover	**0.195****	**0.190****	**0.225*****	**0.225*****	**0.247*****	**0.251*****	**0.169*****	**0.171*****	**0.149****	**0.244*****
	(0.044)	(0.049)	(0.003)	(0.003)	(0.004)	(0.003)	(0.010)	(0.009)	(0.039)	(0.001)
Change in Portfolio Value	**-0.296****	**-0.295****	-0.013	-0.011	-0.043	0.069	-0.086	-0.081	-0.108	-0.006
	(0.028)	(0.029)	(0.868)	(0.886)	(0.605)	(0.418)	(0.239)	(0.267)	(0.156)	(0.936)
Active Share Measure		0.054		0.062	0.100	-0.203		0.139	0.165	-0.100
		(0.810)		(0.672)	(0.541)	(0.253)		(0.323)	(0.288)	(0.559)
Institutional Ownership	0.138	0.141	0.008	0.010	0.010	0.015	0.037	0.037	0.060	-0.035
	(0.111)	(0.104)	(0.880)	(0.851)	(0.868)	(0.795)	(0.461)	(0.467)	(0.290)	(0.509)
Insider Ownership					0.023				0.005	
					(0.371)				(0.825)	
Stock Characteristics										
Market-to-Book	0.010	0.009	**0.009***	**0.008***	0.006	**0.012****	0.003	0.003	0.001	**0.009****
	(0.142)	(0.167)	(0.054)	(0.070)	(0.190)	(0.015)	(0.414)	(0.489)	(0.903)	(0.038)
Past Returns	**0.103****	**0.105****	-0.007	-0.006	-0.009	**-0.055***	0.025	0.026	0.022	-0.006
	(0.015)	(0.014)	(0.802)	(0.832)	(0.754)	(0.062)	(0.316)	(0.305)	(0.406)	(0.817)
Return Variability	4.007	3.756	**-18.581*****	**-18.782*****	**-19.766*****	**-17.286*****	0.990	1.000	0.017	1.185
	(0.199)	(0.228)	(0.000)	(0.000)	(0.000)	(0.000)	(0.605)	(0.600)	(0.993)	(0.573)
Share Turnover	0.020	0.042	-1.930	-1.934	-1.513	-2.281	0.004	-0.006	0.313	0.255
	(0.994)	(0.986)	(0.148)	(0.148)	(0.302)	(0.105)	(0.997)	(0.996)	(0.823)	(0.850)
Bid-Ask Spread	1.419	1.285	**3.961*****	**3.829*****	**3.185****	**5.316*****	-0.289	-0.393	-0.592	-0.277
	(0.460)	(0.509)	(0.002)	(0.002)	(0.019)	(0.003)	(0.812)	(0.747)	(0.659)	(0.877)
Firm Characteristics										
Firm Size	-0.012	-0.013	0.003	0.002	-0.002	**0.022*****	0.005	0.005	0.000	**0.021*****
	(0.164)	(0.142)	(0.631)	(0.709)	(0.810)	(0.004)	(0.337)	(0.428)	(0.957)	(0.002)
Leverage			-0.049	-0.051	-0.049	**-0.072***	-0.020	-0.021	-0.013	-0.054
			(0.134)	(0.123)	(0.153)	(0.077)	(0.532)	(0.500)	(0.706)	(0.145)
Return on Assets	**0.213****	**0.207***	0.016	0.010	-0.010	-0.036	**0.140****	**0.137****	0.114	**0.141****
	(0.049)	(0.058)	(0.802)	(0.879)	(0.885)	(0.589)	(0.030)	(0.034)	(0.107)	(0.028)
Ownership Concentration	-0.070	-0.063	0.088	0.088	**0.121****	0.016	0.067	0.068	0.086	0.043
	(0.505)	(0.552)	(0.133)	(0.136)	(0.050)	(0.868)	(0.188)	(0.183)	(0.121)	(0.609)
Constant	**-0.396*****	**-0.399*****	0.069	0.062	0.086	-0.029	**-0.289*****	**-0.319*****	**-0.284*****	**-0.256*****
	(0.000)	(0.001)	(0.315)	(0.422)	(0.323)	(0.742)	(0.000)	(0.000)	(0.000)	(0.001)
Industry Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**NO**	**YES**	**YES**	**YES**	**NO**
Errors Clustered at Firm Level	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**YES**
Non-Financial Firms Only	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**NO**	**NO**	**YES**
N	2,211	2,008	2,300	2,297	2,073	1,695	2,300	2,297	2,073	1,695
Adjusted R^2	0.1049	0.1047	0.109	0.110	0.116	0.125	0.0511	0.0512	0.072	0.0164

Panel B: Abnormal Returns - Window [+9,+25]

