Trends in Institutional Stock Ownership and Some Implications

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Abstract

Institutional investors have rapidly increased their percentage holdings of US equities in recent years. In this paper we update previous research on the nature of institutional stock ownership, extending the evidence by ten years to the end of 2006. In contrast to previous research, we find that institutions and mutual funds have increased their holdings of smaller stocks and decreased their holdings of larger stocks over this period. They now underweight the largest stocks and overweight the smaller stocks relative to market weights. We examine the implications of this increasing institutional presence in equity markets for the liquidity of the market, the behavior of stock prices, and institutional investment returns.

Since the beginning of the twentieth century, institutional investors have increased their percentage holdings of US equities.[1] Using the FRB Flow of Funds data we update previous results and in Figure 1 plot the time series of institutional versus household stock ownership from 1900 through the end of 2006. As described in earlier research, after World War II the growth of institutional holdings in the stock market accelerated, and at year end 2006 institutions held 70 percent of outstanding equities.

Yet, this growth in institutional ownership has not been uniform over different types of stocks. For example, Del Guercio (1966) examined data from 13f filings for June 1988 and found that banks, subject to the prudent man rule, tilt the portfolios under their management towards higher quality stocks [presumably larger stocks], while mutual funds, not subject to the prudent man rule, did not display a similar tendency. Falkenstein (1996) finds that mutual funds, with the exception of small-cap funds, avoid small cap stocks and tilt their portfolios towards more liquid stocks during the years 1991 and 1992. Gompers and Metrick (2001) conclude that during the 1980 to 1996 period institutions increased their demand for large stocks and decreased their demand for small stocks. Thus, over time the composition of institutional portfolios has diverged from the composition of the market portfolio.

In this paper we update previous research on the nature of institutional stock ownership, extending the evidence by ten years to the end of 2006, a period of considerable change in equity markets. We analyze the aggregate holdings of institutions and mutual funds by market value and confirm there have been major shifts in institutional stock ownership. In contrast to previous research, however, we find that institutions and mutual funds have gradually increased their holdings of smaller stocks and decreased their holdings of larger stocks. They now underweight the largest stocks and overweight the smaller stocks relative to market weights.

This increased presence of institutions in the stock market carries implications for the liquidity of the market and the behavior of stock prices, among other things. We present in this draft a preliminary analysis of several of these issues. We first explore the relation between institutional investing trends and market liquidity. Granted, the liquidity of securities markets is a function of many things, among them being the volume of trading or order flow, the presence of institutions which tend to initiate larger trading volumes, and factors that directly affect the cost of trading such as increased competition in the provision of market-making services,

[1] For documentation of this trend, the reader is referred to Institutional Investor Study Report (1971, Supplementary Volume 1, p.78) for the years 1900 through 1952, Friedman (1996) for the years 1950 through 1994; and Bennett, Sias, and Starks (2003) for the years 1983 through 1997.

improved technology, and structural changes in the market. But because the trading activity of institutions is greater than that of non-institutions, they are likely to leave a bigger footprint. Two reasonable conjectures are: (1) as institutions increase their overall ownership of stocks (figure 1), overall equity market liquidity should increase, holding constant other influences on liquidity; and (2) as institutions increase their relative holdings of smaller stocks, the relative liquidity of smaller stocks should also increase. We look at three measures of liquidity – bid-ask spreads, turnover rates, and stale prices – and find that the trend of increasing liquidity in the stock market generally, and in smaller cap stocks in particular, over the past two decades mirrors the increase in institutional ownership of common stocks.

Previous research finds short-term predictability in stock returns, and some of these studies attribute a portion of this predictability to stale prices. In view of the recent increase in trade volume and institutional presence in the market – and the concurrent increase in turnover rates and decrease in stale prices, particularly for smaller stocks – we explore the possible linkage between institutional stock ownership and return predictability. We find that predictability appears to be confined to the smallest stocks, which continue to display some stale prices at the end of our sample period. However, we find significant variation in predictability over our sample period that is unrelated to the observed trend of increasing market liquidity and fewer stale prices.

Lastly, in light of our evidence on the increase in institutional stock holdings, and recognizing the long literature linking trading to returns, we examine the extent to which institutional holdings are related to subsequent institutional returns over the period 1981 through 2006. Using performance attribution analysis, we find that any excess returns of institutional investors in the past two decades are primarily due to security selection within market cap deciles, not to allocation across deciles. However, neither the mean total excess return of 6.1 basis points, nor the 4.6 basis points of this return due to security selection, is significant at usual levels.

The paper is organized as follows. First, we describe our data, which are derived from numerous sources. In section II, we document trends in institutional and mutual fund ownership of common stocks over the period 1980 to 2006 showing that there have indeed been major shifts in institutional stock ownership, and institutional stock portfolios in aggregate deviate substantially from market weights. Section III explores the relation between institutional stock ownership and the liquidity of equity markets, focusing on three measures of liquidity – bid-ask

spreads, turnover rates, and stale prices. In section IV we examine daily stock market predictability, which is often attributed to market illiquidity and stale prices, and find significant variation in predictability over our sample period that appears unrelated to the observed trend of increasing market liquidity and fewer stale prices. In section V we examine the extent to which institutions earned significant excess returns on their investment portfolios from 1980 through 2006. Section VI concludes the paper.

I. Data

The data used in this study are the CRSP daily and monthly stock return files, Trade and Quote data (TAQ) provided by the NYSE, tick data for the S&P 500 futures contract from TickData, the CRSP Survivor-Bias Free Mutual Fund File, the stock holdings for mutual funds in the S12 data set and those for all institutions from the 13f filings as compiled by Thomson/CDA, mutual fund data from Morningstar, and specially collected data from annual reports of mutual funds. Wharton Research Data Services (WRDS) was the ultimate source for these data, with the exception of the S&P500 futures data and the mutual fund information from Morningstar and annual reports.

We include in the analysis all common stocks and REITS listed on US markets independent of the domicile of their headquarters, as determined by a share code of 10, 11, 12, 18, 48, and 72. The reason for including REITs is that the S&P 500 index, the subject of some of our analysis in Section II, includes them. We exclude ADRs, ETFs, and closed-end investment companies. We also exclude the two classes of Berkshire Hathaway stock as there are errors in TAQ in the recording of the trade prices of the two classes. Analyses of mutual fund data (i.e., Thomson S12 and CRSP Mutual Fund File) include only diversified domestic equity mutual funds. We use Morningstar's classification system when analyzing the holdings of different mutual fund investment strategies.

The S12 filings contain the name, cusip and number of shares of each US stock owned by each domestic equity mutual fund, as well as the fund identification number ("fundno") and fund name. The file provides holdings data often at quarterly intervals.[2] In addition to the holdings

[2] See Wermers (1999) for an excellent discussion of the Thomson/CDA mutual fund database and the initial analysis of these data. Prior to 1985 mutual funds were required to report their holdings quarterly. Beginning in 1985 the requirement was changed to semiannual reporting, although some funds continued to voluntarily report quarterly. See Wermers (1999) and Alexander, Cici and Gibson (2005) for further discussion about mutual fund reporting practice.

derived from the Thomson/CDA data, we also use the holdings data recently added to the CRSP Mutual Fund File, originally developed by Carhart (1996).

Any financial institution exercising discretionary management over $100 million is required to report their holdings in qualified securities to the SEC with form 13f on a quarterly basis. Like the S12 file, the Thomson/CDA 13f file provides holdings data at quarterly intervals. Note that because the $100 million breakpoint has not changed over time, the growth in equity values over our sample period may introduce a bias when comparing data across distant years. Gompers and Metrick (2001) examine this bias and find the industry is sufficiently concentrated above this breakpoint so that any resulting bias is minimal. We rely on this finding and make no temporal adjustments.

The TAQ data used in this study begin in January 1993 and end in December 2006. For each stock, we record for each day *t* whether the stock traded on its primary market and if so, the last price on the primary market and the time of that price, as well as the last bid and offer on the primary market, where primary is defined as the market on which the stock is listed. We merge our TAQ data with data from the CRSP daily stock return file using a mapping file developed by WRDS. We also eliminate daily stock observations where the absolute value of the percentage difference between the last trade price from TAQ and the closing price from CRSP exceeded 10% for stock prices less than $5, 5% for stock prices between $5 and $10, and 1% for stock prices greater than $10. For each stock, we record from CRSP its market value on both day t–1 and day t–2 as the product of the shares outstanding at the end of the day and the closing price from CRSP. The daily stock returns on CRSP are based on consolidated prices that are not always prices from the primary market. To determine the return based upon prices from the primary market, we multiply the CRSP return (plus one) for day *t* by the product of the following ratios: the ratio of last price from CRSP to last price from TAQ for day t–1 and the ratio of last price from TAQ to last price on CRSP for day *t*.

We then merge our institutional and mutual fund holdings data with the TAQ/CRSP stock data on the basis of the concurrent CUSIP number.

II. Trends in Institutional Stock Ownership

This section updates previous research on the nature of institutional stock ownership, extending the evidence by ten years to the end of 2006, a period of considerable change in equity markets. We begin with an analysis of the aggregate holdings of institutions and mutual funds

by market value and confirm there have been major shifts in institutional stock ownership. In contrast to previous research, however, we find that institutions and mutual funds have gradually increased their holdings of smaller stocks and decreased their holdings of larger stocks relative to market weights. In the second subsection we reconcile this new finding with the prior research. The third subsection examines the holdings of mutual funds at the fund level and finds that many funds underweight their holdings of larger-cap stocks relative to market weights.

A. The Distribution of Stock Ownership

In this subsection we reexamine the behavior of institutional stock ownership beginning in 1980, thereby coinciding with the beginning of the Gompers and Metrick (2001) sample period, and extend the analysis through 2006. We first partition US equities into ten equal-capitalization deciles by year. More specifically, each year we rank all US equities in our sample by their year-end market value and assign the largest stocks whose total market value was less than or equal to ten percent of the total market value of all stocks to the first or largest decile. Because of the granularity of market values, the combined market value of the stocks in our top decile is likely to be less than ten percent of the total market value of all equities. To adjust for this possibility, we assign to the second decile the next largest equities whose total market value combined with those in the first decile is less than or equal to twenty percent of the total market value. We then repeat this process for the remaining eight deciles.

This approach is different from that used by most researchers when constructing size portfolios, and by CRSP when constructing its US Market Cap-Based Portfolios. To illustrate, CRSP first ranks NYSE-listed US stocks by market value and assigns an *equal number* of stocks to each decile. It then uses the resulting market-value breakpoints to assign NASDAQ and AMEX stocks to the deciles. The result is that the stocks in the largest decile represent a disproportionately large portion of the market value of all stocks (i.e., much greater than the 10 percent portion a decile might imply) and the stocks in the smallest decile represent a disproportionately small portion of the market value of all stocks. For example, by applying the CRSP algorithm to the stocks used in this study for yearend 2006,[3] we find that the market value of the stocks in the largest decile represent 60.3 percent of the market value of all stocks and in the stocks in the smallest decile represent 1.6 percent.[4] The stratification that we use will better

[3] CRSP uses all stocks in its indexes, whereas we exclude ADRs, ETFs, and closed-end investment companies.
[4] If we use all stocks as CRSP does, the corresponding percentages are 65.2 percent 0.6 percent.

highlight deviations from market portfolio weights, especially for larger stocks, than the stratification used by CRSP.

