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Institutional Investors and Equity Prices

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Institutional Investors and Equity Prices

Paul A. Gompers and Andrew Metrick*

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This paper analyzes institutional investors' demand for stock characteristics and the implications that this demand has for stock-market prices and returns. We find that "large" institutional investors -- a category including all managers with greater than $100 million under discretionary control -- have nearly doubled their share of the common-stock market from 1980 to 1996, with most of this increase driven by the growth in holdings of the largest one-hundred institutions. We find that the level of institutional ownership in a stock can help to forecast its future return, and we provide evidence that this predictive power is due to demand shocks resulting from the compositional shift in ownership towards institutions. Overall, this compositional shift tends to increase demand for the stock of large corporations and decrease the demand for the stock of small corporations. With unit-elastic demand for both types of stock, the compositional shift can, by itself, account for a nearly 50 percent increase in the price of large-company stock relative to small-company stock. This price appreciation translates into an extra return of 2.3 percent over the sample period, and can explain part of the disappearance of the historical small-company stock premium. These results also show how co-movement in stock prices can be driven by a mechanism that has nothing to do with risk or expected cash flows.

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1. Introduction

From 1926 to 1979, investors in small companies enjoyed a distinct return advantage over investors in large companies. Using standard classifications for these categories, the small-stock premium was four percent per year over this time. This premium, first pointed out by Banz (1981) and subsequently analyzed in many academic studies, has reversed in the subsequent 20 years, with large stocks earning a significant premium over small stocks since 1980. What has caused this reversal? Do these causes have other implications for asset pricing?

In this paper, we study the changing pattern of U.S. equity ownership and analyze its role in explaining the disappearance of the small-stock premium. "Large" institutional investors -- a category including all managers with at least $100 million under management -- nearly doubled their share of the common stock market from 1980 to 1996. By December 1996, these large institutions held discretionary control over more than half of the U.S. equity market. Furthermore, even within this group of large institutions, ownership became more highly concentrated: the one-hundred largest institutions increased their share of the market from 19.0 percent in 1980 to 37.1 percent in 1996.

Do these large institutions invest in the same stocks as everyone else? The evidence shows that institutions have different demand for stock characteristics than do other investors: institutions invest in stocks that are larger, more liquid, and have had relatively low returns during the previous year. Moreover, these demands are stable over the sample period. Given this stable demand for stock characteristics, a shift of investment discretion from individuals to institutions implies changes in the demand of the "representative" investor. For example, an increase in the institutional share of the market will result in greater demand for large, liquid stocks. If supply and demand curves for stocks are not perfectly elastic, then this demand shift will affect stock market prices and returns. In particular, we would expect the price of large stocks to rise relative to small stocks, with a contemporaneous increase in the return of large stocks relative to small stocks. In support of the impact of demand changes on prices, we present regression evidence showing that the level of institutional ownership forecasts returns, with this forecasting power strongest when institutional inflows are highest. Calibrations using unit-elastic demand for stock suggest that ownership-composition changes can account for the entire return advantage earned by large stocks over small stocks since 1980.

The growth in institutional ownership began well before our sample period and has not gone unnoticed by academics. Friedman (1996) analyzes federal flow-of-funds data to show that aggregate institutional ownership increased from less than 10 percent in 1950 to over 50 percent in 1994 and uses this fact to discuss implications for capital formation, stock market volatility, and corporate governance. Two recent papers analyze the cross-sectional properties of institutional investment. Del Guercio (1996) examines the holdings of mutual funds and banks in 1988 and finds that banks tilt their portfolios more heavily towards "prudent" stocks. She also finds that overall institutional preferences for prudence characteristics were relatively stable from 1988 to 1991. Falkenstein (1996) analyzes two years of mutual funds' holdings of NYSE stocks and finds preferences for stocks with high liquidity, information flow, and volatility. Our paper extends these latter two studies by analyzing a 17-year panel over all stocks and for all types of managers. These extensions allow us to analyze the interaction of the cross-sectional demand with the pronounced time-series patterns; it is this interaction that yields the testable implications for prices and returns.

Our paper joins a growing literature that demonstrates the importance of demand shocks on asset prices and returns. In the traditional finance paradigm, demand shocks are absorbed by arbitrageurs, who can use sophisticated trading strategies to ensure that assets remain at their "correct" price. Theoretical work by DeLong, Shleifer, Summers, and Waldmann (1990) and Shleifer and Vishny (1997) show how perfect arbitrage can break down, and empirical studies of the price effects of S&P 500 listings (Shleifer (1986), Harris and Gurel (1986), Beneish and Whaley (1996), Lynch and Mendenhall (1997), Wurgler and Zhuravskaya (1999)) provide compelling evidence of the importance of such breakdowns for the prices of individual stocks. The role of demand shocks in explaining large-scale price movements across broad asset classes is studied by Warther (1995), Zheng (1997), Bakshi and Chen (1994), Poterba (1998), and Goetzmann and Massa (1999). These studies rely on time-series variation in investment flows or demographic variables in order to identify demand changes. Our analysis provides a unique opportunity to combine time-series changes (in the institutional share of the market) with cross-sectional variation (in institutional demand for different stocks) in order to identify price effects.

The rest of the paper is organized as follows. Section 2 summarizes the data, documents the time-series composition of the sample, and examines the determinants of institutional ownership at the firm level. We find a steadily growing share of the market controlled by institutions, with the representative institution having stable preferences for large, liquid stocks. Together, these facts imply that, over time, the demand of the representative investor has shifted towards that of the representative institution. Section 3 explores the implications of this shift for stock prices and returns. Regression results show that the level of institutional ownership forecasts stock returns, with suggestive evidence that this forecasting power is due to demand shifts. We then estimate the total magnitude of this demand shift over our sample period and calculate that it can account for nearly 50 percent relative price appreciation for large stocks over small stocks. This price appreciation is sufficient to explain the entire return advantage of large stocks over the sample period. Section 4 concludes the paper with a summary of our results and discussion of their implications for asset-pricing models.

2. The Stock Holdings of Large Institutions

A. Data

A 1978 amendment to the Securities and Exchange Act of 1934 required all institutions with greater than $100 million of securities under discretionary management to report their holdings to the SEC. Holdings are reported quarterly on the SEC's form 13F; all common-stock positions greater than 10,000 shares or $200,000 must be disclosed.[1] These reports are available in electronic form back to 1980 from CDA/Spectrum, a firm hired by the SEC to process the 13F filings. Our data include the quarterly reports from the first quarter of 1980 through the fourth quarter of 1996. Throughout this paper, we use "institution", "large institution", and "manager" as synonyms for "an institution that files a 13F". We restrict our study to common stocks found in the Center for Research in Security Prices (CRSP) monthly files; this includes all stocks listed on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and National Association of Security Dealers Automated Quotations (NASDAQ) National Market System.

On the 13F, each manager must report all securities over which they exercise sole or shared investment discretion.[2] In cases where investment discretion is shared by more than one

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[1] Other types of security holdings – convertible bonds, stock options, preferred stock – are also required to be disclosed and count towards the $100 million limit, but only common stocks are included in our study.

[2] United States Securities and Exchange Commission (1988).

institution, care is taken to prevent double counting. Spectrum officials have told us that they believe that duplication is rare. Once an institution enters the 13F sample, it is assigned a manager type by Spectrum. The five types are (1) bank, (2) insurance company, (3) investment company (mutual fund), (4) investment advisor, and (5) other. The first three categories are self-explanatory; the investment advisor category includes most of the large brokerage firms; the "other" category includes pension funds and university endowments. These categorizations are not always precise; for example, brokerage firms with mutual fund subsidiaries will fall into category (3) if the mutual funds are deemed by Spectrum to make up more than 50 percent of the total 13F assets for that manager and into category (4) otherwise. Spectrum does not provide information to allow more precise partitioning of the data. It is also possible for a manager to be reclassified over time if Spectrum determines that the institution's main business has changed.

Table 1 shows the number of institutions reporting their equity holdings during the final quarter of each year from 1980 through 1996 and breaks down the reporting number of institutions by manager type. In 1980, the largest fraction of qualifying institutions was banks (41.1%), followed by investment advisors (23.2%). Over the subsequent 16 years, the number of banks reporting equity holdings declined in absolute terms, losing 44 reporting institutions. At the same time, the number of investment advisors increased almost seven-fold: 900 investment advisors reported their equity holdings in 13Fs in 1996 and represented 69.1% of 13F institutions. Mutual funds represent only a small fraction of the institutions over the entire time period, with only 9.0% of the sample in 1980 and 6.9% of the sample in 1996. The total number of 13F institutions increases from 525 to 1,303 over the time period.

