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Institutional investors and the limits of arbitrage ☆

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ABSTRACT

The returns and stock holdings of institutional investors from 1980 to 2007 provide little evidence of stock-picking skill. Institutions as a whole closely mimic the market portfolio, with pre-cost returns that have nearly perfect correlation with the value-weighted index and an insignificant CAPM alpha of 0.08% quarterly. Institutions also show little tendency to bet on any of the main characteristics known to predict stock returns, such as book-to-market, momentum, or accruals. While particular groups of institutions have modest stock-picking skill relative to the CAPM, their performance is almost entirely explained by the book-to-market and momentum effects in returns. Further, no group holds a portfolio that deviates efficiently from the market portfolio.

1. Introduction

Institutional investors play a growing role in the US stock market. From 1980 to 2007, the share of US common equity held by mutual funds, hedge funds, pensions, bank trust departments, and other institutions increased from 32% to 68% of total market value, according to quarterly 13F filings compiled by Thomson Financial.

The growth of institutional investors coincides with a large literature on institutions' performance and trading strategies. Recent studies that use stock-holdings data suggest that institutions in general, and mutual funds in particular, have stock-picking skill even though their returns after costs and fees seem to be poor. For example, Daniel, Grinblatt, Titman, and Wermers (1997) show that stocks held by mutual funds outperform a variety of benchmarks, building on the results of Grinblatt and Titman (1989, 1993) and Grinblatt, Titman, and Wermers (1995). More broadly, Gompers and Metrick (2001) show that institutional ownership (the fraction of a firm's shares held by all institutions) predicts returns cross sectionally after controlling for other firm characteristics, and Cohen, Gompers, and Vuolteenaho (2002) show that institutions, as a group, exploit price momentum at the expense of individuals.[1]

This paper offers new results on the performance of institutional investors. I provide an updated and comprehensive analysis of institutions' returns, both in aggregate and for different groups of institutions, and test whether their investment decisions are constrained by the so-called "limits of arbitrage" discussed by Shleifer and Vishny (1997). The evidence, as a whole, provides a more negative assessment of institutions' stock-picking skill than have other recent studies.

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[1] Other studies that explore institutions' returns and holdings include Nofsinger and Sias (1999), Wermers (1999, 2000), Chen, Jegadeesh, and Wermers (2000), Chen, Hong, and Stein (2002), Bennett, Sias, and Starks (2003), Kovtunenko and Sosner (2004), and Brunnermeier and Nagel (2004).

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My initial tests focus on institutions' aggregate performance. While prior studies consider a variety of return benchmarks and weighting schemes (equal weights versus value weights versus cross-sectional regressions), I argue that the best way to evaluate institutions' overall stock-picking skill is just to sum their holdings and study their aggregate returns. This approach leads to a surprisingly simple view of performance: Institutions as a whole essentially hold the market portfolio. From 1980 to 2007, the aggregate portfolio held by institutions has a return correlation of 99.8% with the value-weighted market index and a beta of 1.01 (see also Cohen, Gompers, and Vuolteenaho, 2002). Given those facts, it should come as little surprise that institutions, overall, have little stock-picking still even before costs and fees, with a CAPM alpha of 0.08% per quarter and a Carhart (1997) four-factor alpha of 0.05% per quarter (both insignificant).

My tests find weaker performance than prior studies in part because of my longer sample—institutions' returns have been poor since 2000—but, more importantly, because I focus directly on institutions' returns rather than the predictive power of institutional ownership (IO). In fact, I confirm that IO predicts returns cross-sectionally during my sample. But I also show that institutions' stock-picking ability is reliable only for smaller stocks, which make up a tiny fraction of their holdings. For example, institutions' investment in micro-cap stocks (below the NYSE 20th percentile) outperforms a value-weighted index of those stocks by a significant 0.57% quarterly but represents just 1% of their total holdings. Institutions' investment in large-cap stocks (above the NYSE 80th percentile) outperforms a value-weighted index of those stocks by 0.01% quarterly and represents nearly 80% of their holdings.

The near-perfect correlation between institutions' returns and market returns is surprising, in some ways, because institutions have been found to tilt toward certain types of stocks, deviating significantly from the market portfolio. For example, Gompers and Metrick (2001) regress IO on firm characteristics and find that institutions prefer larger, older stocks with higher prices, book-to-market (B/M) ratios, volatility, and turnover, and, controlling for those characteristics, lower past returns (see also Grinblatt, Titman, and Wermers, 1995; Del Guercio, 1996; Falkenstein, 1996; Bennett, Sias, and Starks, 2003). Institutions' aggregate holdings, however, convey a much different picture. Specifically, I sort stocks into quintiles based on a variety of characteristics and compare how much institutions invest in each quintile with the quintile's weight in the market portfolio. Viewed from this perspective, institutions show little tendency to bet on any of the most common characteristics considered in the asset pricing literature. Institutions tilt a bit toward large stocks (77% of the institutional portfolio versus 73% of market cap) and away from low-turnover (7% institutional versus 12% market) and low-beta (14% institutional versus 16% market) stocks. But for sorts based on eight other characteristics—B/M, momentum, long-term returns, volatility, stock issuance, accruals, asset growth, and profitability—not a single quintile has a weight in the institutional portfolio that differs from its value weight by more than 2 percentage points, and most differ by less than 1. In short, institutions do not bet, to a significant degree, on any of the main characteristics found to predict stock returns.