Table 1 summarizes the percentage distribution of stocks by market cap deciles (our definition) for the first (1980) and the last (2006) yearends in our sample. The table reports the distributions for all stocks, all institutions from the Thomson/CDA 13f data, and all mutual funds from the Thomson/CDA S12 data. The table also reports in the rightmost column the total value of stock holdings (across all deciles) of institutions and mutual funds and the total value of the entire stock market. The total market value of all stocks at yearend 1980 was $1.4 trillion, increasing to $18.8 trillion by the end of 2006. In 1980 institutions owned 34 percent ($473 billion) of the total, but by the end of 2006 institutions had nearly doubled their percentage ownership to 67 percent ($12.6 trillion) of the total. Although prior studies have documented a steady increase in the institutional ownership of stocks, what may be surprising is that although institutions owned over two thirds of the market value of all stocks by 2006, a substantial portion of this increase occurred in the last few years. By 2000, their percentage ownership had increased slowly to 55 percent and had remained around this number until 2003. Their percentage ownership then spiked: 63 percent in 2004, 65 percent in 2005, and 67 percent in 2006.[5]

Turning to the percentage distributions across deciles in Table 1 for the overall market, we observe that the market value of stocks is highly concentrated. In 1980 decile one (the largest stocks) contains just four stocks out of the 4844 stocks in our sample. The top four deciles contain just 68 stocks. In contrast, the smallest decile contains 3753 stocks, or 77.5 percent of all stocks. A similar pattern holds for 2006. The percentage distributions for institutions and mutual funds in Table 1 demonstrate the extent to which their portfolios deviate from market weights, and how much these deviations change over time. For example, at the beginning of our sample period institutions tilted their portfolios toward larger stocks and away from stocks in the smallest two deciles. By the end of our sample period, institutions were underweighting the stocks in the largest three deciles and overweighting the stocks in the smallest five deciles.

[5] The 67% value from the Thomson data differs from the Flow of Funds figure of 70% (figure 1) for several possible reasons. First, the Flow of Funds data do not include non-profit institutions, which are included in the Thomson data. Second, there is the possibility the Thomson data double count the holdings of institutions which hire a subadvisors when both advisor and subadvisor inadvertently report the same holdings information. Both of these explanations indicate the holdings from Thomson should be higher than the Flow of Funds data, but we find the opposite. We are investigating this issue further.

A more direct way to see the institutional and mutual fund deviations from market weights is through the percentage over- and under-weights reported in Panel A of Table 2. The values in Panel A for institutions, for example, are ratios of the institutional ownership percentages to the total market percentages less one (percentages are from Table 1). The greatest institutional overweight in 1980 was in the third and fourth decile—an overweighting of 36.2 percent and 21.9 percent, respectively.[6] Their greatest underweight in 1980 was in the smallest decile with only 3.5 percent of their portfolios invested in stocks from that decile—an underweighting of 65.3 percent. (Though institutions overweighted the larger stocks and underweighted the smaller stocks, the degree of overweighting is not monotonic in market value.) In contrast, mutual funds underweighted the top four deciles, overweighted the fifth through ninth deciles, and underweighted the smallest decile by 29.2 percent—a marked difference from all institutions. Since our data for institutions include mutual funds, the differences would be even greater if all institutions less mutual funds were compared to mutual funds. If size is correlated with prudence, the differing size tilts in institutional versus mutual fund portfolios is consistent with the findings of Del Guercio (1996).

By 2006 all institutions, including mutual funds, had reduced their holdings of larger stocks relative to market weights and now underweight the top three deciles.[7] Interestingly, institutions in aggregate now overweight the smallest decile by 2.0 percent. Panel A of Table 3, in which we break the smallest decile into five groups of successively smaller market proportions (largest 8% of the decile value, the next 1%, next 0.5%, next 0.25%, and smallest 0.25%), shows that only the smallest 2% of the stocks are underweighted by institutions and mutual funds relative to market weights. The largest 8% of the smallest decile is overweighted by both institutions (8.5%) and mutual funds (12.2%).

To display in compact form the time trends in the institutional fund ownership, we combine the four largest deciles and the fifth through the eighth deciles into two separate groups.

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[6] One conjecture for the slightly smaller institutional overweighting in the largest two deciles in comparison to the much larger overweighting in the third and fourth deciles is that the largest companies might be closely held, resulting in a smaller float available for institutions investors. This appears not to be the case, though. In 1980, for example, the four companies and the percentage of stock held by institutions are in order of the market value of each company: IBM, 45.1 percent; AT&T, 17.5 percent; Exxon, 41.0 percent; and Standard Oil, 37.7 percent. All four stocks are widely held. In the second decile, the company with the largest institutional holdings is Atlantic Richfield with 51.5 percent, and the company with the smallest institutional holdings is Shell Oil with 19.3 percent. Again, all of the companies in this decile are widely held. The other seven companies in the second decile, in alphabetical order, are: Eastman Kodak, GE, GM, Mobil, Schlumberger, Texaco, and Standard Oil of California.

[7] An analysis of mutual fund holdings in section IIC suggests that aggregate institutional holdings of the largest stocks would be further reduced if the holdings indexed to the S&P 500 were excluded.

We continue to report the ninth and smallest deciles separately. Figure 2 plots the annual under- and over-weightings for all institutions for these four market-cap-based groupings for 1980 through 2006. At the beginning of the sample period institutions overweighted the stocks in the largest four deciles, then gradually decreased this tilt, and after 1989 consistently underweighted the largest stocks. There is little time trend in their relative weighting of the stocks in the fifth through the eight decile over this period. In contrast, there is a steady increase in the relative weighting of stocks in the two smallest deciles. In 1980, institutions underweighted the stocks in the ninth decile but gradually increased their weighting and beginning in 1997 overweighted these equities. There is a steady decrease in the underweighting of the stocks in the smallest decile and ultimately a small overweight by 2006.

Finally, one additional way to view the data is through the ownership percentages reported in Panel B of Table 2. These ownership percentages are derived from the ratio of institutional holdings or mutual fund holdings in a decile to the market value of all stock in that decile and can be interpreted as a weighted average of the ownership percentages of the individual stocks, where the weights are the market value of each stock.[8] Panel B clearly shows that institutions and mutual funds have increased their holdings in all the market cap deciles. However there are distinct patterns in the growth of their percentage ownership across the deciles: growth in their share of the larger cap deciles is much smaller than the growth in their shares of the smaller cap deciles. For example, the percentage of the largest cap decile owned by institutions grew from 35.3% of the entire decile in 1980 to 57.3% of the decile in 2006. In contrast, the percentage of the smallest cap decile owned by institutions grew from 11.9% of the entire decile in 1980 to 68.2% of the decile in 2006. And even though institutions and mutual funds still underweighted the smallest 2% of stocks in 2006 relative to market weights (Panel B of Table 3), the percentage of this tail of the distribution owned by them increased dramatically between 1980 and 2006 (Panel C of Table 3).

In summary, institutions have gradually shifted their ownership from larger to smaller stocks over the years 1980 through 2006. They now underweight the largest stocks and overweight the smaller stocks relative to market weights. Further, the relation between

[8] Let O_i be the shares outstanding of stock i, P_i be the price of that stock, and H_i be the shares held by all institutions. For each stock, the ownership percentage is $H_i P_i / O_i P_i$. Weighting these percentages by $O_i P_i / \sum_i O_i P_i$ and summing proves the statement in the text.

ownership percentages and market value of the stocks is not monotonic and certainly not linear in any monotonic transformation of market value, such as the logarithm of market value.

B. Comparison with Previous Results

As described at the beginning of section II, previous research concludes that institutions increased their allocations to large-cap stocks and decreased their allocations to small-cap stocks in recent years. These earlier results may seem at variance with our results presented above, particularly for the years 1990 and later when institutions were underweighting the largest four deciles of stocks. In an attempt to reconcile the differences, we take a closer look at Gompers and Metrick (2001). They find a positive correlation between the ratio of shares owned by institutions to shares outstanding and the logarithm of the market value of the shares outstanding. Covering 68 quarters from 1980 and 1996, they report an average cross-sectional correlation (across individual securities) of 0.625. We replicated their analysis for the last quarter of each year from 1980 through 2006 and find that the correlations varied from a low of 0.61 to a high of 0.67. These correlations are consistent with theirs. And even in 2006, when institutions tilted their portfolios toward the smaller deciles, the correlation is still 0.62.

To help resolve this paradox, we focus on the relation in 1980 and 2006. In Figure 3 we plot the regression of the percent of institutional ownership in each stock on the logarithm of its market value separately for 1980 and 2006, treating the market value variable as an exogenous variable. We also plot the simple means of these two variables for each decile and center upon each point a disk whose area is proportional to the number of stocks in the decile. As a measure of specification, we also indicate the average residual for each decile.

The 1980 regression fits the data much more closely than the 2006 regression. Consistent with the results in this paper, the 1980 regression underestimates the percentage ownership for the mid-size deciles and overestimates the percentage ownership for the two largest deciles. The 2006 regression substantially overestimates the ownership percentages for the largest deciles. This regression even predicts an ownership ratio of over 100 percent for the four largest deciles.

In 2006, it appears that the large number of observations in the two smallest deciles is driving the regression line. To demonstrate this, we estimate the regression within each of the ten deciles. The correlation between percentage institutional ownership and the logarithm of market value is 0.62 for all stocks, 0.68 for the stocks in the smallest two deciles, and -0.29 for the stocks in the largest eight deciles. Thus, the estimated correlation across all stocks in 2006

appears to be driven by the stocks in the two smallest deciles. In contrast in 1980, the correlation is 0.67 for all stocks, 0.53 for the stocks in the smallest two deciles, and 0.20 for the stocks in the larger eight deciles. Thus, in 1980 the positive correlation overall derives more generally from stocks in all deciles.

C. Mutual Fund Portfolios

Institutional portfolios differ in their investment objectives, so the analysis in the previous section masks potentially interesting patterns in institutional ownership across investment styles. To remedy this, we use the newly-developed mutual fund holdings file from CRSP to analyze the relation between institutional ownership and investment style. These data, which CRSP obtained from Standard & Poor's, are not subject to the possible problems associated with the Thomson/CDA S13 data. Although the CRSP holdings data start in January 2003, we focus on the holdings for December, 2006.