Table 2 summarizes the dollar amount of institutional holdings for each of the five manager types over the sample period. This provides a different perspective from Table 1, since the average holdings per institution vary significantly across manager types. In the early part of the sample, banks represent the largest fraction of institutional holdings: 46.1% in 1980. Over time, however, banks, insurance companies, pension funds and endowments control decreasing fractions of total institutional holdings. During the same time, there is rapid growth for mutual funds and investment advisors: mutual fund and investment advisor holdings grow 3300 percent and 1800 percent, respectively, and both garner increasing fractions of the total institutional pie. Finally, the holdings in the "other" category are relatively small – only $260 billion in 1996 – this is because many pension funds and university endowments yield investment discretion to other managers.

For all institutions, holdings grew from $253 billion in March 1980 (not shown in Table 2) to $3.98 trillion in December 1996. To put these holdings in perspective, 13F institutions controlled 26.8% of the market value of all publicly traded stocks in March 1980. In December 1996, the fraction was 51.6%, nearly double the level from the beginning of the sample.

Some of this growth is due to institutions that became 13F filers only because a rising market pushed their portfolio across the nominal threshold level of $100 million. Because the value of the equity market increased substantially over the sample period, more institutions could be required to file without any "real" change in institutional holdings. To correct for this, we adjust the $100 million cutoff using an index of total stock market value, where this index includes all the stocks in CRSP that are used in our study. Using this index, our revised cutoff rises from $100 million in March 1980 to $818.6 million in December 1996. While this indexation would reduce the number of qualifiying insititutions to 441 in December 1996, it would have little effect on the amount of equity controlled by institutions. Only $240 billion out of $3.98 trillion is due to the institutions eliminated by the revised cutoff; with the remaining 441 institutions exercising discretionary control over almost half of the U.S. equity market.[3]

As a further demonstration of the concentrating growth in the largest managers, Figure 1 plots the fraction of the total market held by the largest manager, the ten largest managers, the one-hundred largest managers, and the whole 13F sample. Figure 1 shows that most of the growth in institutional ownership was driven by increases in the holdings of the largest managers. In March of 1980, the ten largest institutions exercised discretionary control over 5.0 percent of the common-stock market; in December 1996 this fraction was 14.6 percent. In March 1980, the one-hundred largest institutions controlled 19.0 percent of the market; in December 1996, this fraction was 37.1 percent. This is well above the percentage controlled by *all* qualifying institutions in 1980.

B. Why might institutions differ from other investors?

Financial assets can be thought of as composite commodities. Their main attribute is the ownership rights over an uncertain stream of future cash flows. Most asset-pricing applications focus on this attribute and compute asset prices using some weighting of these cash flows. There are, however, other attributes of financial assets that influence investor demand. For example, most investors would prefer liquid assets over illiquid ones and would be willing to give up some amount of expected future cash flows to buy more liquidity.

Are institutions different from other investors in their demand for asset characteristics? In this section, we answer this question through a firm-level analysis of institutional holdings. For

[3] We have omitted the table with the results for the revised cutoff; it is available in Gompers and Metrick (1998).

simplicity, we refer to all other investors as “individuals”, even though this group also includes investment partnerships and small institutions. Thus, the fraction of a firm held by institutions and the fraction held by individuals must sum to one. If the demand of individuals and institutions for stock characteristics were identical, then the fraction of institutional shareholdings would be identical across all stocks.

There are reasons, however, to expect institutions’ demand for to be different from that of individuals. To some degree, all insititutions except those in the “other” category will often be acting as agents for other investors. This agency relationship is standard for investment advisors and mutual funds, but also occurs for banks through their trust departments and for insurance companies through consumer products such as variable annuities. Once individuals have ceded investment discretion to an institution, however, they can only imperfectly monitor the choices of that institution, and institutional incentives may often differ from those of their clients. In addition, individuals do not always exercise complete and costless discretion over the choice of an investment agent: retirement plans often have limited investment options, trustees are difficult to replace, and other advisory changes often require portfolio turnover, transactions costs, and taxes. Thus, even though individuals have some control over the ultimate investment choices of their agent institutions, this control is imperfect, and we would expect different incentives to result in different demand patterns between the two groups. These differences are costly to individuals, but they may be willing to pay such agency costs because of economies of scale or other investment advantages enjoyed by institutions.

One possible cause of differences between individuals and institutions is the legal environment that institutions face as fiduciaries. We refer to fiduciary motives as “prudence”. Del Guercio (1996) examines the issue of prudence as it relates to stock ownership by banks and mutual funds. She provides intuition and evidence to show that different types of institutions are affected by prudence restrictions to varying degrees. Banks are the only institution governed by the common-law “prudent-man rule”; a standard which is often interpreted more strictly than the written regulations governing the investment behavior of other institutions. Empirical studies and survey evidence, however, suggest that many non-bank institutions also consider prudence characteristics.[4] Although standards for prudence vary, Del Guercio identifies several variables that have appeared in the prudence case law. We use four of the variables that she suggests: firm age, dividend yield, S&P membership and stock-price volatility.[5] If prudence considerations are important for institutions, then we would expect institutional ownership to be positively related to age, yield, and S&P membership, and negatively related to volatility.

Another source of cross-sectional variation in institutional ownership stems from liquidity and transaction-cost motives. The large positions held by institutions may lead them to demand stocks with large market capitalizations and thick markets. In addition, if institutions turn over their portfolios and trade more often than individuals do (Shapiro and Schwartz (1992)), then they would be more sensitive to the transactions costs caused by large-percentage bid-ask spreads for illiquid or low-priced stocks. We use firm size, per-share stock price, and share turnover as proxies for liquidity. If institutions demand liquid stocks more than individuals do, then we would expect institutional ownership to be positively related to each of these characteristics.

A third set of factors that can lead to cross-sectional variation in institutional ownership

[4] See Del Guercio (1996), Longsgreth (1986), Badrinath, Gay, and Kale (1989), and O’Barr and Conley (1992).

[5] See Del Guercio (1996), p.43. Her main prudence proxy, the S&P “quality” variable, is only available for part of our sample period and thus is not included in our analysis.

are the historical return patterns for different types of stocks. Academic research has shown that small stocks, stocks with high book-to-market ratios, and stocks with high returns over the previous year ("momentum") have all enjoyed higher historical returns than stocks without those characteristics. Thus, we test whether a firm's size, book-to-market ratio, and momentum are related to the level of institutional ownership. There are two reasons why institutions may differentially invest in stocks that have these characteristics. First, institutions may have better knowledge about historical return patterns and believe them to be exploitable anomalies. Second, institutions may have different preferences for risk and return and may believe that differences in historical returns across stocks are due to differences in risk.

C. Empirical Results

The main object of this analysis is "institutional ownership" (IO), defined as the fraction of a company's stock that is owned by institutional investors. To compute IO for a specific stock in a given quarter, we sum the holdings of all reporting institutions and divide by the total shares outstanding for the firm.[6] If a stock in CRSP is not held by any institution, then we set IO to 0.[7]

To analyze the determinants of IO, we use the characteristics discussed in section 3.1 as proxies for prudence, liquidity, and historical returns. All variables are measured at the same quarter-end as the 13F filing, unless otherwise noted. We omit the units because, as will be discussed below, our analysis uses natural logs of most variables. We consider ten different

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[6] We use the entire sample to calculate the percent institutional ownership – we do not index the reporting cutoffs to the level of the stock market. Results are similar if we repeat the analyses using an indexed sample.