	Market Model			Fama and French's Methodology		
	(1)	(2)	(3)	(4)	(5)	(6)
Investor Turnover	**0.014****	**0.014****	**0.011***	**0.010***	**0.010***	**0.012****
	(0.015)	(0.013)	(0.097)	(0.071)	(0.073)	(0.041)
Change in Portfolio Value	-0.006	-0.005	0.002	**-0.009***	**-0.008***	-0.003
	(0.316)	(0.393)	(0.725)	(0.070)	(0.094)	(0.540)
Active Share Measure		**0.020***	-0.007		0.013	-0.011
		(0.088)	(0.632)		(0.254)	(0.435)
Institutional Ownership	**-0.007***	**-0.007***	**-0.007***	-0.001	-0.001	-0.005
	(0.080)	(0.084)	(0.092)	(0.795)	(0.803)	(0.259)
Stock Characteristics						
Market-to-Book Weekly	0.001	0.000	**0.001****	**-0.001*****	**-0.002*****	**-0.001****
	(0.124)	(0.174)	(0.019)	(0.001)	(0.001)	(0.039)
Past Returns	0.001	0.001	-0.003	**0.004***	**0.004***	0.0003
	(0.669)	(0.640)	(0.174)	(0.064)	(0.058)	(0.853)
Past Returns over 1 Day	**-0.237*****	**-0.236*****	**-0.239*****	**-0.241*****	**-0.241*****	**-0.214*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Past Returns over 5 Days	**0.029*****	**0.029*****	**0.027*****	**0.028*****	**0.028*****	**0.019****
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.036)
Past Returns over 15 Days	**-0.014*****	**-0.014*****	**-0.014*****	**-0.015*****	**-0.015*****	**-0.011*****
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.022)
Past Returns over 30 Days	**-0.004***	**-0.005***	**-0.006****	**-0.007****	**-0.007****	**-0.009*****
	(0.065)	(0.059)	(0.034)	(0.014)	(0.013)	(0.002)
Return Variability Weekly	0.053	0.048	0.016	**-0.193*****	**-0.193*****	**-0.210*****
	(0.457)	(0.505)	(0.848)	(0.000)	(0.000)	(0.000)
Share Turnover Weekly	**0.090*****	**0.089*****	**0.095****	**0.224*****	**0.221*****	**0.240*****
	(0.001)	(0.001)	(0.020)	(0.002)	(0.003)	(0.004)
Bid-Ask Spread Weekly	0.001	0.000	**0.001****	-0.026	-0.027	-0.012
	(0.124)	(0.174)	(0.019)	(0.338)	(0.327)	(0.766)
Firm Characteristics						
Firm Size	**0.001***	**0.001***	**0.002*****	0.000	0.000	0.001
	(0.052)	(0.093)	(0.000)	(0.584)	(0.481)	(0.118)
Leverage	-0.002	-0.002	-0.004	-0.003	-0.003	-0.002
	(0.474)	(0.417)	(0.226)	(0.213)	(0.196)	(0.448)
Return on Assets	0.006	0.006	0.000	**0.013****	**0.013****	**0.010***
	(0.234)	(0.260)	(0.939)	(0.022)	(0.026)	(0.075)
Ownership Concentration	**0.008***	**0.008***	0.007	0.004	0.005	-0.005
	(0.074)	(0.084)	(0.370)	(0.343)	(0.329)	(0.512)
Constant	**-0.020*****	**-0.024*****	**-0.025*****	**-0.024*****	**-0.027**	**-0.034*****
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Time Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Industry Dummies	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Errors Clustered at Firm Level	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Non-Financial Firms Only	**NO**	**NO**	**YES**	**NO**	**NO**	**YES**
N	31,410	31,364	23,148	31,392	31,360	22,930
Adjusted R^2	0.030	0.030	0.032	0.0390	0.0391	0.0378

Table 8
Exploiting the Exogenous Variation in Investor Turnover

This table presents instrumental variable regressions for the entire sample. The variables are described in Appendix B. We use Trading-Performance Sensitivity 1 and Trading-Performance Sensitivity 2 as instruments for investor turnover. The first three columns in the table show results for the price drop period (between week -10 and week +8), while the last three columns show results for the price reversal period (between week +9 and week +25). The dependent variable is the price change in columns 1 and 4, the MCARs in column 2 and 5, and the FFCARs in columns 3 and 6. * indicates significance at 1% (***), 5% (**), 10% (*). P-values are in parenthesis.