To classify mutual funds into different investment styles, we use the Morningstar equity style categories. Morningstar assigns funds to nine different categories, classifying their reported holdings along two dimensions – the market value of the stocks held (large cap, mid cap, and small cap) and the type of stocks held (growth, blend, and value). The result is the well-known three-by-three Morningstar style matrix representing nine distinct investment styles. By using the actual holdings in determining investment style, it is more likely that funds assigned to a particular Morningstar style category are more homogeneous in investment strategy than if there were subjectively assigned to a category by the declared investment objectives reported in prospectuses (i.e., the S&P objectives contained in the CRSP mutual fund file that are often used in studies of mutual funds.)[9] The Morningstar categorization reflects what the manager actually did as opposed to what she says she did. In addition to the nine Morningstar categories, we culled out funds that mimic the S&P 500 and present those funds as a separate category. A fund was deemed an S&P 500 index fund if it had a Morningstar beta with respect to the S&P 500 of between 0.985 and 1.015 and an R-squared greater than 0.99.

In Panel A of Table 4 we report the percent ownership distributions using our equal-market-cap decile definitions from section IIA for the ten fund categories, as well as the distribution for the overall market and for the S&P 500 Index. Panel B reports the corresponding

[9] Preliminary work with the Standard & Poor's objectives given in CRSP confirms this observation.

percentage over- and under-weightings by decile. These two panels are analogous to the panels in tables 1 and 2 for all institutions and all mutual funds.

We turn first to the percentage distribution of stocks in the S&P 500 Index. We use the shares outstanding from CRSP to calculate market values for stocks in the S&P 500.[10] The S&P 500 Index overweights stocks in the seven largest deciles and underweights stocks in the smallest three deciles (Panel B). For the largest decile, the overweighting is 44.6 percent. This overweight gradually decreases and by the seventh decile is only 16.6 percent. As is commonly known, the S&P 500 includes virtually no stocks from the two smallest deciles, making the S&P 500 index an imperfect reflection of the entire stock market.[11] As expected, the portfolio weights in the index funds match very closely those in the S&P 500 across all ten deciles.[12]

As expected, the funds identified as large-cap funds tilt their portfolios more towards larger stocks than those identified as mid-cap or small-cap. Morningstar states that large blend funds often compare themselves to the S&P 500[13] and, correspondingly, we find that large-blend funds overweight the stocks in the larger deciles, but not nearly enough in the largest three deciles to match the S&P weights. The same finding also applies to large-value funds. Large-growth funds substantially underweight the largest two deciles and tilt their portfolios to the fourth through eighth decile. Somewhat inconsistent with their categorization, the mid cap funds tilt their portfolios towards the four smallest deciles, relative to market weights. Surprisingly, in 2006 none of the small-value or small-growth funds holds any stocks from the smallest decile; rather their portfolios are concentrated in the eighth and ninth deciles. In contrast, small-blend funds concentrate their portfolios in the ninth and tenth deciles, with 71.7 percent of their holdings coming from the smallest decile.

[10] Up until ????, S&P employed a similar calculation, but now reduces the shares outstanding for some stocks by closely held stock to approximate more closely floating supply. Using the CRSP shares provides compatibility in comparing the market values for the stocks to the S&P 500, although it will overstate the weights that the S&P uses in its index for a few stocks with a corresponding small underweight for most stocks.

[11] To fill this void, both S&P and Russell have developed completion indexes, indexes which include stocks other than the 500 stocks in the S&P index.

[12] As previously indicated, the S&P Index weights used here are based upon market weights, while an index fund may well use floating supply weights. Certainly, part of the small difference in the weights in the index fund and S&P weights shown in the text could attributable to the differences between market weights and floating supply weights.

[13] To verify this claim, we took a random sample of 50 large blend funds out of 337 and found that 40 out of the 50 compared themselves to the S&P 500. Independent of equity style, Cremers, Petajisto, and Zitewitz (2007) find that the majority of mutual funds compare themselves to the S&P 500.

III. Liquidity and Institutional Stock Ownership

There is ample evidence that equity markets have become more liquid in recent years (see, for example the recent paper by Chordia, Roll and Subrmanyam (2008) and the references cited therein). The liquidity of securities markets is a function of many things, among them being the volume of trading or order flow, the presence of institutions which tend to initiate larger trading volumes, and factors that directly affect the cost of trading such as increased competition in the provision of market-making services, improved technology, and structural changes in the market. Because the trading activity of institutions is greater than that of non-institutions, two reasonable conjectures are: (1) as institutions increase their overall ownership of stocks (figure 1), overall equity market liquidity should increase, holding constant other influences on liquidity; and (2) as institutions increase their relative holdings of smaller stocks (figure 2), the relative liquidity of smaller stocks should increase. To examine these conjectures, we look at three measures of liquidity – bid-ask spreads, turnover rates, and stale prices.

A. Bid-Ask Spreads

One often-used measure of liquidity is the bid-ask spread.[14] For five market-cap quintiles, each containing an equal number of stocks, Figure 4 plots the average across all stocks within each quintile of the median closing bid-ask percentage spread for each month for 1993 through 2004. The percentage spread is the ratio of the dollar spread to the bid price less one, where the last bid and ask prices are from the primary market, where primary is defined as the market on which the stock is listed. On the surface, the steady decline in spreads over the period 1993-2004 suggests that liquidity has increased in equity markets over the period. Note, however, that several structural changes during the time period likely affected the level of spreads: Changes brought about by SEC and Justice Department actions regarding brokers who were avoiding quotes at the odd eighths, and changes in the minimum tick size from eighths to sixteenths in 1997 and then to decimals at the end of 2000 (phased in over the period August 2000 to February 2001). Visually, it is possible to split the plot in Figure 4 into three segments according to these three regimes. But it is apparent that within each of the regimes there is also a downward trend in spreads across all the quintiles. The general decline in spreads is likely due to the increased trade volume over this period as institutions increased their ownership of stocks relative to households. The largest declines occur for the three smallest quintiles which

[14] Chordia, Roll and Subramanyam (2008) rely on the bid ask spread as the measure of liquidity in their analysis.

approximate the smallest equal-cap decile we examined in section II. This large decline for the smallest stocks is interesting because they are the least liquid stocks and will be most sensitive to changes in the factors that affect liquidity. One potential explanation for the relatively larger decline for smaller cap stocks is the increased institutional holdings of small stocks relative to large stocks. Thus, our conjectures about relations between institutional stock ownership and liquidity appear to be borne out by the trends in bid-ask spreads.

B. Turnover

Turnover is another measure of liquidity often used in academic research (e.g., Gompers and Metrick (2001)). For the analysis here, we again combine the four largest deciles into one group, the next four largest deciles into another group, and keep the two smallest deciles as separate groups. We define turnover as the ratio of the total dollar yearly volume for that group to year-end market value for the group, where the yearly dollar volume for each stock is the sum of the products of the monthly volume and the month-end price. In this subsection, we include only common stocks with a CRSP share code of 10 or 11 in the analysis.

The turnover rate for all stocks combined increased from 35.4 percent in 1980 to a peak of 201.6 percent in 2000, consistent with our first conjecture above. Thereafter, turnover decreased to 169.4 percent in 2006 even though the institutional share of stock was still increasing, suggesting that there are secular trends in trading volume not related to institutional presence in the market. Indeed, volume peaked in both 1987 and 2000.

Our second conjecture receives little support from the plots in Figure 5 which show turnover rates separately for our four equal-cap decile groups. In 1980, the turnover rate for the smallest decile was 1.83 times the turnover rate for the largest four deciles; in 2006, this ratio was 1.94. One would have expected a much greater increase in this ratio from the ownership trends in Figure 2. In the smallest decile, the percentage of stocks owned by institutions increased from 11.9 percent in 1980 to 68.2 percent in 2006. This increase far exceeds the corresponding increases for the largest four deciles.

C. Stale Prices

Stale prices have been the focus of several studies on profits from market timing of mutual funds (e.g., Chalmers, Edelen, and Kadlec (2001), Zitzewitz (2003)). A price is termed stale at the end of trading if that price is from a trade prior to the close. Since mutual funds allow

a trader to trade at its net asset price (NAV), a trader can profit if the NAV is based upon stale prices occurring prior to the close of trading. Liquidity, as measured by stale prices, is relevant to an investor who wants to trade at the closing price. The increased trade volume in recent years suggests a decrease in stale prices over time.

This section examines the incidence of stale prices through an update of the findings in Kadlec and Patterson (1999), who analyze NYSE and American Stock Exchange stocks for the years from 1988 through 1992. They find that almost all large-cap stocks trade within the last 15 minutes of the close, but find that a substantial number of small-cap stocks have last trades prior to the last 15 minutes. For the more recent period 1993 to 2006, the period for which we have TAQ data, we find even less evidence of stale prices for both large-cap and small-cap stocks.

For each stock in a cap-decile, we record for day *t* the time of its last trade on its primary market and calculate the number of minutes between that trade and the time of the market close. For most days the closing time was 4:00 pm Eastern Time, but on some days the market closed earlier.[15] To permit aggregation across days with different closing times we convert all early closing times to 4:00 pm. This simplifies the reporting of results with no loss of accuracy because our analysis focuses on the number of minutes between last trade and the close. We define a price as stale if it was based upon a transaction more than five minutes before the close. Thus, for each cap decile for each day *t*, we compute the market value of all the stocks that traded within five minutes of the close as a percentage of the market value of all stocks in that cap-decile on that day. We average these daily percentages over all days in each year from 1993 to 2006 and report the results in Figure 6A.

Figure 6A shows that there were virtually no stale prices for stocks in the largest four deciles from 1993 through 2006. There were a limited number of stale prices for stocks in the fifth through eighth deciles in mid-1990s, but after 1999, there were virtually no stale prices in these deciles. For the ninth and tenth deciles, there were substantial stale prices in 1993, but the number of stale prices declined rapidly over our sample period. By 2006, 99.5 percent of the stocks in the ninth decile traded within the last five minutes of close and 95.2 percent in the tenth decile traded within the last five minutes. Breaking down the tenth decile into the five subgroups

15 During our sample period the markets closed at 1:00 pm Eastern Time on the following days: Nov 26, 1993, Nov 25, 1994, Jul 3 1995, Nov 24,1995, Jul 5, 1996, Nov 29 ,1996, Dec 24, 1996, Jul 3, 1997, Nov 28, 1997, Dec 24, 1997, Dec 26, 1997, Nov 27, 1998, Dec 24, 1998, Nov 26, 1999, Dec 31, 1999, Jul 3, 2000, Nov 24, 2000, Jul 3, 2001, Nov 23, 2001, Dec 24, 2001, Jul 5, 2002, Nov 29, 2002, Dec 24, 2002, Jul 3, 2003, Nov 28, 2003, Dec 24, 2003, Dec 26, 2003 and Nov 26, 2004. In addition, the markets closed at 2:30 pm Eastern Time on Feb 11, 1994 and at 2:00 pm Eastern Time on Jan 8, 1996

described in section IIA shows that 99.0 percent or more of the stocks in the largest 80% of this decile traded in the last five minutes. Only the stocks in the bottom one percent of market value display a tendency for stale prices, with percentages of not trading during the last five minutes range from 76% to 50% at the end of 2006. Thus, by the end of 2006, there were virtually no stale prices for 98 percent of equities in terms of market value. In general, both our conjectures are supported by the trends in stale prices over our sample period.