[7] Note that the threshold reporting levels of either $200,000 or 10,000 shares will impart a small downward bias to our IO calculations. This bias should be lower for large stocks than for small stocks. Therefore, we would expect some relationship between IO and size from this bias alone.

characteristics:[8]

1) Size: market capitalization.
2) The book-to-market ratio: book value for the fiscal year ended before the most recent June 30, divided by size as of December 31 during that fiscal year.
3) Yield: cash dividends for the fiscal year ended before the most recent June 30, divided by size as of December 31 in that fiscal year.
4) Price, per share.
5) S&P 500: a dummy variable equal to one if the firm is included in the S&P 500, zero otherwise.
6) Volatility: the variance of monthly returns over the previous two years.
7) Age: number of months since first return appears in CRSP file.
8) $Momentum_{-3,0}$: past 3-month gross return. This is the percentage return earned in the current quarter (*i.e*. March 31 – June 30 return for a June 30 13F filing).
9) $Momentum_{-12,-3}$: 9-month gross return preceding the quarter of filing (*i.e*., June 30 – March 31 return for a June 30 filing 13F filing in the following year.)
10) Turnover: volume divided by shares outstanding, measured for the month prior to the beginning of the quarter (*i.e*., March turnover for a June 30 13F filing);

Since IO is measured as a percentage, it is helpful to have other variables as percentages or in natural logs. Thus, our analysis uses the natural log for all the above variables except for the

[8] The source of data for these variables is CRSP (for price, returns, and market capitalization data), and Standard

S&P 500 dummy and the momentum measures. Table 3 summarizes the cross-sectional correlations between each pair of these variables, after logs are taken, within each of the 68 quarters. The table presents the average correlation coefficient for each pair for all 68 quarters. Our primary interest is in the first column – the correlations between IO and the other variables. These bivariate correlations, however, can sometimes give misleading intuition for the multivariate relationships among IO and all the characteristics. To see why this is so, note that the correlations of IO with the characteristics (column 1) almost always have the same sign as the correlation of size with the characteristics (column 3 and row 3). Since, as we will see, size is a very important determinant of IO, any analysis that does not control for size will face a potentially large omitted-variable bias. This bias is important for explaining the role of dividend yield and the momentum variables in the multivariate analysis, which we turn to next.

We estimate 68 separate cross-sectional regressions – one for each quarter – of

$$IO_{i,t} = a_{i,t} + b_{i,t} X_{i,t} + e_{i,t} \qquad (1)$$

where $IO_{i,t}$ is the level of institutional ownership, and $X_{i,t}$ is the vector of ten characteristics (size, book-to-market, yield, etc.) for firm *i* in quarter *t*. The sample includes every firm that has data for all ten independent variables.[9] The sample size ranges from 1873 firms in March 1980 to 5199 firms in December 1996.

In Table 4, we report average coefficients, the number of positive and negative coefficients, and the number of significant (at the 95 percent level) positive or negative

and Poor's (S&P 500 inclusion, dividend yield and book value.)

[9] The only variables that are missing for significant number of stocks are turnover (not available for NASDAQ firms before November 1983) and the accounting variables necessary to calculate yield and the book-to-market ratio (missing for about 15 percent of all observations). Coefficients on the other seven variables are not greatly affected if we drop turnover, book-to-market, and/or yield from the analysis.

coefficients for 68 OLS regressions of (1).[10] Since other cross-sectional studies have found heteroskedastic errors in similar estimations, we compute and use White's (1980) correction for the standard errors. Since the coefficient estimates are not independent across quarters, we do not report any time-series statistics other than the average coefficient.

The results show a strong and consistent institutional demand for liquidity. The coefficients on all of the liquidity variables mentioned above – size, turnover, and price – are positive and significant throughout the sample period. The evidence on the prudence proxies is mixed. The coefficients on age and the S&P 500 dummy are positive and significant in most quarters. This finding is consistent with prudence motives. The other results, however, are not. The coefficients on volatility are mostly positive and significant. Also, the coefficient on dividend yield is negative and significant in most quarters.

Large institutions are *not* momentum investors. The coefficients on both $\text{momentum}_{-3,0}$ and $\text{momentum}_{-12,-3}$ are negative and significant in almost all quarters. This regression coefficient is of a different sign than the simple correlations between IO and each momentum variable, *i.e.*, both $\text{momentum}_{-3,0}$ and $\text{momentum}_{-12,-3}$ are positively correlated with IO. The simple correlation between IO and momentum, however, is driven by the positive correlations between size and IO and between momentum and size. Once size has properly been controlled for, the remaining marginal contribution of momentum is negative. This sign is robust to many specifications – as long as size is included as an independent variable.[11]

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[10] Since IO < 0 and IO > 100 cannot be observed, one could argue that a censored regression would be more appropriate. The results of censored estimations are similar to those presented in Table 4 and are available from the authors.

[11] These results are consistent with the findings of Cohen (1998). Using Federal flow-of-funds data, he finds that institutions tend to buy stocks from individuals after market declines and sell stocks to individuals after market increases.

The regressions also show that institutions have weak but growing preference for stocks with high book-to-market ratios. Table 4 indicates that in most quarters, the coefficient on book-to-market is positive and significant. The relatively small average coefficient, however, hides a time-series pattern. The last negative coefficient occurs in 1986, and all the coefficients are positive and significant beginning in 1987, with point estimates growing over time. (This pattern cannot be seen in the table.)

Overall, we find that institutions show a strong demand for large, liquid stocks that have low past returns.[12] We interpret the stability of this demand as evidence that the representative institution and individual have also been stable, and thus the shift of discretion has been from a 1980 representative individual to a 1980 representative institution. That is, new institutional money has come from typical individuals, and not from those who themselves have a preference for large, liquid stocks. Thus, the representative investor has shifted towards the representative institution over time, and this shift has increased demand for stocks with institutionally preferred characteristics. The next section explores the implications of this change for prices and returns.

3. Implications of Institutional Ownership for Stock Market Prices and Returns

The analysis in this section proceeds in two steps. First, we show that IO forecasts future returns and we analyze the determinants of this relationship. The evidence suggests that inflows to institutions increases the demand for stocks with preferred characteristics, and that this increased

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[12] Regression results for each of the five manager types were also estimated. Most of the patterns of Table 4 are evident for all types of managers. While the magnitude of the average coefficients may differ across types, the signs are generally the same. The exception is the coefficient on yield in the bank subsample. Here the coefficient is consistently positive – banks show a preference for yield (or "prudence") not seen in any of the other subgroups. This is consistent with the results of Del Guercio (1996).

demand drives up prices and returns. Next, we analyze whether these demand shifts can explain the disappearance of the small-firm return premium.

A. Does institutional ownership forecast returns?

This data provide an opportunity to directly and comprehensively measure the performance of the underlying stocks in institutional portfolios. To do so, we form a portfolio based on the aggregate institutional holdings at the end of each quarter and compute the value-weighted returns to this portfolio over the subsequent quarter. In effect, we treat the entire sample of institutions as a giant mutual fund. We repeat this exercise for each quarter in the sample. For comparison, we replicate the return calculations using the holdings of the remaining (individual) investors. By definition, the sum of the institutional and individual portfolios is the entire equity market. We then calculate the difference between the compounded returns on the two portfolios.

Figure 3 plots the results. Returns are computed from April 1980 to December 1996. If we had invested $1 in the aggregate institutional portfolio on March 31, 1980, this investment would have grown to $13.49 on December 31, 1996. A $1 investment in the aggregate individual portfolio would have been worth $12.10 on December 31, 1996. The annualized returns to these portfolios are 15.11 percent and 14.44 percent, respectively. Why does the institutional portfolio outperform the individual portfolio? We know, for example, that large stocks outperformed small stocks over this same sample period and that institutions prefer to invest in large stocks. After we control for these differences, will the return difference be statistically significant? The rest of this subsection attempts to disentangle the predictive power of size and other stock characteristics from that of IO.

To examine the cross-sectional determinants of returns, we employ the method of Fama and Macbeth (1973). In each quarter we estimate a cross-sectional regression of returns on IO and the same set of independent variables as used in Table 4. We use weighted-least-squares, with each observation weighted by its market capitalization, so we are effectively estimating a value-weighted regression that corresponds to the value-weighted returns graphed in Figure 2. The regression is given by:

$$r_{i,t+1} = a_t + b_t X_{i,t} + g_t IO_{i,t} + e_t \qquad (2)$$

where $r_{i,t+1}$ is the return to stock *i* in quarter *t+1*, and $X_{i,t}$ is the same vector of independent variables used (1) and listed in Table 4. In the discussion that follows, we drop the *i* subscripts.