	Drop - Window [-10,+8]			Reversal - Window [+9+25]		
	Price Change	MMCAR	FFCAR	Price Change	MMCAR	FFCAR
	(1)	(2)	(3)	(4)	(5)	(6)
Investor Turnover	**-1.662*** **	**-1.037*** **	**-1.343*** **	**0.619***	**0.626** **	**0.534*** **
	(0.000)	(0.001)	(0.000)	(0.070)	(0.021)	(0.020)
Change in Portfolio Value	**0.313** **	**0.358*** **	**0.302*** **	**-0.278** **	-0.064	**-0.145** **
	(0.019)	(0.000)	(0.000)	(0.040)	(0.437)	(0.048)
Active Share Measure	**-0.466***	-0.133	-0.194	0.067	0.092	0.161
	(0.077)	(0.411)	(0.232)	(0.769)	(0.548)	(0.254)
Institutional Ownership	**0.212** **	0.078	**0.139** **	0.130	0.004	0.037
	(0.031)	(0.166)	(0.020)	(0.142)	(0.935)	(0.439)
Stock Characteristics						
Market-to-Book	0.005	**0.008***	**0.0432*** **	0.009	**0.011** **	0.003
	(0.544)	(0.055)	(0.00458)	(0.162)	(0.018)	(0.526)
Past Returns	0.055	**-0.099*** **	0.0407	**0.117*** **	0.007	0.040
	(0.284)	(0.000)	(0.0294)	(0.007)	(0.799)	(0.103)
Return Variability	**-14.47*** **	**-27.99*** **	**-20.74*** **	2.851	**-17.74*** **	1.686
	(0.000)	(0.000)	(2.400)	(0.382)	(0.000)	(0.378)
Share Turnover	**-7.932*** **	-0.599	-0.730	-0.948	**-2.659***	-0.005
	(0.003)	(0.706)	(1.620)	(0.710)	(0.069)	(0.997)
Bid-Ask Spread	**-5.170** **	0.950	0.170	1.789	**2.990** **	-1.201
	(0.016)	(0.474)	(1.350)	(0.376)	(0.017)	(0.311)
Firm Characteristics						
Firm Size	**-0.034*** **	0.007	**0.0147** **	-0.009	-0.002	-0.001
	(0.002)	(0.277)	(0.00710)	(0.354)	(0.726)	(0.840)
Leverage		**-0.203*** **	**-0.321*** **		-0.043	-0.011
		(0.000)	(0.0357)		(0.183)	(0.723)
Return on Assets	**0.291** **	**-0.263*** **	-0.0658	**0.236** **	0.037	**0.203*** **
	(0.019)	(0.000)	(0.0718)	(0.038)	(0.588)	(0.002)
Ownership Concentration	-0.017	**0.118** **	0.0729	-0.075	0.085	0.073
	(0.840)	(0.048)	(0.0609)	(0.488)	(0.171)	(0.152)
Constant	**0.488*** **	**0.733*** **	**0.611*** **	**-0.505*** **	0.091	**-0.295*** **
	(0.005)	(0.000)	(0.000)	(0.000)	(0.405)	(0.002)
Over-identifying Restrictions Test (p-value)	4.55 (0.03)	0.65 (0.21)	0.24 (0.62)	0.10 (0.75)	049 (0.49)	0.53 (0.47)
Industry Dummies	**YES**	**NO**	**NO**	**YES**	**NO**	**NO**
Errors Clustered at Firm Level	**YES**	**YES**	**YES**	**YES**	**YES**	**YES**
Non-Financial Firms Only	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**
N	2,338	2,345	2,345	2,208	2,295	2,295
R^2	0.1586	0.129	0.1136	0.1143	0.056	0.0241

Figure 1
Mean Cumulative Abnormal Returns of Stocks Held by Long-term and Short-term Investors

This figure compares the mean cumulative abnormal returns calculated by using the market model (MCARs) of (i) stocks mostly held by institutional investors with a long trading horizon, and (ii) stocks mostly held by institutional investors with short trading horizons. We divide the entire sample in terciles using firms' investor turnover measured by the average investor turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. Week 0 is the week when Lehman Brothers' bankruptcy occurred (week beginning on Monday September 15, 2008).