IV. Return Predictability

Earlier studies found short-term predictability in stock returns, and some of these studies attribute a portion of this predictability to stale prices. In view of the recent increase in trade volume and institutional presence in the market – and the concurrent increase in turnover rates and decrease in stale prices, particularly for smaller stocks – we revisit the evidence on predictability.

One branch of the literature (Chalmers, Edelen, and Kadlec (2002), Goetzmann, Ivkovic, and Rouenhorst (2001), Greene and Hodges (2002), and Zitzewitz (2003)) documents short-term return predictability in mutual fund returns. These studies either estimated regressions of mutual fund returns on some set of prior returns, or analyzed returns conditional on some extreme prior returns. They attribute at least part of the observed predictability in returns to stale prices. A second branch (e.g., Lo and MacKinlay (1988, 1989, 1990) and Kadlec and Patterson (1999)) examines short-term predictability in stock returns directly, and concludes that stale prices are not the only source of predictability in stock returns.

We use our cap-decile portfolios from section II to analyze return predictability. To streamline the reporting of results, we again combine with value weights the largest four market cap deciles into one portfolio and deciles 5 through 8 into another portfolio, and keep the two smallest deciles as separate portfolios. To focus on the effect of stale prices, we calculate two daily returns for each of the four portfolios. The first return is measured irrespective of whether the stocks in the portfolio traded at the end of the day; i.e., returns are taken directly from the CRSP data. The second calculation includes only stocks whose returns are based on non-stale prices — specifically, prices in both the numerator and denominator are required to be from transactions that occurred within five minutes of the close.

A. Regressions using lagged S&P 500 Futures

For each cap-decile portfolio, we estimate in each year the following regression of daily returns on the lagged S&P 500 future price changes

$$R_{i,t} = a_0 + a_1 R_{SP500,t-1} + e_{i,t} , \qquad (1)$$

where $R_{i,t}$ is the daily return for cap-decile portfolio i for day t and $R_{SP500,t-1}$ is the S&P 500 futures price change over the interval from the close on day t–2 to 3:55 pm on day t–1. This convention follows the practice of some of the earlier work in that it gives an investor the opportunity to place an order to buy or sell an asset at the close of that day.

Table 5 reports estimate slope coefficients from (1) using returns taken directly from CRSP, irrespective of whether the stocks in the portfolio traded at the end of the day. Results are reported separately for each market cap group in each year for which we have TAQ data, 1993 to 2006. In the early years of the sample the results are roughly consistent with those of earlier studies: Prior to 1997 there is significant predictability for the portfolio containing the fifth through eighth deciles and for each of the two smallest deciles; and there is little predictability for the portfolio containing the four largest deciles. However, from 1997 on, there is little predictability in the second group, and after 2000 the coefficients across all the market cap groups are generally insignificant, although they do increase for the two smallest deciles in 2006.

We also estimated, but do not report, slope coefficients using only stocks whose daily returns have no stale prices. Comparing the coefficients estimated with no stale prices to those in Table 5, there is little difference in the estimated coefficients during the second half of the sample. This result is expected in view of the declining importance of stale prices in the later part of the sample (see Figure 6). However, the coefficients estimated with no stale prices for the two smallest deciles are often larger than those in Panel A that include stale prices, although not significantly larger. This is a surprising result, as one would expect the reverse under the usual understanding of the effect of stale prices on predictability.

B. Conditional Returns

Following earlier studies, we compute conditional returns based on the prior-trade-day S&P 500 futures price change being either greater than or equal to one percent or less than or

equal to negative one percent. We report the results in Figure 7 for all stocks whether they have stale prices or not.[16] As the magnitude of conditional returns might differ following a positive as opposed to a negative extreme value of the lagged S&P 500 futures, we report results separately for these two cases. Figure 7A reports returns conditional on an S&P return of one percent or more. The conditional returns for the group containing the fifth through eighth deciles and the two smallest groups are generally positive and range from slightly under 20 basis points to more than 60 basis points through 2000. However, in 2001 through 2004, the positively conditioned returns are smaller than in the other years, again suggesting some time variation in the predictability of stocks returns. Like the regression results, the conditional returns for the group with the largest four deciles are much smaller – often close to zero and sometimes negative – and indicate little predictability.

Figure 7B reports returns conditional on a lagged S&P return of negative one percent or more. To permit easier comparisons to the results in Figure 7A we multiply the negatively conditioned returns in 7B by minus one. The results in 7B are similar, except for sign, to the positively conditioned returns through 2000, except that the negatively conditioned returns are often larger than the positively conditioned returns, especially in 1992 and 1998. This result is consistent with xxx, who show that it is slightly more difficult to short stocks than to take long positions. Thereafter, the negatively conditioned returns tend to turn smaller, similar to the time variation for the positively conditioned returns, but with slight uptick in 2005 and 2006. Consistent with the regressions, there is little predictability in the group containing the largest four deciles; the strongest predictability occurs in the two smallest deciles. Thus, predictability appears to be confined to the smaller stocks and varies over time.

V. Institutional Holdings and Institutional Returns

There is a long literature linking trading to returns. For instance, Friedman (1953) argues that speculation stabilizes prices. In contrast, De Long, Shleifer, Summers, and Waldman (1990) suggest that feedback mechanisms may cause speculative trading to be destabilizing. There is an extensive literature showing that large (block) trades move prices. And Blume,

[16] As we did for the predictive regressions, we repeat the analysis of conditional returns using only stocks whose daily returns are calculated from non-stale prices – prices from transactions within five minutes of the close for the both the numerator and denominator. Similar to the regression results, the analysis using conditional returns computed using non-stale prices produced somewhat stronger results, although not significantly different. These results are available on request.

MacKinlay, and Terker (1989) examine the October 19, 1987 crash and find direct evidence of downward sloping demand curves.

The investment industry has for many years used investment flows to explain and predict returns (e.g., Laszlo Biryini Associates). In the academic literature, Gompers and Metrick (2001) conclude that institutional flows explain "part of the disappearance of the historical small-company stock premium." In view of the evidence in section II on changes in institutional holdings, in this section we examine the extent to which institutions earned significant excess returns on their investment portfolios from 1981 through 2006.

Do institutional stock holdings forecast equity returns? To answer this question, we follow Gompers and Metrick (2001) and aggregate institutional holdings at the end of each quarter during the period from December 1980 to September 2006 and compute the value-weighted returns for this aggregated portfolio over each subsequent quarter.[17] For comparison, we also compute the quarterly value-weighted market return over the same time period. We compute quarterly institutional excess returns by taking the difference between these two series.

We then use attribution analysis to decompose the institutional excess returns into excess returns earned from security selection (deviation from market weights on securities within market-cap deciles) and from asset allocation (deviating from market weights for market-cap deciles). Let lower case letters represent attributes of the aggregate of institutional portfolios and upper case letters attributes of the market portfolio. Decile weights are indicated by a lower or upper case *w,* and returns by a lower or upper case *r*. Variables with subscripts refer to attributes of the deciles, and variables without subscript to the market as whole. With these conventions the difference between the returns on the institutional portfolios over all stocks and the market portfolio, the total excess return, can stated in terms of the following identity:

$$r - R = \sum_k w_k \ (r_k - R_k) + \sum_k (w_k - W_k)\,(R_k - R)$$

The first term to the right of the equal sign can be interpreted as the total gain by institutions from security selection within a decile, and the second term as the total gain from over or under weighting specific deciles relative to market weights (i.e., asset allocation). We can also examine each term within the summation sign to view the gains for each decile.

[17] In our analysis here, we only use the WRDS/Thomson institutional holdings data where the actual date of the holdings (rdate in the Thomson file) is the same as the date the holdings are added into the Thomson data base (fdate). Fdate will be equal to or greater than rdate in the Thomson data. Requiring rdate to equal fdate avoids any possible errors in prices and shares due to incorrect adjustments for splits in the intervening period.

Figure 8A plots the total excess return ($r - R$) by quarter from 1981 through 2006. There is substantial variability in the first part of the sample gradually decreasing over time, except for the fourth quarter of 1999 and the 4 quarters of 2000 (more on these five quarters in a moment). This decrease should be expected as the proportion of the market owned by institutions has gradually increased over time. In the limit when institutions own all stocks and non-institutions own nothing, the institutional return will track perfectly the market return. During the five quarters in 1999-2000 mentioned above, a WRDS programming problem that incorrectly adjusts for stocks splits (resulting in overstatement of shares held for stocks that split) was exacerbated by the dramatic growth in tech stock prices during this period, a class of stocks that experienced numerous splits at that time. Thus, institutional portfolios that were tilted toward these stocks showed artificially inflated performance during this period if the WRDS/Thomson holdings are used to construct the institutional portfolios.[18] In the analysis below we report performance results both with and without these five quarters.

Figure 8B breaks out the total excess return into that due to security selection within the market-cap decile and that due to the over- and under-weighting of deciles. The mean and variance of excess returns due to security selection is greater than the excess return due to over- and under-weighting deciles. Again once again there is drop off in volatility over time, except for the five quarters in 1999 and 2000.

In Table 6 we summarize institutional performance by reporting mean quarterly excess returns and associated t-values for several time periods. From 1981 through 1998, the mean total excess return is 10.4 basis points with most of this excess return coming from security selection. Both the total excess return and the return from security selection are significant. The 1999-2000 excess returns are extreme for reasons noted above. From 2001 through 2006, the total excess returns are negative with substantial negative returns from security selection offset by decile weighting. From 1981 through 2006 (excluding 1999-2000), the mean total excess return is 6.1 basis points with three quarters (4.6 basis points) of this return due to security selection, but neither of these are significant at usual levels. Thus, 1999 and 2000 aside, institutional performance over the period 1981-2006 is marked by substantial variation with any positive value added from security selection in the 1981-1998 period offset by a negative contribution

[18] Numerous academic studies use the Thomson/CDA holdings data distributed by WRDS when analyzing the performance of institutional portfolios. Two recent examples that use these holdings to predict institutional returns over sample periods including 1999 and 2000 are Cohen, Coval and Pastor (2005) and Wermers, Yao and Zhao (2006).

from security selection in the 2001-2006 period. The positive contribution from asset allocation across deciles that we observe in the 2001-2006 period likely reflects the overweighting of smaller-cap stocks and underweighting of larger-cap stocks by institutions over this time period relative to market weights (see figure 2), a period when small-cap stocks significantly outperformed large-cap stocks.