It is well-known that in cross-sectional regressions like (2), the residuals are not independent. Because the structure of dependence is unknown, it is not possible to assess statistical significance of coefficients within a quarter. To handle this problem, we use the technique developed in Fama and Macbeth (1973) and treat each set of estimated cross-sectional coefficients as a random draw from an unknown distribution. We then compute the time-series means and time-series standard errors for each coefficient, and calculate *t*-statistics from these estimates. The results are reported in Table 5. The variables with significant mean coefficients are size (negative), $\text{momentum}_{-3-,12}$ (positive), and IO (positive). Thus, the level of institutional ownership at the end of a quarter has positive predictive power for returns in the next quarter.[13]

At first glance, this result appears to conflict with substantial evidence from other

[13] Brennan, Chordia, and Subrahmanyam (1997) find a similar result: after first using a multi-factor model to compute monthly "abnormal returns" for NYSE stocks over the 1977-1989 period, they find that the log of

academic studies that show mutual funds and pension funds underperforming appropriate risk-adjusted benchmarks. If, other things equal, higher institutional ownership forecasts higher returns, how can these institutions underperform? This conflict is reconciled because virtually all of these studies analyze returns *after* fees and transactions costs have been subtracted.[14] Our study focuses on the raw returns to the underlying stocks in institutional investors' portfolios. Thus, institutional ownership forecasts returns, but institutions themselves do not earn abnormal returns because of fees and transactions costs.

What is driving the positive relationship between IO and returns? We consider two explanations. First, institutions may be "smarter" than individuals, *i.e.*, they choose stocks with higher expected returns. Since we are already controlling for characteristics that explain average returns across stocks, the marginal impact of smart institutions would be to shift their portfolios in advance of abnormally high or low returns. In other words, because momentum is included as in independent variable in (2), it is not enough for institutions to merely hold high-momentum stocks. Instead, they must identify stocks that would outperform other high-momentum stocks. Under this smart-institutions explanation, the level of institutional ownership is a proxy for recent shifts in institutional holdings towards stocks with higher expected returns. Thus, if we divide institutional ownership (IO_t) into two components – last period's level of institutional ownership (IO_{t-1}) and the change in institutional ownership from last period to this period (ΔIO_t) – we would expect ΔIO_t to forecast returns better than IO_{t-1} does.

An alternative explanation for the forecasting power of institutional ownership for returns

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institutional ownership is positively related to future abnormal returns.

[14] The finding of mutual-fund underperformance dates back to Jensen (1969). A recent study that finds underperformance in a survivor-bias free sample is Malkiel (1995). Pension-fund underperformance is found by Lakonishok, Shleifer, and Vishny (1992). In an exception to underperfomance findings, Daniel et al. (1997) study

is that the growth in the institutional share of the market causes "demand shocks" in the stocks preferred by institutions. As discussed in the introduction, there is substantial evidence that demand shocks affect stock prices. In this context, the demand shock is induced by the changing composition of ownership and occurs over many quarters. For example, consider stock ABC, which is owned 100% by institutions, and stock XYZ, which has no institutional ownership. At prevailing prices, institutions clearly prefer to hold ABC over XYZ. In a typical quarter of the sample, institutions increase their share of the market, so the representative investor also shifts towards preferring ABC. Holding the supplies of ABC and XYZ constant, finite demand elasticities for stocks would imply that the relative price (and, thus, the contemporaneous return) of ABC must rise. Under this mechanism, institutional ownership this period, IO_t, proxies for expected demand shocks in the next quarter, t+1. Since institutional demand patterns are relatively stable over time, institutional ownership in the previous period (IO_{t-1}) should be almost as good a proxy for these shocks as is IO_t. On the other hand, the change in institutional ownership, (ΔIO_t) which typically reflects the trades of only a small fraction of institutions in any given stock, would be a much noisier measure. Thus, if the demand-shock explanation is correct, then we would expect IO_{t-1} to forecast returns better than ΔIO_t does.

To disentangle the smart-institutions and demand-shock explanations, we replace IO_t by its two components, IO_{t-1} and ΔIO_t, as independent variables in (2). The results are summarized in the second column of Table 5. The average coefficient on IO_{t-1} is positive and significant. The average coefficient on ΔIO_t is positive but is not significantly different from zero. Since the significance level of these coefficients is fairly close, we draw only weak conclusions from these

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the raw performance of mutual fund holdings (analogous to our study) and find slight overperformance.

results. Nevertheless, this evidence is more supportive of demand shocks than it is of smart institutions.

A second test to disentangle the two explanations is based on the relationship between demand shocks and the flow of funds into institutions. If the positive coefficient on IO_t is primarily driven by demand shocks, then we would expect this coefficient to be higher in quarters that have large inflows to institutions, because the size of the demand shock will be proportional to the inflow of capital to institutions. To test this hypothesis, we divide the sample into "high-inflow" and "low-inflow" quarters. For our purposes, inflows are defined as the quarterly change in the total value of aggregate institutional holdings, less any price appreciation of the underlying stocks, expressed as a percentage of the total equity in the market. By construction, this demand shock only reflects compositional change in ownership and is exactly offset by a change of the opposite sign in individual holdings. The institutional inflows measure can be calculated as:

$$Inflows_t = \sum_i (size_{i,t} * \Delta IO_{i,t}) \qquad (3)$$

Using this definition, we rank all quarters in the sample and define the top half as "high inflow" and the bottom half as "low inflow". We then we estimate (2) for both subsamples. The results are summarized in the last two columns of Table 5. In high-inflow quarters, the coefficient on IO_t is approximately twice its level for the whole sample and is statistically significant. In low-inflow quarters, the average coefficient on IO_t is very close to zero and not statistically significant. These results suggest that virtually all of the forecasting power of IO_t for returns occurs in quarters that have contemporaneously high inflows to institutions. Under the smart-institutions explanation, there is no reason to expect this result: IO_t should have the same predictive power in both subsamples.

Since inflows are measured contemporaneously with returns, one cannot rule out the possibility of simultaneous-equations bias in explaining the results from the subsamples. If investors react quickly to high returns earned by stocks in institutional portfolios by increasing their inflows to institutions, then this direction of causality would bias the results in the direction found above. We believe that this direction of causality is highly unlikely. While significant evidence exists that relative returns between institutions affect the subsequent inflows to those institutions, there is no evidence that aggregate returns affect subsequent aggregate inflows. In fact, recent research (Warther (1995), Goetzmann and Massa (1999)) points to the contrary.[15] Furthermore, for most institutions in the sample, the salient horizons for results are quarterly or longer time periods, so that it is unlikely that investors would even have the information necessary to react to within-quarter return evidence. For simultaneous-equations bias to be a problem here, one would need individual investors to react quickly to abnormally high returns for institutional holdings, *after* adjusting for other characteristics such as size and S&P membership.

Overall, the evidence in Table 5 shows that the level of institutional ownership forecasts individual stock returns and supports the demand-shock explanation for this result. There is no supporting evidence for the smart-institutions explanation. What is the economic impact of these demand shocks? While we cannot use the evidence in Table 5 to infer anything about the elasticity of demand, we can use other evidence from our data to calibrate the total size of the demand shift from 1980 to 1996. By combining this calibrated shift with other authors' estimated

[15] Warther (1995) examines lead-lag effects at weekly and monthly horizons for aggregate returns and mutual-fund inflows. He finds no evidence that aggregate returns leads inflows, but does find some evidence of the reverse. Also, Goetzmann and Massa (1999) find no causality from S&P 500 returns to S&P 500 index fund inflows at daily horizons, but some evidence of the reverse.

demand elasticities, we can compute an impact of this demand shift on prices and returns.

B. The Size Premium in Equity Returns

The annualized return (geometric mean) from January 1926 to December 1979 for small stocks – those below the cutoff of the lowest quintile on the NYSE – was 12.2 percent, while for the large stocks – the highest quintile – it was 8.2 percent. This premium for small stocks, first pointed out in the academic literature by Banz (1981), has disappeared since 1980. From January 1980 to December 1996, the annualized returns for small stocks and large stocks were 13.3 percent and 15.9 percent, respectively. How much of this reversal in the size premium could be due to the changing composition of stock ownership?

To answer this question, one must first estimate the effect of changing composition on the demands for large stocks and small stocks. Suppose that the "representative" institution and individual maintained the same demand function for large stocks and small stocks in 1996 as they had in 1980. Given constant prices, these representative agents would then maintain constant budget shares between large and small stocks. By holding budget shares constant, but shifting the ownership composition, we can estimate the change in demand for each class of stock. These estimates can then be combined with specific demand elasticities to calibrate the effect of changing demand on prices and returns.