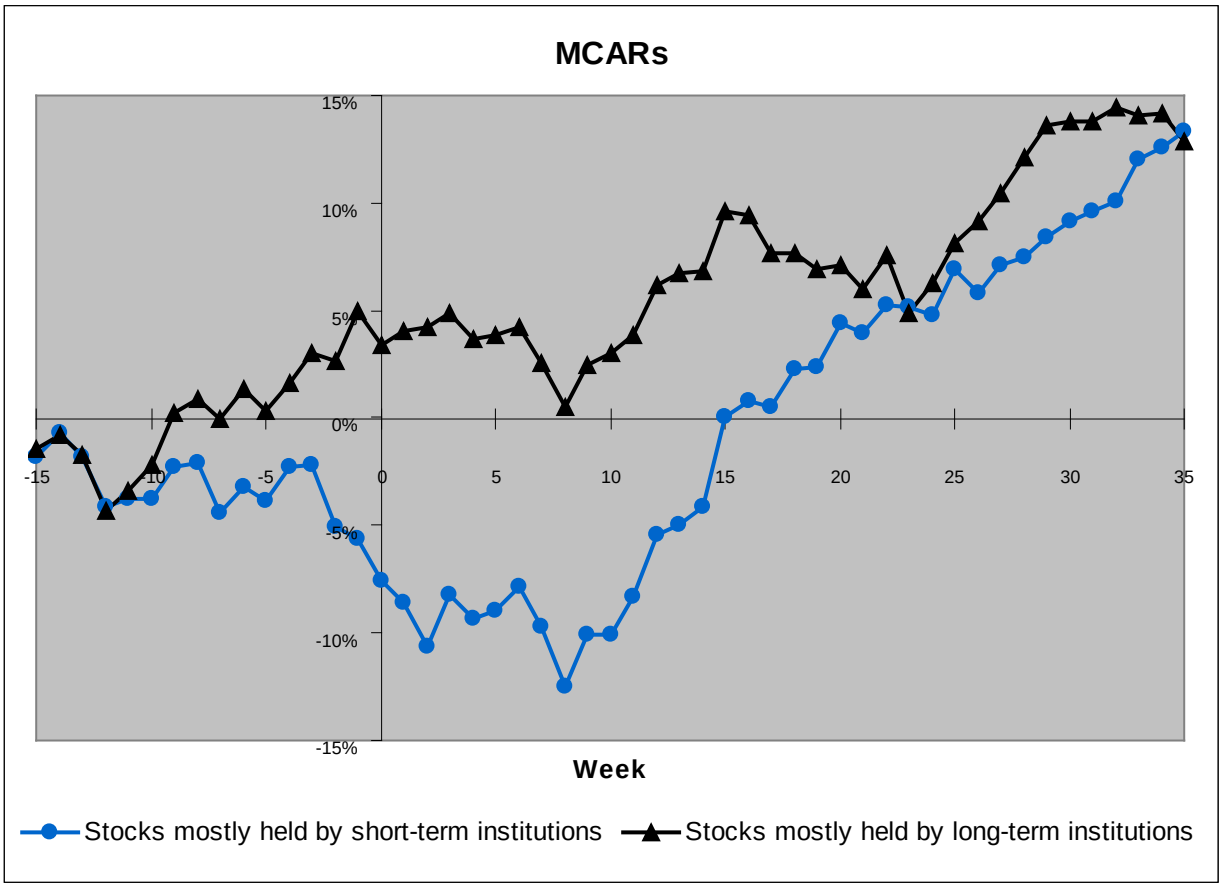


Figure 2
Fama and French Cumulative Abnormal Returns
for Stocks Held by Long-term and Short-term Investors

This figure compares the mean cumulative abnormal returns calculated by using the Fama and French's methodology (FFCARs) of (i) stocks mostly held by institutional investors with a long trading horizon, and (ii) stocks mostly held by institutional investors with short trading horizons. We divide the entire sample in terciles using firms' investor turnover measured by the average investor turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile. We also show the MCARs for all the stocks that do not belong to the financial industry and held by the two different groups of institutional investors. Week 0 is the week when Lehman Brothers' bankruptcy occurred (week beginning on Monday September 15, 2008).

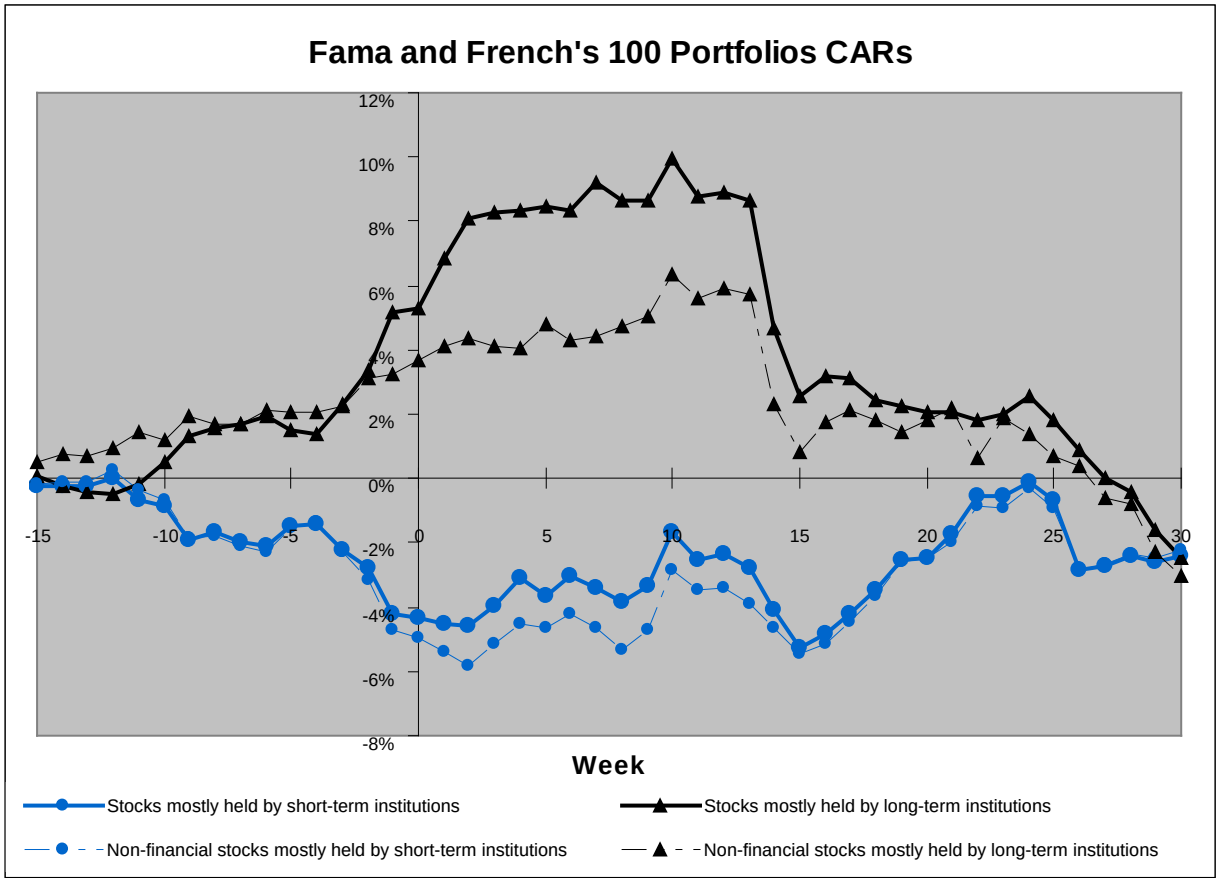


Figure 3
Institutional Investors' Net Share Volume Transacted

The figure shows the net share volume transacted (total number of shares purchased minus total number of shares sold) by (i) long-term institutional investors and (ii) short-term institutional investors over the period from the first quarter of 2007 until the second quarter of 2009. We divide the entire sample in terciles using firms' investor turnover measured by the average investor turnover over the period 1990-2006. A firm is classified as a firm held by long-term institutional investors (Low IT Firm) if it belongs to the first tercile. A firm is classified as a firm held by short-term institutional investors (High IT Firm) if it belongs to the third tercile.