VI. Conclusion

In this paper we examine changes in institutional stock ownership over the period 1980 to 2006, and explore implications of these changes for the liquidity of the market, the behavior of stock prices, and institutional investment performance. We provide several new results. First, institutions have increased their stock market holdings at a rapid pace in recent years and at the end of 2006 owned 67 percent of the value of all stocks. In contrast to previous research, we show that institutions have increased their holdings of small stocks and decreased their holdings of large stocks over our sample period, and now overweight medium and small stocks and underweight large stocks relative to market weights. Second, we look at three measures of liquidity – bid-ask spreads, turnover rates, and stale prices – and find that the trend of increasing liquidity in the stock market generally, and in smaller cap stocks in particular, over the past two decades mirrors the increase in institutional ownership of common stocks. Third, we find that daily predictability in stock returns appears to be confined to the smallest stocks, which continue to display some stale prices at the end of our sample period. However, we find significant variation in predictability over our sample period that is unrelated to the observed trend of increasing market liquidity and fewer stale prices. Lastly, using performance attribution analysis, we find that any excess returns of institutional investors in the past two decades are primarily due to security selection within market cap deciles, not to allocation across deciles. However, neither the mean total excess return of 6.1 basis points, nor the 4.6 basis points of this return due to security selection, is significant at usual levels.

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Table 1

Percentage Distribution of Stock Ownership by Market Cap Deciles: All Stocks, Institutions, and Mutual Funds

Year End 1980 and 2006

The table presents the percentage distribution of stocks by market cap-deciles, where the largest decile contains the largest stocks whose total market value equal to or less than 10 percent of the total market value of all stocks. The second decile contains the next largest stocks whose total market value combined with the stocks in the largest cap-decile is less than 20 percent of the total market value of all stocks. Also contained are the total numbers of stocks in each cap-decile and the corresponding cumulative number. Total values in rightmost column are in billions of dollars.

	Market Cap Decile										Total for
	Largest	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**Smallest**	**All Stocks**
A. 1980											
All Stocks	9.74	10.25	9.92	9.91	10.10	10.07	9.96	10.04	10.01	10.01	$1,376
All Institutions	9.99	11.02	13.51	12.07	10.99	11.67	10.47	9.69	7.12	3.47	$473
All Mutual Funds	5.26	6.72	9.40	9.34	11.06	12.50	12.49	13.47	12.67	7.09	$45
Memo: All Stocks											
Number	4	9	20	35	59	87	133	230	514	3,753	4,844
Cumulative	4	13	33	68	127	214	347	577	1,091	4,844	
B. 2006											
All Stocks	9.77	9.77	10.13	10.10	10.16	9.99	10.04	10.01	10.02	10.00	$18,841
All Institutions	8.38	8.63	8.72	10.35	9.54	10.53	10.95	11.43	11.26	10.20	$12,594
All Mutual Funds	7.02	8.71	8.28	10.76	9.83	10.83	11.14	12.08	11.83	9.52	$3,680
Memo: All Stocks											
Number	6	11	19	31	52	81	124	240	584	4,186	5,334
Cumulative	6	17	36	67	119	200	324	564	1,148	5,334	

Table 2
Percentage Distributions of Stock Ownership by Deciles: All Stocks, Institutions, and Mutual Funds
Yearend 1980 and 2006

The data in this table are derived from the dollar distribution of holdings underlying the percentage distribution reported in Table 1. The first panel reports the percent over or under weighted and is the ratio of the percentage holding of all institutions or all mutual funds to all stocks less one, and expressed as a percent. The second panel is the ratio of the value of the stocks held by all institutions or all mutual funds to total value of all stocks in that cap-decile and expressed a percent.

	Decile										
	Largest	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**Smallest**	**Total**
					A. Percent Over and Underweight						
1980											
All Institutions	2.7	7.4	36.2	21.9	8.8	15.9	5.1	-3.5	-28.9	-65.3	
All Mutual Funds	-45.9	-34.5	-5.2	-5.7	9.5	24.1	25.4	34.1	26.6	-29.2	
2006											
All Institutions	-14.3	-11.7	-13.9	2.5	-6.1	5.4	9.1	14.1	12.4	2.0	
All Mutual Funds	-28.2	-10.8	-18.2	6.5	-3.2	8.4	10.9	20.7	18.0	-4.9	
					B. Percentage Ownership						
1980											
All Institutions	35.3	37.0	46.9	41.9	37.4	39.9	36.2	33.2	24.5	11.9	34.4
All Mutual Funds	1.8	2.2	3.1	3.1	3.6	4.1	4.1	4.4	4.2	2.3	3.3
2006											
All Institutions	57.3	59.0	57.5	68.5	62.8	70.5	72.9	76.3	75.1	68.2	66.8
All Mutual Funds	14.0	17.4	16.0	20.8	18.9	21.2	21.7	23.6	23.0	18.6	19.5

Table 3
Percentage Distributions of Stock Ownership in the Smallest Market Cap Decile
All Stocks, Institutions, and Mutual Funds (Year End 1980 and 2006)

The table reports the stock holdings in the smallest decile of stocks in Table 1. We divide the stocks in the smallest decile into five successively smaller slices, as measured by the aggregated value of the stocks within that slice. The first panel is the percent over or under weighted and is the ratio of the percentage holding of all institutions or all mutual funds to all stocks in that sub-decile, less one and expressed as a percent. The second panel is the ratio of the value of the stocks held by all institutions or all mutual funds to total value of all stocks in that sub-decile and expressed a percent. The third panel reports the number of stocks that reside within the sub-deciles as a percent of the total number of stocks in the market at the stated year end.

	Ninth Decile (Smallest 10% of Market Value)					
	Largest 8%	**Next 1%**	**Next 0.5%**	**Next 0.25%**	**Smallest 0.25%**	**Entire Decile**
			A. Percent Over and Underweight			
1980						
All Institutions	17.1	-62.5	-68.1	-79.9	-82.2	
All Mutual Funds	18.8	-66.7	-74.7	-92.5	-93.3	
2006						
All Institutions	8.5	-18.6	-37.7	-54.4	-69.2	
All Mutual Funds	12.2	-34.0	-52.6	-68.3	-81.5	
			B. Percentage Ownership			
1980						
All Institutions	14.0	4.5	3.8	2.4	2.1	11.9
All Mutual Funds	2.8	0.8	0.6	0.2	0.2	2.3
2006						
All Institutions	74.0	55.5	42.5	31.1	21.0	68.2
All Mutual Funds	20.9	12.3	8.8	5.9	3.4	18.6
			C. Stocks in Sub-Decile as a Percent of Total Stocks in Market			
1980	30.2	11.7	9.8	7.6	18.1	77.5
2006	29.2	11.1	9.7	7.9	20.6	78.5

Table 4

Percentage Distribution of Stock Ownership by Cap Deciles
All Stocks, Institutions, and Diversified Equity Mutual Funds; Grouped by Morningstar Equity Style Categories
Year End 2006

We first assign each stock to a market-cap decile, where the largest decile contains the largest stocks whose total market value is equal to or less than ten percent of the total market value of all stocks. The second decile contains the next largest stocks whose total market value combined with the stocks in the largest decile is less than twenty percent of the total market value of all stocks, and so on. Based upon these assignments, the market value of the stocks held in the S&P 500, index mutual funds, and other mutual funds identified by Morningstar equity style are then summed by decile and expressed as a percent of the total market value of the stocks held (Panel A.). Index mutual funds are funds with a beta with respect to the S&P 500 between 0.985 and 1.015. Panel B presents the percentage over- and under-weight relatives to the total market. "All Stocks" is from Table 1.

	Market Cap Decile										Total
	Largest	**2nd**	**3rd**	**4th**	**5th**	**6th**	**7th**	**8th**	**9th**	**Smallest**	**($ mill)**
					A. Percentage Distribution						
All Stocks	9.8	9.8	10.1	10.1	10.2	10.0	10.0	10.0	10.0	10.0	18,841
S&P 500	14.1	13.2	13.0	12.7	11.2	12.2	11.7	9.2	2.4	0.1	13,027
Index Funds	14.6	13.1	13.1	13.4	10.9	12.1	11.5	8.5	2.6	0.1	290
Large Value	11.7	13.1	12.7	12.3	14.5	10.7	9.9	9.3	4.8	1.0	573
Large Blend	10.9	12.6	11.9	13.1	10.9	12.7	10.3	9.2	6.0	2.4	588
Large Growth	6.0	7.2	12.4	14.6	11.5	15.0	11.8	12.5	6.6	2.3	818
Mid Value	0.1	0.5	1.2	0.5	1.2	3.3	11.9	25.5	36.9	19.0	94
Mid Blend	0.3	0.4	1.1	1.5	2.5	4.0	10.9	24.7	37.1	17.6	142
Mid Growth	0.1	0.4	0.4	1.0	1.2	3.6	9.8	26.0	35.5	22.0	227
Small Value	0.0	0.0	0.0	0.0	0.0	0.2	1.4	28.0	70.4		47
Small Blend	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1.9	25.9	71.7	96
Small Growth	0.0	0.0	0.0	0.0	0.1	0.3	1.6	25.3	72.8		91
					B. Percent Over and Underweight						
S&P 500	44.6	34.7	28.8	26.3	10.5	22.6	16.6	-7.6	-75.6	-99.5	
Index Funds	49.4	34.5	29.7	33.1	7.4	21.3	14.6	-15.6	-73.9	-99.3	
Large Value	19.3	34.3	25.3	21.7	42.6	7.5	-1.6	-7.2	-52.1	-89.7	
Large Blend	11.4	28.7	17.9	29.7	7.8	27.1	2.4	-8.5	-40.2	-75.9	
Large Growth	-38.4	-26.0	22.6	44.4	12.8	50.2	18.0	24.9	-34.0	-77.0	
Mid Value	-99.4	-94.8	-88.1	-95.0	-88.1	-67.1	18.4	154.2	268.1	89.7	
Mid Blend	-97.4	-96.2	-89.4	-85.6	-75.1	-60.1	9.0	146.3	270.1	76.2	
Mid Growth	-99.2	-96.4	-96.2	-89.8	-88.1	-64.4	-2.3	160.0	254.6	120.0	
Small Value	-99.9	-99.8	-100.0	-100.0	-99.7	-98.3	-86.5	179.7	602.4		
Small Blend	-100.0	-99.7	-99.8	-99.6	-99.6	-98.9	-98.1	-80.6	158.5	616.9	
Small Growth	-100.0	-100.0	-100.0	-100.0	-98.9	-97.3	-84.1	152.4	625.9		

Table 5

Time Variation in Stock Return Predictability

Estimated slope coefficients from the following model estimated separately in each of the 14 annual periods:

$$R_{i,t} = a_0 + a_2 R(SP\ fut)_{t-1} + e_{i,t}$$

where $R_{i,t}$ is the return on cap-decile group i for day t and $R(SP\ fut)_{t-1}$ is the S&P 500 futures price change over the specified interval on day t -1. Values in **bold** indicate significance at the .05 level. Significance levels are computed with heteroskedasticity-consistent standard errors.