As an illustration of our approach, consider a hypothetical stock, ABC, that comprised one percent of total institutional holdings in March 1980 and zero percent of individual holdings, so its IO was 100 percent. The total share of the $942 billion stock market controlled by institutions in March 1980 was 26.8 percent, a percentage that grew to 51.6 percent in December 1996. Thus, the total “demand” for ABC in March 1980 (= supply, by construction) was .268 *

.01 * 942 = $2.52 billion. Our calculation of the demand shift in December 1996 holds constant the one percent institutional budget share, the stock price, and the total value of the market while focusing only on the compositional shift to 51.6 percent aggregate institutional ownership. The new demand is then .516 * .01 * 942 = $4.86 billion, for an increase of 93 percent. Note that this calculation is invariant to the choice of units to measure the "quantity" of stock; all we need to observe is price * quantity = market value in March 1980. The actual price change that results from this demand shift will also not be directly observable, but can be inferred for any given demand elasticity and supply change.

We next apply the same methodology to the classes of large stocks and small stocks as defined at the beginning of this subsection.[16] In March 1980, institutions held 83.1 percent of their portfolios in large stocks, and 0.4 percent in small stocks. At the same time, individuals held 69.7 percent in large stocks and 3.8 percent in small stocks. Thus, the total demand for large stocks can be decomposed as:

$$D_{Large,1980} \text{ (in billions)} = (0.831 * 0.268 + 0.697 * 0.732) * 942 = 690.4 \qquad (4)$$

A similar decomposition for small stock demand in March 1980 yields:

$$D_{Small,1980} \text{ (in billions)} = (0.004 * 0.268 + 0.038 * 0.732) * 942 = 27.2 \qquad (5)$$

[16] Following standard classifications (see, for example, Lakonishok, Shleifer and Vishny (1994) or Fama and French (1996)), we use NYSE size cutoffs to classify all NYSE, AMEX, and NASDAQ stocks. "Small stocks" are those with market values below the cutoff for the lowest quintile on the NYSE, and large stocks are those with market values above the cutoff for the highest quintile. Thus, there are an equal number of NYSE stocks in each of these quintiles, but far more of the total market value of the NYSE is in the highest quintile.   Since AMEX and NASDAQ stocks tend to be smaller than NYSE stocks, they are disproportionately classified as "small", and there are far more small stocks than large ones.

The share of the market controlled by institutions rose from 26.8% to 51.6% between March 1980 and December 1996. Holding constant the total market value, relative prices, and budget shares spent on large stocks and small stocks from March 1980 to December 1996, we can compute the effect of this compositional change on the demand for large stocks as:

$$D_{Large,1996} \text{ (in billions)} = (0.831 * 0.516 + 0.697 * 0.484) * 942 = 721.7 \qquad (6)$$

which represents a 4.5 percent increase over the total in equation (4). While this percentage change may seem small, it represents a significant dollar inflow into large stocks. The (partially) offsetting effect on small stocks is significantly more striking:

$$D_{Small,1996} \text{ (in billions)} = (0.004 * 0.516 + 0.038 * 0.484) * 942 = 19.3 \qquad (7)$$

This implies a 29.1 percent decrease from the total demand found in equation (5). Essentially, almost all of the demand for small stocks is coming from individuals; a one-third drop in a fraction of the market controlled by individuals results in a similar percentage decrease in the demand of small stocks.[17]

The calculations above abstract from all aggregate demand changes, supply responses, and price changes. The focus is purely on the demand shift from changes in the composition of

[17] The minimum reporting cutoff should play only a minor role here. Even if we believe that institutional holdings of small stocks are underreported by half – a bias that seems implausibly high – the decrease in demand would still be 25 percent.

ownership. We find a 4.5 percent increase in the demand for large stocks and a 29.1 percent decrease in the demand for small stocks, *i.e.*, large stocks have enjoyed 47.4 percent (= 1.045/0.709 - 1) increase in relative demand over small stocks. To estimate the impact of these demand changes on relative prices and returns, we assume that the demand elasticity for large and small stocks is the same and is constant over the sample period. In this case, the relative price impact can be calculated as

$$\Delta P = \frac{0.474}{c} \qquad (8)$$

where c is elasticity of demand for large stocks and small stocks. There is compelling evidence -- discussed in the introduction to the paper and supplemented by Table 5 -- that c is finite. Specific estimates of c vary across different studies, all of which have been done on individual stocks.[18] Our calculation requires an elasticity for broad groupings of stocks by market capitalization. These elasticities are likely to be smaller in absolute value than those for individual stocks, on the same principle that applies for broad and narrow groupings of consumer goods.

If we use unit elasticity as a baseline case, then the (relative) price impact of a compositionally-induced demand shock would be 47.4 percent. That is, a $1 small stock would depreciate to 70.9 cents, and a $1 large stock would appreciate to $1.045. Over the March 1980 to December 1996 sample period, this difference in relative price appreciation would translate into a return differential of approximately 2.3 percent per year.[19] Thus, unit-elastic demand for large stocks and small stocks, combined with the estimated demand shift from the compositional change

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[18] Shleifer (1986) suggests unit elasticity for individual stocks, Wurgler and Zhuravskaya (1998) estimate a median elasticity of –7.1, and Loderer, Cooney, and Van Drunen (1991) estimate a mean elasticity of –4.3.

[19] This return effect can be calculated as log(1.474)/16.7=0.023.

in ownership, can account for the nearly the entire return differential between large stocks and small stocks since 1980.

One criticism of our approach is that it ignores any supply response by firms or arbitrageurs. From firms, overpricing of large stocks could be met by mergers or equity issuances. From arbitrageurs, overpricing of large stocks could be met by short sales, which effectively makes the supply of such stocks infinitely elastic at their "correct" price. We believe that both of these market responses are severely limited and perhaps even nonexistent over our sample period.

On the firm side, the 1980s and 1990s have seen the breakup of conglomerates coupled with a phenomenal rise in initial public offerings of small and medium-size firms. Using our definitions, there were 376 large firms in 1979 and 405 in 1996. In contrast, the number of small firms grew from 2,656 in 1979 to 4,802 in 1996. By one measure of the “quantity” of stock – the book value – the relative quantity of large stocks to small stocks has *decreased* by almost half since 1979.[20] This evidence suggests that the supply response has not militated, but exacerbated, the demand shift. It is important to note that our reliance on NYSE cutoffs is not the driving factor in this result; other reasonable cutoffs also lead to the same conclusion.

In effect, the optimal scale and scope of firms is a natural limit the market's ability to simply increase the supply of large firms. While institutional investors demand large liquid stocks, this does not automatically imply that they would pay more for a merged entity than they would for its components. A large corporate finance literature has developed that explores the value destruction of conglomerate mergers. If we think of stocks as a composite good that bundle cash

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[20] See Gompers and Metrick (1998) for details of this calculation.

flows and other characteristics, then a change in firm size may be more appealing because of additional liquidity, but less appealing because increased agency problems reduce expected cash flows.

On the arbitrageurs' side, there are obvious limits to their ability to infinitely supply broad classes of assets. The argument of Shleifer and Vishny (1997) applies well to this case. Arbitrageurs need capital to carry out their activities. In this case, the "arbitrage opportunity" would require short-selling large stocks and buying small ones with the proceeds. Since the end of our sample in December 1996, this strategy would have earned very poor returns. Large stocks outperformed small stocks by more than 50 percentage points from January 1997 through December 1998. Unless arbitrageurs can continue to attract and retain funds despite losing money over such horizons, they will be unable to hold the positions necessary to profit from their strategy. The loss of capital for this kind of arbitrage can also exacerbate the original mispricing.

If neither firms nor arbitrageurs can force a supply response to soak up the extra demand for large stocks, then the compositional shift in institutional ownership can play a significant role in explaining the anomalous returns over the last 20 years. Our simple calibration yields a relative price appreciation for large stocks of almost 50 percent – sufficient to explain 2.3 percent a year in extra returns.

4. Conclusions

In this paper, we study the equity holdings of all institutional investors that have at least $100 million under management. The study uses quarterly data from 1980 to 1996 drawn from the filings of the SEC's form 13F. We find that large institutions approximately doubled their market share during the sample period; by 1996, they controlled over half of the equity market.