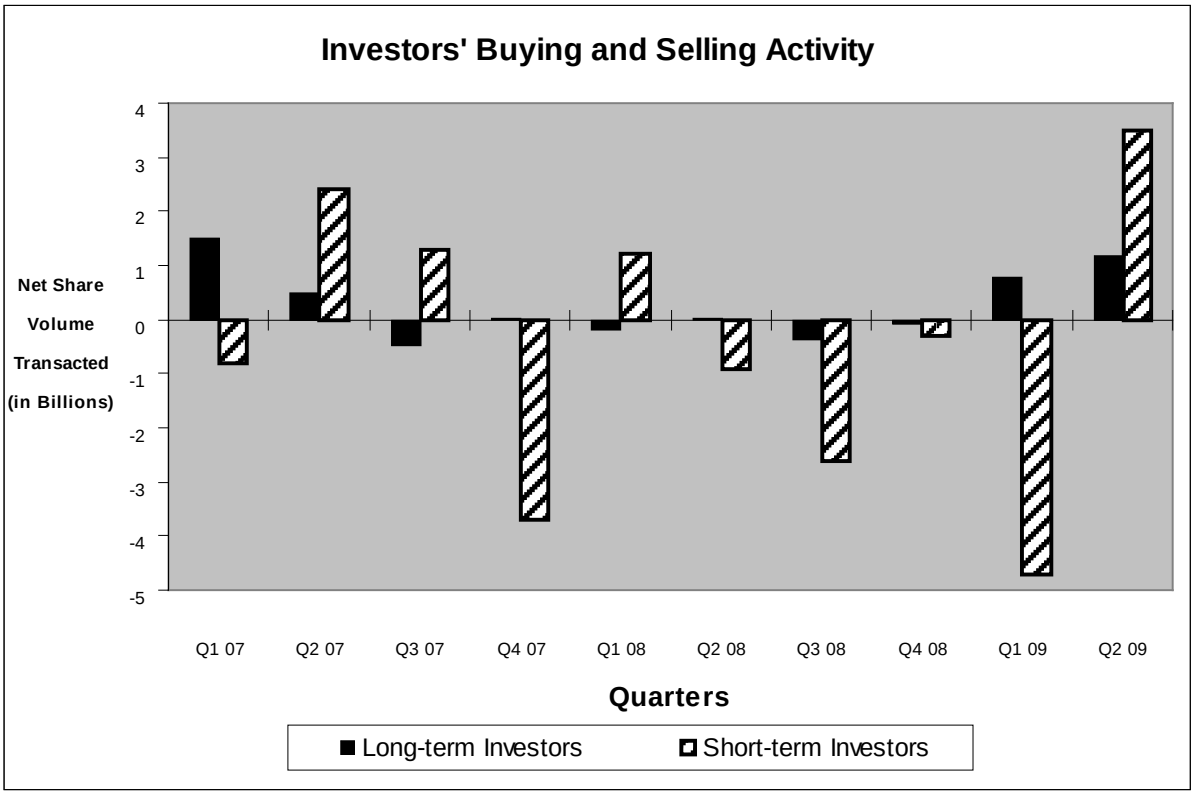
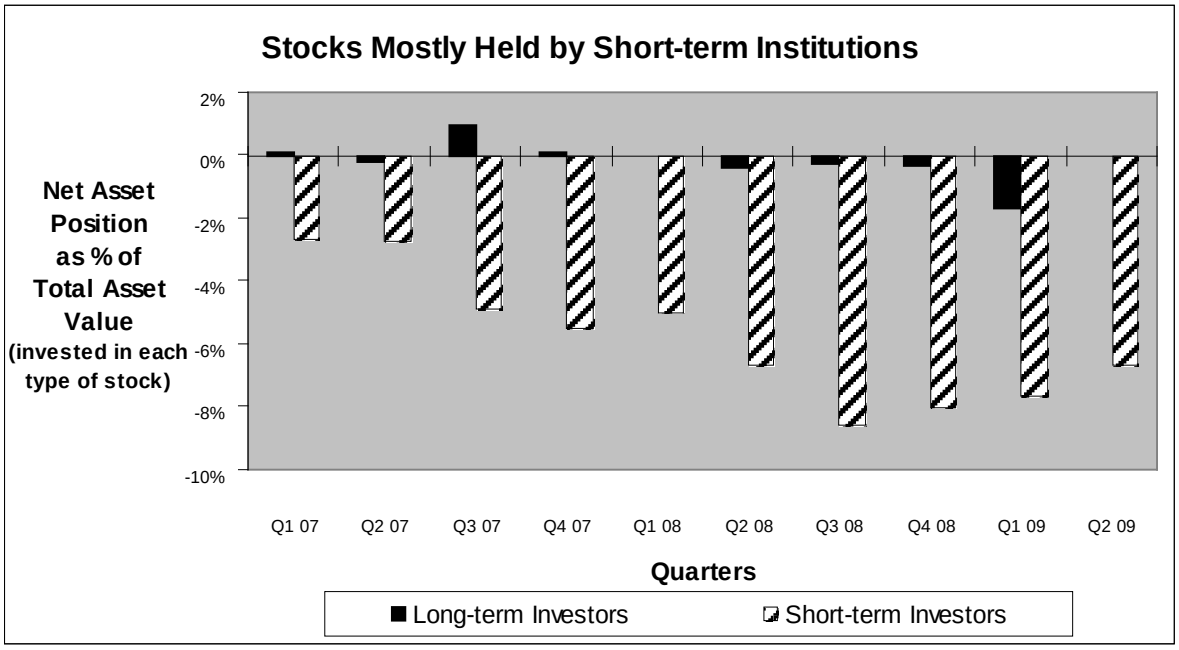