	Market Capitalization Decile Groups			
year	**Largest 4**	**5 to 8**	**9**	**Smallest**
1993	-0.054	**0.152**	**0.303**	**0.304**
1994	-0.058	**0.146**	**0.293**	**0.267**
1995	-0.018	0.133	**0.241**	**0.242**
1996	0.081	**0.168**	**0.210**	**0.229**
1997	-0.053	0.077	**0.162**	**0.164**
1998	-0.056	0.098	0.226	**0.243**
1999	-0.030	0.009	0.103	**0.163**
2000	0.037	0.163	0.265	**0.255**
2001	0.009	0.030	0.116	0.144
2002	-0.019	0.027	0.078	0.031
2003	**-0.186**	-0.090	0.026	0.070
2004	-0.109	-0.058	0.027	-0.056
2005	-0.138	-0.035	0.054	-0.004
2006	-0.056	0.086	**0.183**	0.162

Table 6

Comparison of Institutional Returns to Benchmark Returns

We use attribution analysis to decompose institutional investment performance into excess returns earned from security selection (deviating from market weights on securities within market-cap deciles) and from asset allocation (deviating from market weights for market-cap deciles). The table reports means and t-values (in italics) of the quarterly total excess returns (in basis points) and the decomposition into security selection and asset allocation for several time periods.

	Excess Returns (basis points)		
	Security Selection	Asset Allocation	Total
1981-1998	10.09	0.33	10.41
	2.37	*0.12*	*2.29*
1999-2000	68.99	4.07	73.06
	4.56	*0.45*	*4.71*
2001-2006	-11.85	5.14	-6.71
	-3.30	*1.95*	*-1.56*
1981-2006	7.50	3.07	10.57
	1.64	*1.26*	*2.17*
1981-2006 (exc 1999-2000)	4.60	1.53	6.13
	1.14	*0.59*	*1.44*

Figure 1
Institutional Ownership of Common Stock, 1900-2006

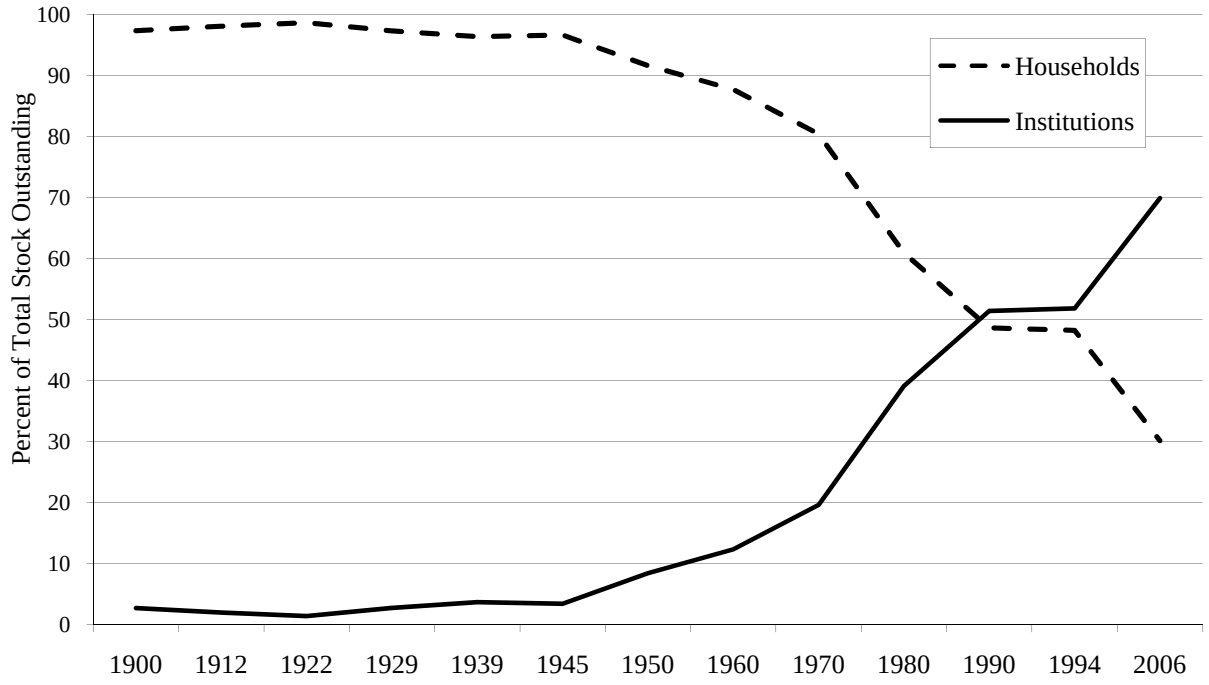


Figure 2
Time Series of Under & Overweight by Groups of Deciles 1980-2006

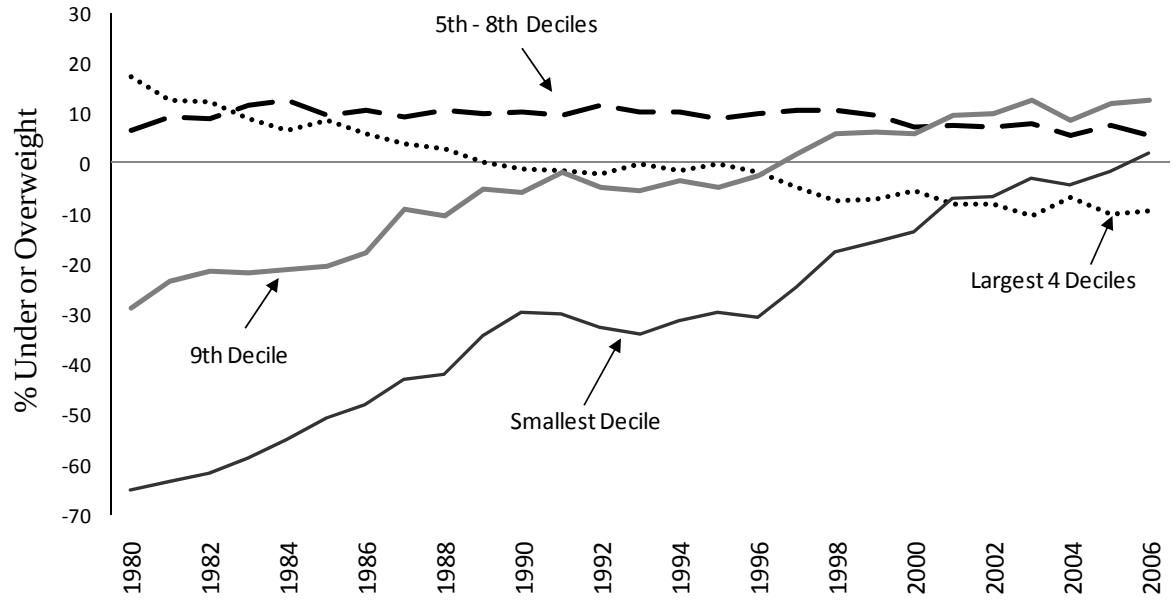


Figure 3A. Predicted and Actual Institutional Ownership of Securities by Market Value Deciles 1980

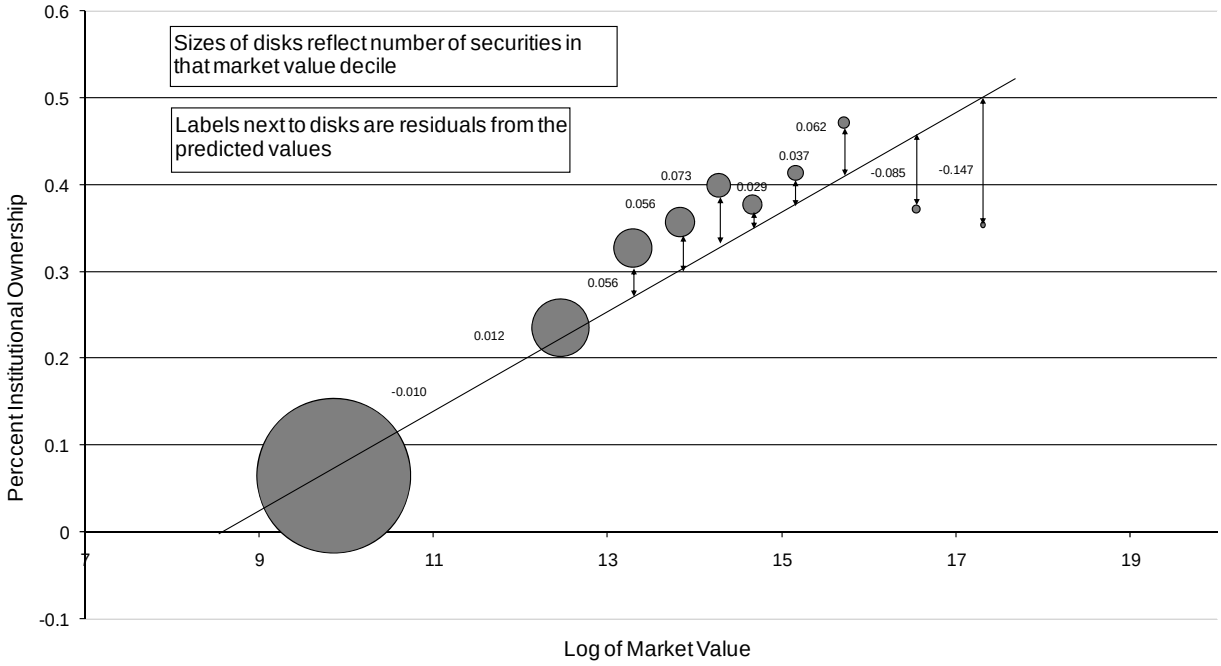


Figure 3B. Predicted and Actual Institutional Ownership of Securities by Market Value Deciles 2006