Even within this set of large institutions, holdings became more concentrated: the largest one hundred of these institutions saw their share of the market rise from 19.0 percent in 1980 to 37.1 percent in 1996. We also examine the investment demands of these institutions. We show that large institutions, as compared to other investors, prefer to invest in large, liquid stocks that have low past returns. Furthermore, these demand patterns were stable over the sample period.

We find that the level of institutional ownership in a stock can help to forecast its future return, and we provide evidence that this predictive power is due to demand shocks resulting from the compositional shift in ownership towards institutions. Overall, this compositional shift tends to increase demand for the stock of large corporations and decrease the demand for the stock of small corporations. With unit-elastic demand for both types of stock, the compositional shift by itself can account for a nearly 50 percent increase in the price of large-company stock relative to small-company stock. This price appreciation translates into an extra return of 2.3 percent over the sample period, and can explain part of the disappearance of the historical small-company stock premium.

More broadly, our analysis supports the importance of investor clienteles for understanding asset pricing. The demand shifts induced by compositional changes are only one manifestation of such clientele effects; others can be observed in dual-class or dual-country shares, calendar-time anomalies, and financial-market liberalizations. As evidence mounts that most assets do not have perfect substitutes and cannot be perfectly arbitraged, clientele and demand effects deserve further attention.

Our results suggest that factor-based asset pricing models should be interpreted with caution. Given the appetite of institutions for various types of stock characteristics that are commonly used to construct factors, the demand pressure associated with compositional shifts ownership over time can induce correlation in returns that appear to be caused by common factors. These co-movements in returns, however, would only be the results of common demand shocks across stocks, not of common exposures to fundamental risk.

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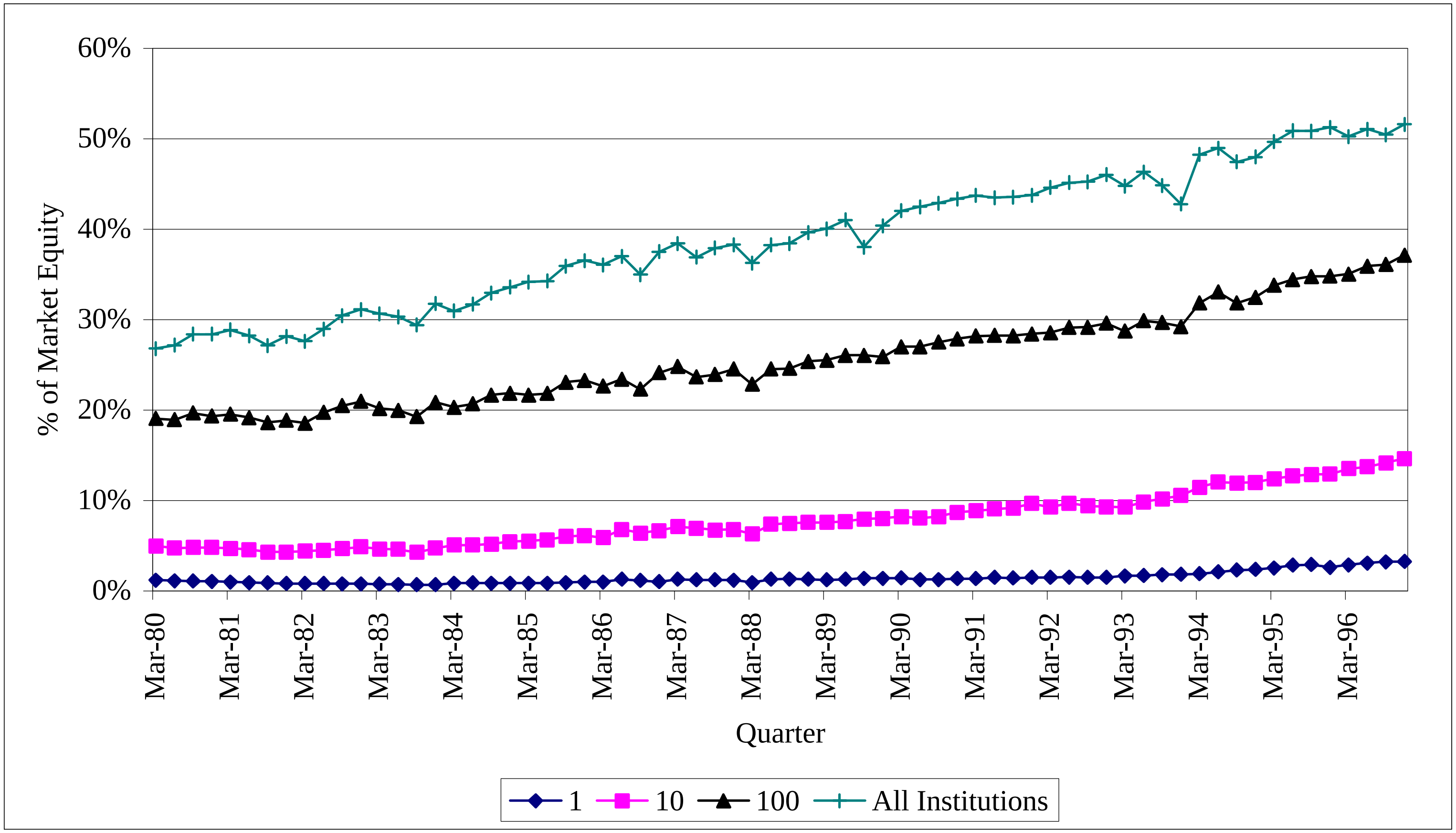

Figure 1 Percent of Market Owned by All Institutions and by the First, First Ten, and First 100 as Ranked by Holdings. The figure plots the cumulative institutional holdings (as a fraction of the market value of all equities) for all institutions, and for the first, first ten, and first 100 institutions as ranked by total holdings.