Figure 4
Sales in Firms with High and Low Investor Turnover

This figure shows the trading behavior of long-term institutional investors and short term institutional investors in (a) stocks held mostly by short-term investors and (b) stocks held mostly by long-term investors. To do so, we first sort stocks on the basis of their investor turnover and, second, investors on the basis of the churn ratio of their portfolios. For each type of investor, we report the value of the total number of shares purchased (number of shares purchased multiplied end-of-the-quarter price) minus the value of shares sold (number of shares sold multiplied by end-of-quarter price) divided by the (dollar) value of their investment in each of the two types of stocks.



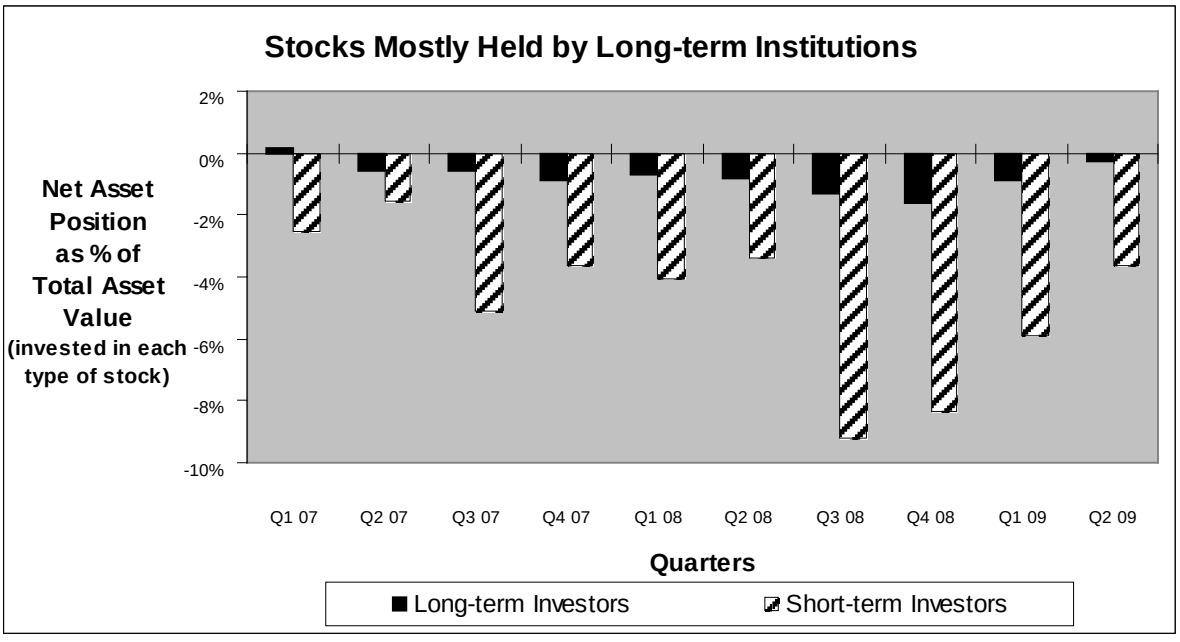


Figure 5
Exposure to Aggregate Volatility Risk and Returns of High and Low IT stocks

We compute stocks' normal returns using a multifactor model that includes the market returns and aggregate volatility risk, measured by the VIX index, as in Ang, Hodrick, Xing, and Zhang (2006). The multifactor model has been estimated using weekly returns from the beginning of 2003 until the end of the first quarter of 2008. The cumulative abnormal returns for the different groups of stocks in this figure are calculated using abnormal returns obtained subtracting from the actual returns the expected returns estimated using the multifactor model.