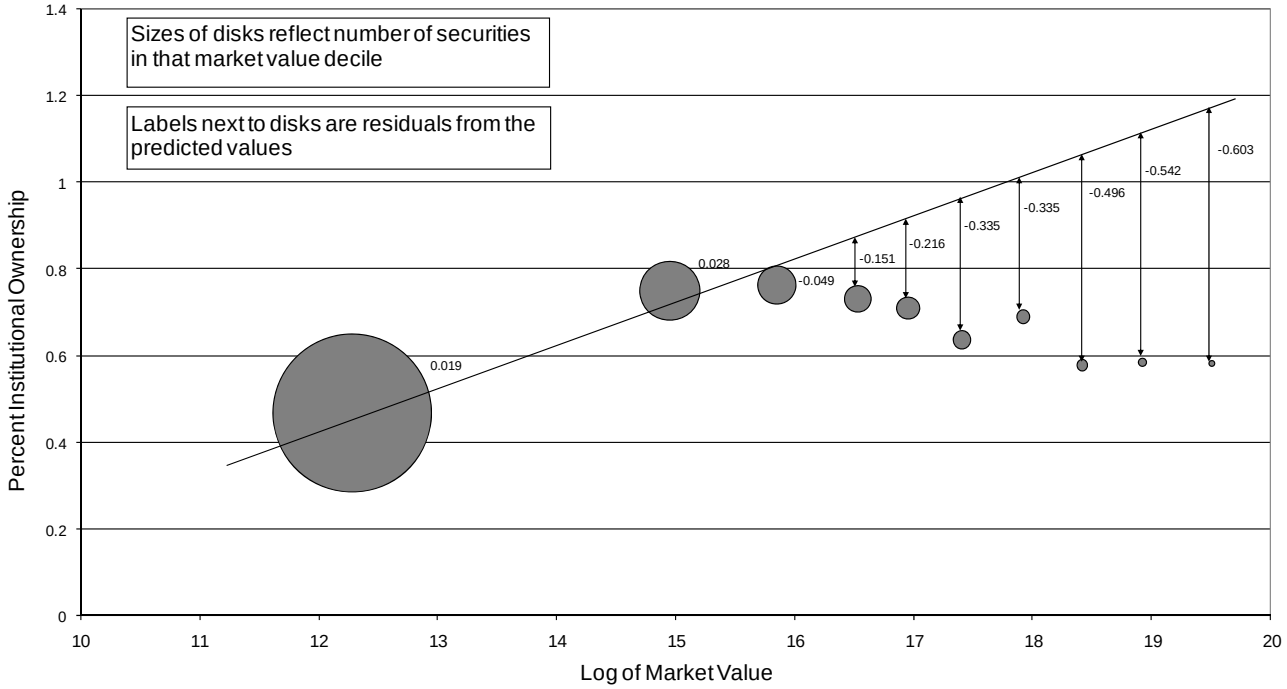


Figure 4
Median Bid-Ask Spreads (%) for Mkt-Cap Quintiles with equal # of Stocks
(Quintile cutoffs based on all NYSE, AMEX and Nasdaq Stocks)

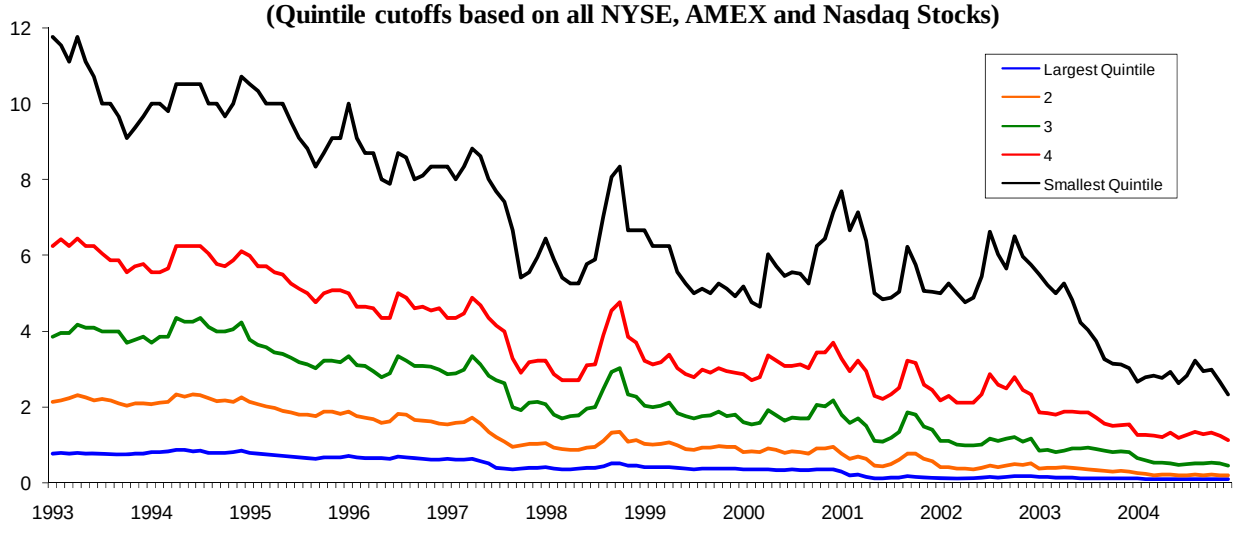


Figure 5
Turnover - Annual Ratio of (Shares Traded / Total Outstanding, in %
Grouped Market-Cap Deciles

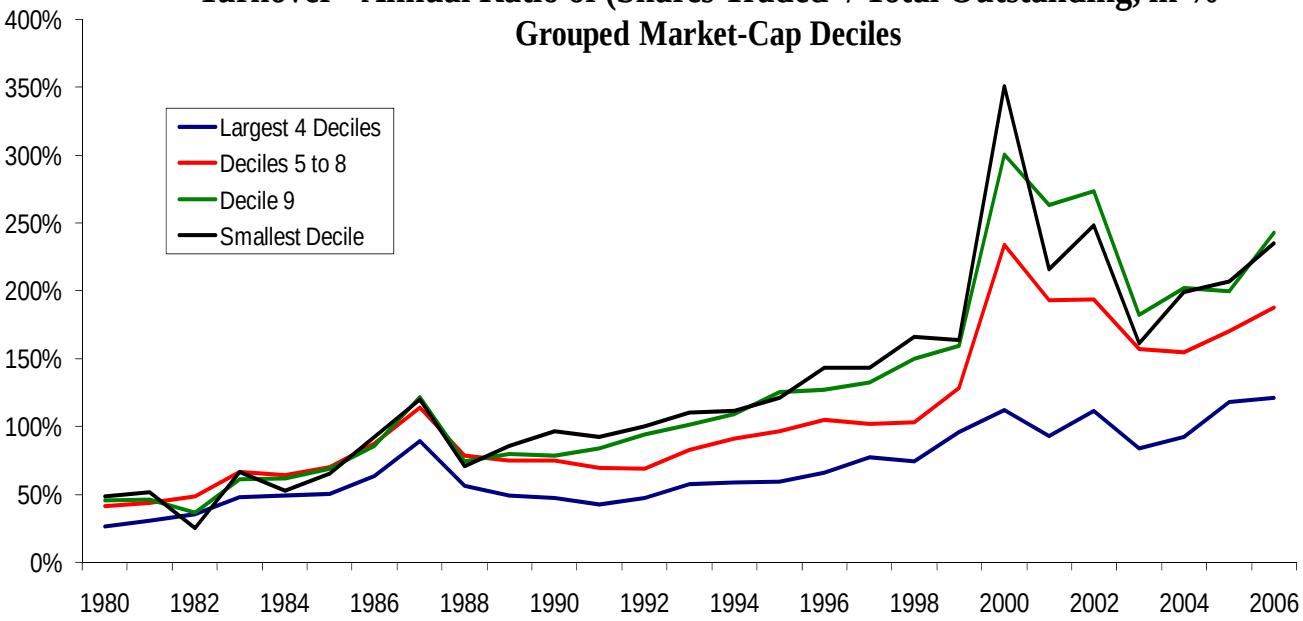
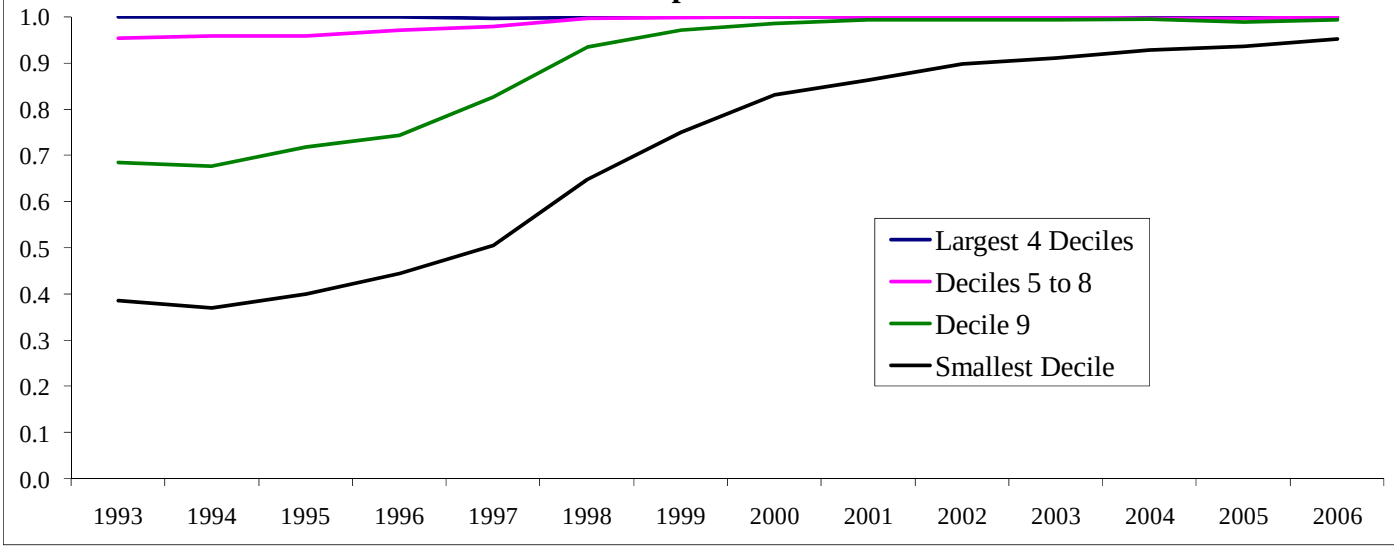


Figure 6
Percentage of Stocks that Traded Within the Last Five minutes of the Trade Day
A. Grouped Deciles