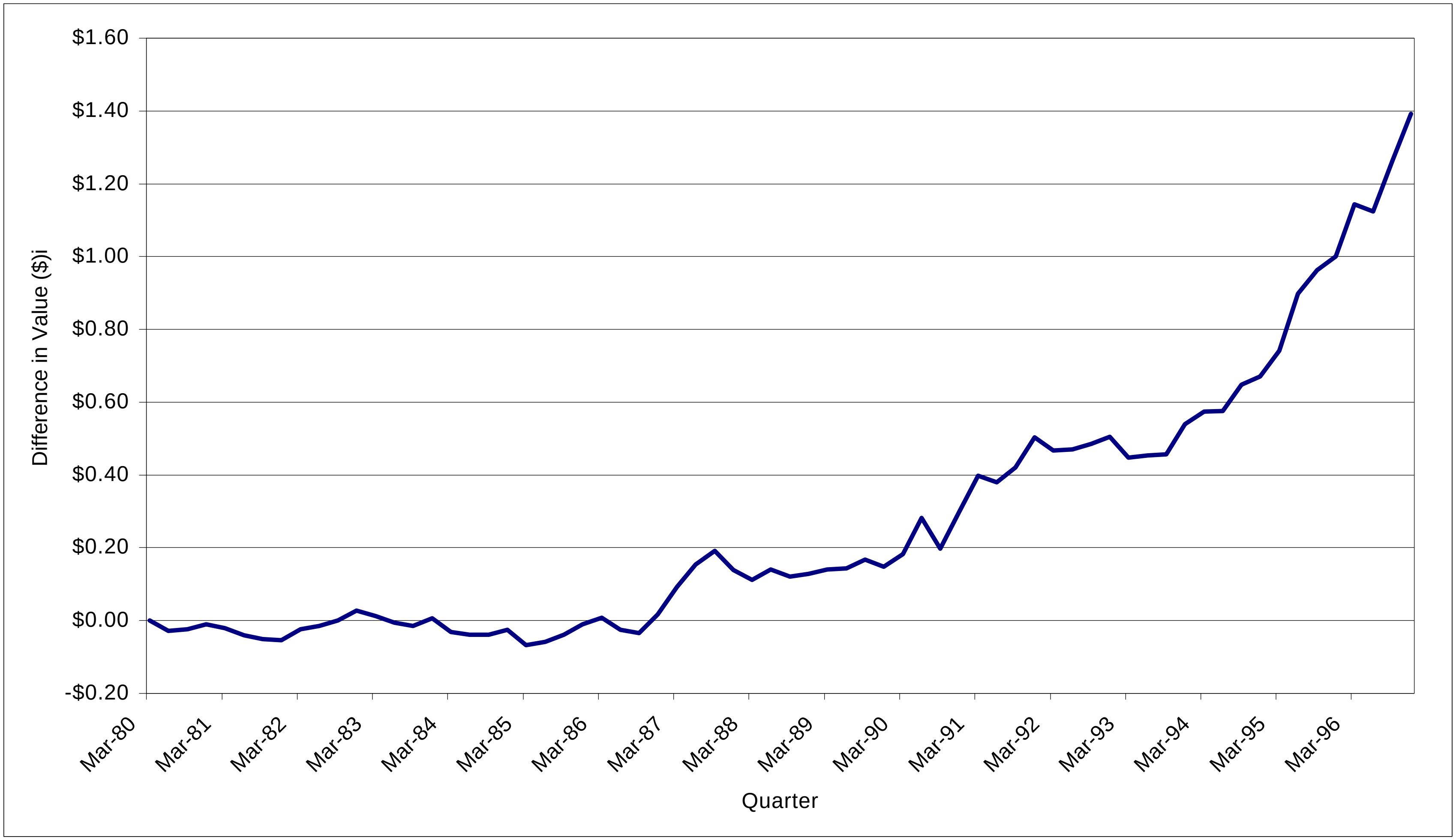

Figure 2 Difference in Return on Institutional Portfolio Relative to Individuals' Portfolio. The figure tracks the difference in the value of one dollar invested on March 31, 1980 in the portfolio of stocks held by institutions vs. an equivalent investment in the portfolio of stocks held by individuals. Quarterly returns are calculated as the value-weighted return on all stocks held by institutions (or individuals) at the beginning of a quarter.

Table 1

Time Series of the Number of Institutions by Manager Type. This table shows the total number of institutions reporting their holdings, broken down by manager type, at the end of each year from 1980 to 1996. Manager types are classified by Spectrum based on the primary business of the institution. The five types are (1) bank, (2) insurance company, (3) investment company (mutual fund), (4) investment advisor, and (5) other. The investment advisor category includes most of the large brokerage firms. The "other" category includes pension funds and university endowments.

	Banks		**Insurance Companies**		**Mutual Fund Companies**		**Investment Advisors**		**Other (University Endowments and Pensions)**		**Total**
	Number of Institutions	*Percent of Total*	*Number of Institutions*	*Percent of Total*	*Number of Institutions*	*Percent of Total*	*Number of Institutions*	*Percent of Total*	*Number of Institutions*	*Percent of Total*	*Number of Institutions*
Dec-80	216	41.1%	65	12.4%	47	9.0%	122	23.2%	75	14.3%	525
Dec-81	215	38.5%	60	10.8%	51	9.1%	150	26.9%	82	14.7%	558
Dec-82	216	37.4%	60	10.4%	52	9.0%	172	29.8%	78	13.5%	578
Dec-83	226	35.4%	63	9.9%	52	8.1%	218	34.1%	80	12.5%	639
Dec-84	225	32.5%	63	9.1%	51	7.4%	266	38.4%	88	12.7%	693
Dec-85	224	29.2%	69	9.0%	54	7.0%	332	43.3%	87	11.4%	766
Dec-86	208	25.8%	65	8.1%	60	7.4%	379	47.0%	94	11.7%	806
Dec-87	211	24.0%	72	8.2%	58	6.6%	441	50.1%	99	11.2%	881
Dec-88	214	24.3%	62	7.0%	58	6.6%	454	51.6%	92	10.5%	880
Dec-89	218	23.3%	69	7.4%	54	5.8%	506	54.0%	90	9.6%	937
Dec-90	216	22.1%	73	7.5%	57	5.8%	541	55.4%	89	9.1%	976
Dec-91	212	21.1%	70	7.0%	56	5.6%	584	58.1%	83	8.3%	1005
Dec-92	216	19.7%	70	6.4%	63	5.7%	666	60.7%	83	7.6%	1098
Dec-93	191	18.5%	64	6.2%	61	5.9%	649	62.8%	69	6.7%	1034
Dec-94	195	17.2%	75	6.6%	54	4.8%	740	65.2%	71	6.3%	1135
Dec-95	202	15.5%	78	6.0%	96	7.4%	845	65.0%	79	6.1%	1300
Dec-96	172	13.2%	69	5.3%	90	6.9%	900	69.1%	72	5.5%	1303

Table 2

Time Series of the Market Value of Institutional Holdings by Manager Type. This table shows the total market value of equity held by each manager type at the end of each year from 1980 to 1996. Manager types are classified by Spectrum based on the primary business of the institution. The five types are (1) bank, (2) insurance company, (3) investment company (mutual fund), (4) investment advisor, and (5) other. The investment advisor category includes most of the large brokerage firms. The "other" category includes pension funds and university endowments. All figures are in billions of nominal dollars.

	Banks		**Insurance Companies**		**Mutual Fund Companies**		**Investment Advisors**		**Other (University Endowments)**		**Total**	
	Market Value	*Percent of Total*	*Market Value*	*Percent of Total*	*Market Value*	*Percent of Total*	*Market Value*	*Percent of Total*	*Market Value*	*Percent of Total*	*Market Value*	*Percent of Market Cap*
Dec-80	$173.00	46.1%	$44.67	11.9%	$30.76	8.2%	$79.90	21.3%	$47.34	12.6%	$375.67	28.4%
Dec-81	$146.49	42.3%	$41.64	12.0%	$27.28	7.9%	$89.06	25.7%	$41.82	12.1%	$346.29	28.1%
Dec-82	$175.87	40.1%	$52.85	12.0%	$36.05	8.2%	$125.89	28.7%	$48.35	11.0%	$439.01	31.1%
Dec-83	$213.39	38.6%	$57.70	10.4%	$47.56	8.6%	$175.43	31.7%	$58.97	10.7%	$553.06	31.8%
Dec-84	$215.11	38.1%	$51.33	9.1%	$42.50	7.5%	$189.60	33.6%	$66.25	11.7%	$564.78	33.6%
Dec-85	$278.81	36.5%	$64.69	8.5%	$50.82	6.7%	$272.35	35.7%	$96.82	12.7%	$763.49	36.5%
Dec-86	$317.32	36.0%	$71.04	8.1%	$50.09	5.7%	$329.84	37.4%	$114.12	12.9%	$882.41	37.5%
Dec-87	$298.89	33.8%	$71.24	8.1%	$53.18	6.0%	$346.97	39.2%	$114.31	12.9%	$884.58	38.3%
Dec-88	$325.06	32.7%	$79.23	8.0%	$56.95	5.7%	$394.44	39.7%	$138.59	13.9%	$994.27	39.6%
Dec-89	$399.28	32.4%	$99.23	8.0%	$69.12	5.6%	$514.40	41.7%	$151.34	12.3%	$1,233.37	40.4%
Dec-90	$356.97	30.0%	$92.81	7.8%	$75.86	6.4%	$522.56	43.9%	$143.24	12.0%	$1,191.43	43.3%
Dec-91	$481.01	29.6%	$121.44	7.5%	$151.07	9.3%	$692.38	42.6%	$179.75	11.1%	$1,625.65	43.7%
Dec-92	$511.16	27.0%	$139.08	7.3%	$202.98	10.7%	$820.95	43.4%	$219.20	11.6%	$1,893.36	46.0%
Dec-93	$507.96	25.4%	$180.54	9.0%	$255.00	12.8%	$853.47	42.7%	$201.48	10.1%	$1,998.45	42.8%
Dec-94	$557.89	25.1%	$215.26	9.7%	$292.31	13.2%	$946.72	42.6%	$207.61	9.4%	$2,219.78	48.0%
Dec-95	$727.79	22.4%	$324.50	10.0%	$719.53	22.2%	$1,174.84	36.2%	$295.97	9.1%	$3,242.62	51.2%
Dec-96	$860.93	21.6%	$372.79	9.4%	$1,008.87	25.3%	$1,479.3	37.2%	$259.93	6.5%	$3,981.89	51.6%

Table 3

Cross-sectional Correlations: The table shows the average cross-sectional correlation between institutional ownership and firm characteristics and for all pairs of these characteristics. The average is taken over the 68 quarters starting with the first quarter in 1980 through the last quarter of 1996. Standard errors for the correlation coefficient are in brackets. All variables except institutional ownership, S&P 500 membership, and momentum are expressed in natural logarithms. The book-to-market ratio is the book value for the fiscal year ended before the most recent June 30, divided by size as of December 31 during that fiscal year. Size is quarter-end market capitalization. Volatility is the variance of monthly returns over the previous two years. Turnover is volume divided by shares outstanding, measured for the month prior to the beginning of the quarter. Price is the quarter-end share price. S&P 500 is a dummy variable equal to one if the firm is included in the S&P 500 at the quarter-end, and zero otherwise. $\text{Momentum}_{-3,0}$ is the firm's past 3-month gross return. $\text{Momentum}_{-12,-3}$ is the 9-month gross return prior to the beginning of the filing quarter. Age is the number of months since the first return for this stock appears in CRSP file. Yield is the cash dividends for the fiscal year ended before the most recent June 30, divided by size as of December 31 in that fiscal year.