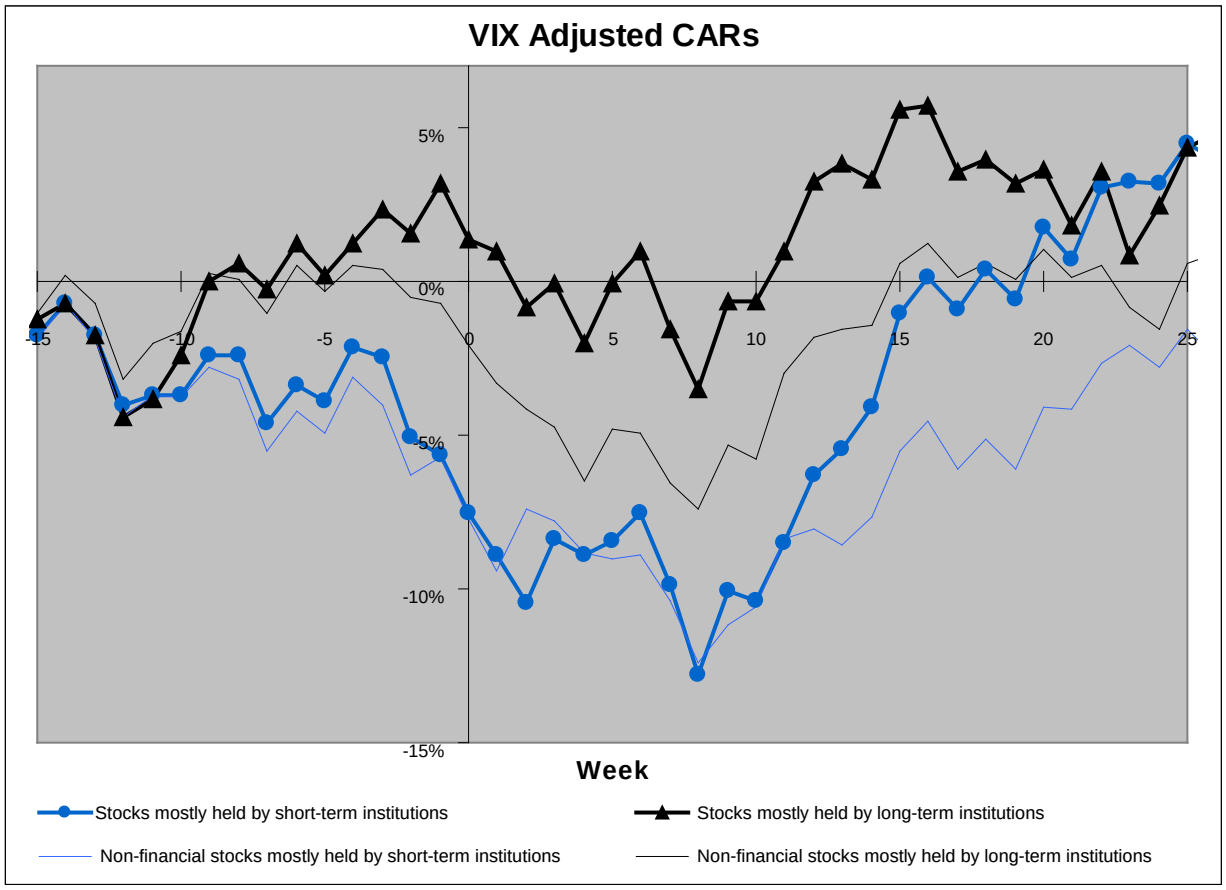
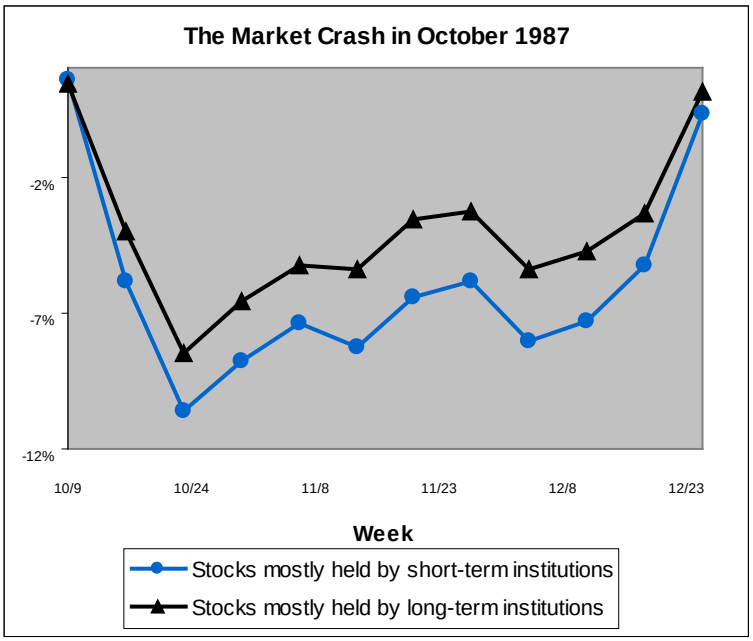
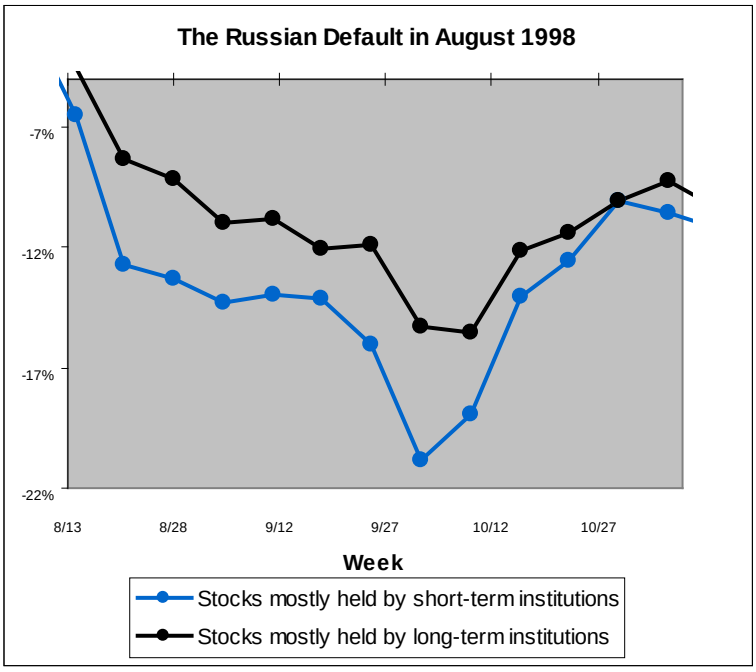
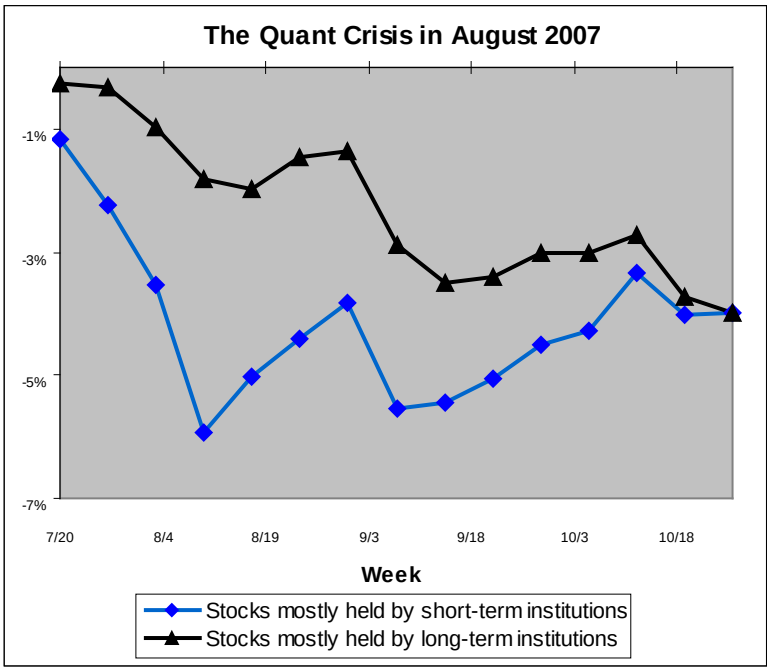