B. Sub-Groups of the Smallest Decile

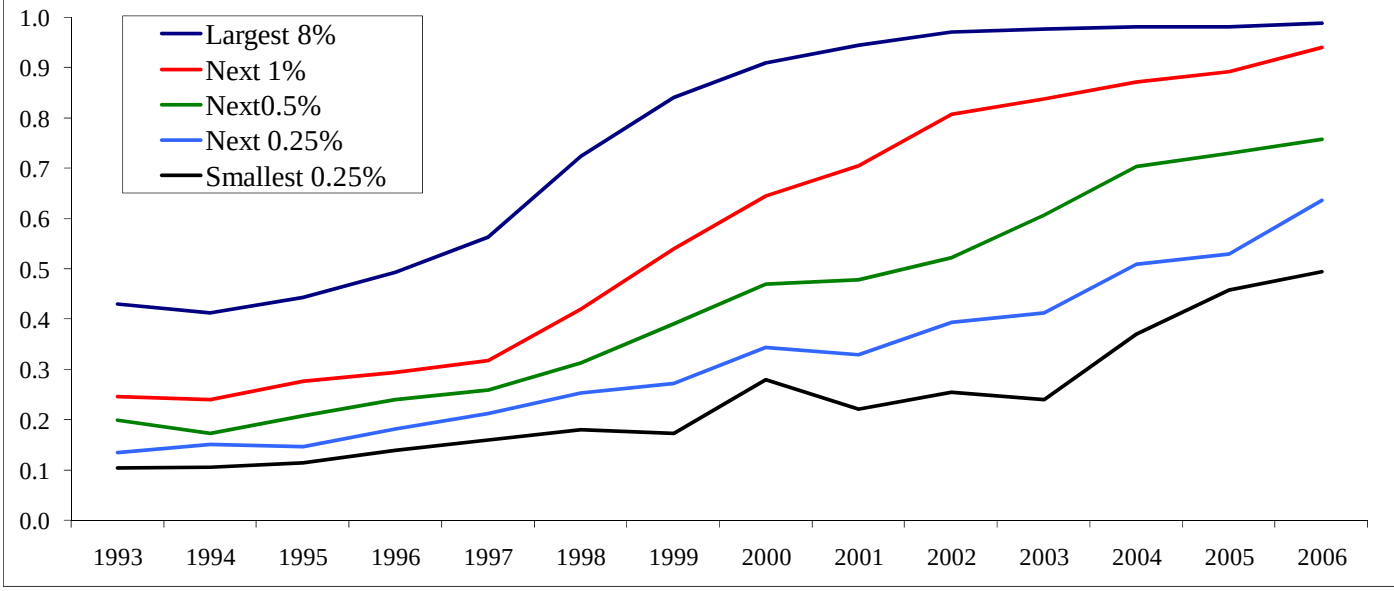
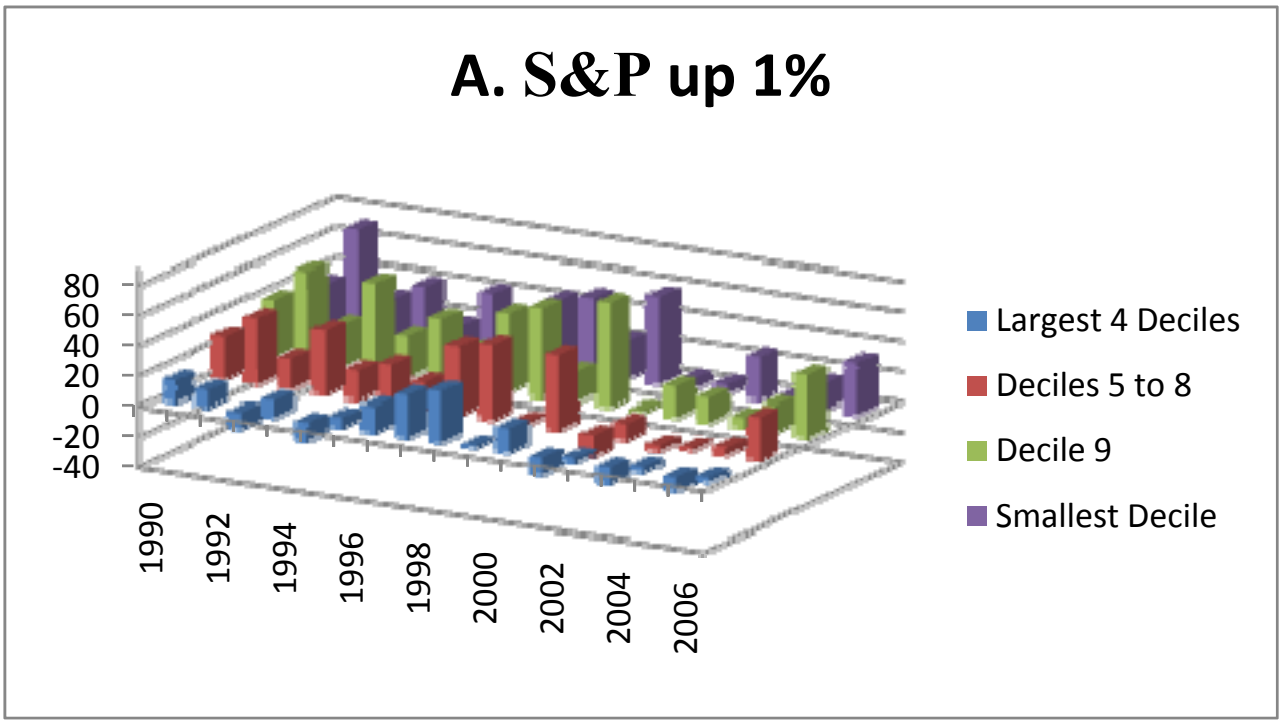


Figure 7. Daily Returns (basis points) conditional on prior-day return on S&P 500



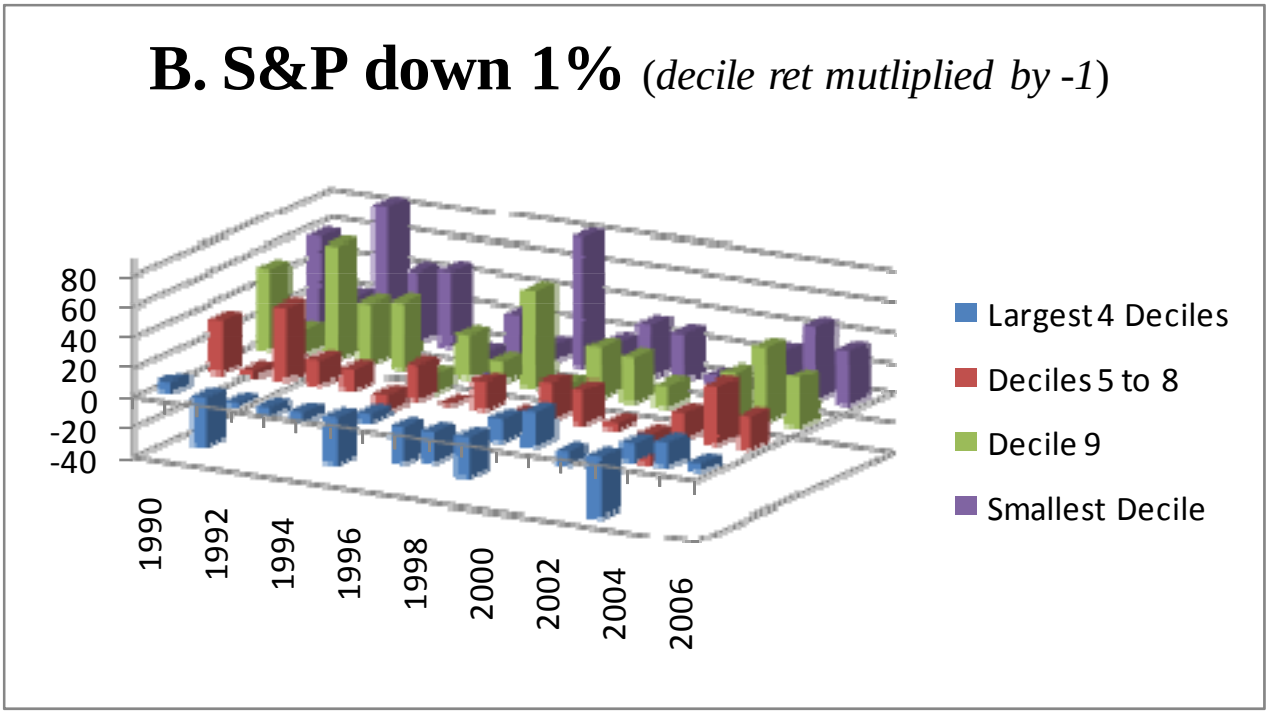


Figure 8A

Total Excess Return by Quarter (basis points)

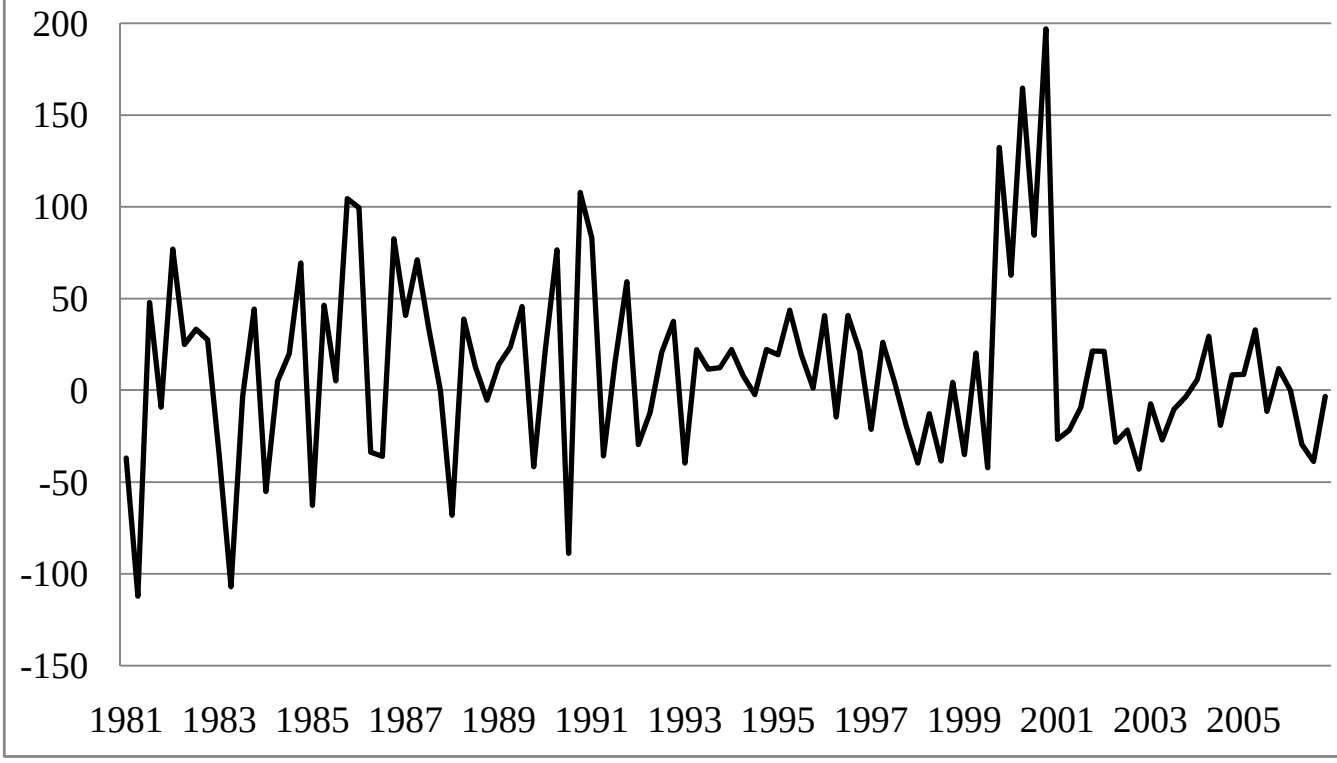


Figure 8B

Security Selection and Decide Allocation (basis points)