	Institutional Ownership	Book-to-Market	Market Equity	Volatility	Turnover	Price	S&P 500	$\text{Momentum}_{-3,0}$	$\text{Momentum}_{-12,-3}$	Age	Yield
Institutional Ownership	1.000										
	[0.000]										
Book-to-Market	0.026	1.000									
	[0.007]	[0.000]									
Size	0.625	-0.063	1.000								
	[0.003]	[0.011]	[0.000]								
Volatility	-0.309	-0.256	-0.476	1.000							
	[0.005]	[0.012]	[0.007]	[0.000]							
Turnover	0.238	-0.202	0.240	0.223	1.000						
	[0.011]	[0.008]	[0.012]	[0.012]	[0.000]						
Price	0.532	0.064	0.785	-0.607	0.155	1.000					
	[0.005]	[0.012]	[0.003]	[0.010]	[0.013]	[0.000]					
S&P 500	0.398	0.032	0.542	-0.238	0.117	0.315	1.000				
	[0.004]	[0.007]	[0.001]	[0.004]	[0.007]	[0.002]	[0.000]				
$\text{Momentum}_{-3,0}$	0.071	0.057	0.172	0.017	0.147	0.256	0.014	1.000			
	[0.008]	[0.017]	[0.011]	[0.024]	[0.015]	[0.014]	[0.006]	[0.000]			
$\text{Momentum}_{-12,-3}$	0.035	0.064	0.118	0.020	-0.020	0.187	0.013	0.028	1.000		
	[0.010]	[0.012]	[0.014]	[0.023]	[0.011]	[0.017]	[0.006]	[0.010]	[0.000]		
Age	0.238	0.314	0.241	-0.296	-0.088	0.206	0.215	0.031	0.025	1.000	
	[0.005]	[0.010]	[0.006]	[0.008]	[0.010]	[0.012]	[0.005]	[0.010]	[0.009]	[0.000]	
Yield	0.284	0.290	0.457	-0.609	-0.123	0.462	0.297	0.008	0.038	0.353	1.000
	[0.009]	[0.012]	[0.009]	[0.005]	[0.014]	[0.007]	[0.003]	[0.017]	[0.015]	[0.006]	[0.000]

Table 4

Determinants of Institutional Ownership. The table summarizes the results from 68 quarterly (cross-sectional) regressions for the sample period. The dependent variable is the institutional ownership as a percentage of the firm's market capitalization (IO). All variables except institutional ownership, S&P 500 membership, and momentum are expressed in natural logarithms. The book-to-market ratio is the book value for the fiscal year ended before the most recent June 30, divided by size as of December 31 during that fiscal year. Size is quarter-end market capitalization. Volatility is the variance of monthly returns over the previous two years. Turnover is volume divided by shares outstanding, measured for the month prior to the beginning of the quarter. Price is the quarter-end share price. S&P 500 is a dummy variable equal to one if the firm is included in the S&P 500 at the quarter-end, and zero otherwise. $Momentum_{-3,0}$ is the firm's past 3-month gross return. $Momentum_{-12,-3}$ is the 9-month gross return prior to the beginning of the filing quarter. Age is the number of months since the first return for this stock appears in CRSP file. Yield is the cash dividends for the fiscal year ended before the most recent June 30, divided by size as of December 31 in that fiscal year. The table gives the number of positive coefficients, number of negative coefficients, the number of significantly positive coefficients (at the 95 percent confidence level) and the number of significantly negative coefficients (at the 95 percent confidence level. Significance of the quarterly coefficients is computed using White-corrected standard errors (White (1980)). The sample size ranges from 1873 in March 1980 to 5199 in December 1996.

Variable	Average Coefficient	Number Positive [Significant]	Number Negative [Significant]
Constant	-0.4478	3 [0]	65 [62]
Book-to-Market	0.0109	52 [46]	16 [10]
Size	0.0403	68 [68]	0 [0]
Volatility	0.0040	51 [31]	17 [9]
Turnover	0.0002	59 [51]	9 [3]
Price	0.0469	68 [68]	0 [0]
S&P 500	0.0537	61 [58]	7 [3]
$Momentum_{-3,0}$	-0.0358	0 [0]	68 [64]
$Momentum_{-12,-3}$	-0.0486	2 [0]	66 [58]
Age	0.0124	65 [51]	3 [1]
Yield	-0.0192	2 [0]	66 [43]

Table 5

Institutional Ownership and Returns. This table summarizes the results of cross-sectional regressions of quarterly returns on institutional ownership and other firm characteristics. Each cross-sectional regression is estimated by weighted-least-squares, with weights equal to the prior market value of each stock. The table reports average coefficients, with *t*-statistics for these averages based on their time-series standard deviations. All variables except return, institutional ownership, S&P 500 membership, and momentum are expressed in natural logarithms. The book-to-market ratio is the book value for the fiscal year ended before the most recent June 30, divided by size as of December 31 during that fiscal year. Size is quarter-end market capitalization. Volatility is the variance of monthly returns over the previous two years. Turnover is volume divided by shares outstanding, measured for the month prior to the beginning of the quarter. Price is the quarter-end share price. S&P 500 is a dummy variable equal to one if the firm is included in the S&P 500 at the quarter-end, and zero otherwise. $Momentum_{-3,0}$ is the firm's past 3-month gross return. $Momentum_{-12,-3}$ is the 9-month gross return prior to the beginning of the filing quarter. Age is the number of months since the first return for this stock appears in CRSP file. Yield is the cash dividends for the fiscal year ended before the most recent June 30, divided by size as of December 31 in that fiscal year.

	Full Sample	*Full Sample*	*High Inflow Sample*	*Low Inflow Sample*
	Average Coefficient [Time Series t-Statistic]			
Number of Cross-Sectional Regressions	67	66	33	34
Intercept	1.0439 [-19.11]	1.0458 [19.03]	1.0060 [28.82]	1.0806 [15.69]
Book-to-Market	0.0017 [0.51]	0.0020 [0.62]	0.0006 [0.17]	0.0027 [0.86]
Size	-0.0031 [-2.02]	-0.0029 [-1.89]	-0.0009 [-0.59]	-0.0053 [-3.32]
Volatility	-0.0072 [-1.69]	-0.0072 [-1.68]	-0.0026 [-0.71]	-0.0117 [-2.44]
Turnover	-0.0033 [-1.99]	-0.0032 [-1.89]	-0.0022 [-1.28]	-0.0044 [-2.73]
Price	0.0009 [0.37]	0.0010 [0.41]	0.0006 [0.26]	0.0012 [0.45]
S&P 500	0.0051 [1.93]	0.0057 [2.16]	0.0053 [2.18]	0.0049 [1.70]
$Momentum_{-3,0}$	-0.0071 [-0.51]	-0.0079 [-0.57]	0.0053 [0.40]	-0.0191 [-1.34]
$Momentum_{-12,-3}$	0.0337 [4.22]	0.0327 [4.12]	0.0285 [3.60]	0.0388 [4.77]
Age	-0.0084 [-0.87]	-0.0106 [-1.13]	-0.0021 [-0.85]	-0.0146 [-1.08]
Yield	-0.0005 [-0.17]	-0.0008 [-0.25]	-0.0046 [-1.39]	0.0034 [1.18]
Institutional Ownership (IO_t)	0.0116 [2.13]		0.0230 [4.65]	0.0006 [0.10]
Last Period's Institutional Ownership (IO_{t-1})		0.0135 [2.49]		
Change in Institutional Ownership (ΔIO_t)		0.0385 [1.79]		