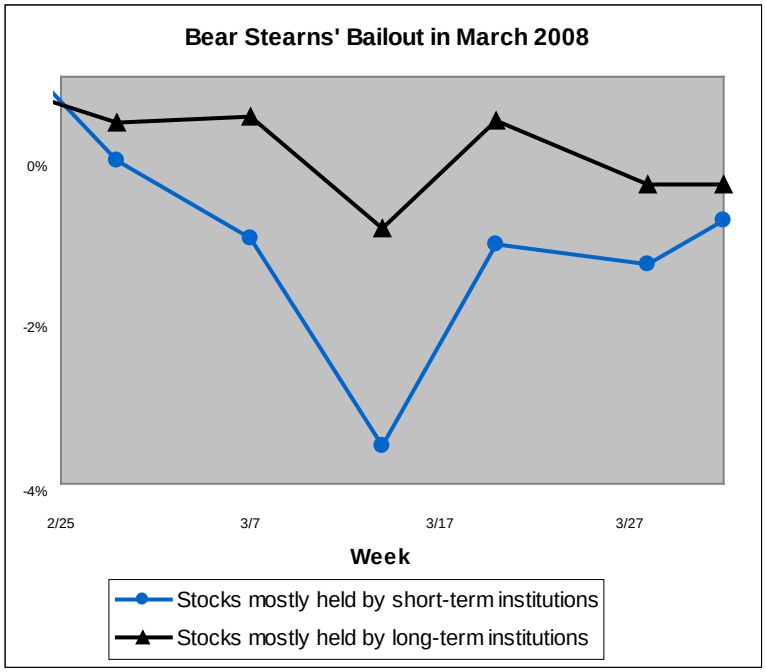
Figure 6
Other Large Market Declines

We report the MCARs of high and low IT stocks during four episodes of large market declines (the market crash in October 1987, the Russian default in August 1998; the Quant crisis in August 2007; and the Bear Stearns' bailout in March 2008). In all cases, we compute firms' normal returns with the market model using 5 years of weekly returns before the events. For the 1987 market crash, we measure investor turnover in each firm in the last quarter of 1986; for the Russian default, we measure investor turnover in the last quarter of 1997; for the Quant crisis, we measure investor turnover in the last quarter of 2006 and for the bailout of Bear Stearns, we measure investor turnover in the last quarter of 2007.






The Quant Crisis in August 2007
-1%
-3%
-5%
-7%
7/20
8/4
8/19
9/3
9/18
10/3
10/18
Week
Stocks mostly held by short-term institutions
Stocks mostly held by long-term institutions


Bear Stearns' Bailout in March 2008
0%
-2%
-4%
2/25
3/7
3/17
3/27
Week
Stocks mostly held by short-term institutions
Stocks mostly held by long-term institutions