These results have several implications. Most directly, they show that institutions in aggregate do little more than hold the market portfolio, presumably generating significant costs and fees in the process. Active trading by one institution largely offsets active trading by other institutions, implying that institutions mostly profit from (or lose to) each other, not individuals. In addition, to the extent that institutions do trade together (e.g., Sias, 2004), such "herding" seems to have little impact on performance, in the sense that an investor who actively mimics institutions' trades or passively holds the market portfolio would earn almost identical pre-cost returns. Further, the results suggest that institutions do not invest like Shleifer and Vishny's (1997) rational but constrained arbitrageurs, as I discuss further below.

My tests also explore the stock-picking ability of different types of institutions, motivated by a number of issues that have been studied previously in the mutual fund literature, such as: Do money managers benefit from economies of scale? Does performance persist? Does money flow to the best institutions? Does active trading help or hurt performance?

Sorting institutions first by business type, I find that the equity holdings of banks, insurance companies, and all other institutions have return correlations of 99.3%, 99.7%, and 99.7%, respectively, with the market index (the "other" category includes mutual funds, hedge funds, pensions, investment advisors, endowments, etc.). Banks have the best performance with a CAPM alpha of 0.19% and a four-factor alpha of 0.12% quarterly (t-statistics of 2.02 and 1.31, respectively), compared with alphas of 0.01–0.07% quarterly for insurance companies and other institutions.

Ranked by equity under management, the largest institutions (top quartile) have the highest correlation with the market (99.8%) and the smallest alphas (0.04–0.07% quarterly for the different factor models). Small and medium-sized institutions have somewhat better returns yet still hold portfolios with greater than 99% correlation with the market. The middle two quartiles have the highest CAPM alphas of 0.21% and 0.24% quarterly (t-statistics of 2.61 and 2.89), while the smallest quartile has the highest four-factor alpha of 0.26% quarterly (t-statistic of 2.68).

Ranked by past annual returns and growth, the best-performing and fastest-growing institutions have the highest CAPM alphas, largely a consequence of momentum in stock returns (consistent with Carhart's (1997), results for mutual funds). The top performers hold, in aggregate, a portfolio with a CAPM alpha of 0.40% quarterly (t-statistic of 2.19) and a four-factor alpha of 0.12% quarterly (t-statistic of 0.71). The fastest-growing institutions hold a portfolio with a CAPM alpha of 0.16% quarterly (t-statistic of 1.52) and a four-factor alpha of 0.04% quarterly (t-statistic of 0.38).

Ranked by annual turnover, institutions that trade the least seem to do the best, even without accounting for

trading costs. Low-turnover institutions have a return correlation of 99.3% with the market, a CAPM alpha of 0.24% quarterly (t-statistic of 2.66), and a four-factor alpha of 0.17% quarterly (t-statistic of 1.99). High-turnover institutions have a correlation of 98.5% with the market, a CAPM alpha of 0.06% (t-statistic of 0.38), and a four-factor alpha of 0.14% (t-statistic of 0.99).

Last, grouping institutions by the types of stocks they hold, I find that institutions that tilt the most toward small, high-B/M, or high-momentum stocks have the highest CAPM alphas, with quarterly estimates of 0.17%, 0.58%, and 0.32%, respectively (only the second of these is significant, with a t-statistic of 2.21). Again, no group has a significant four-factor alpha; the largest point estimate is 0.12% quarterly for these three groups and 0.16% quarterly across all 12 size-, B/M-, and momentum-tilt quartiles.

In sum, several groups of institutions appear to have some stock-picking ability relative to the CAPM but the only groups that have a statistically significant four-factor alpha—taking their t-statistics in isolation, but not accounting for the fact that we searched across 31 groups—are the smallest and lowest-turnover institutions, with point estimates of 0.26% and 0.17% quarterly.

My final tests explore whether any of the groups deviate *efficiently* from the market portfolio: Does any group generate a CAPM alpha that is high relative to the amount of idiosyncratic risk it takes on (as opposed to just a positive alpha)? One motivation for the tests is to explore the limits-of-arbitrage view of Shleifer and Vishny (SV, 1997). SV argue that institutions (i.e., professional traders) may be reluctant to bet heavily on anomalies because mispricing could widen unexpectedly in the short run, leading to poor returns and, consequently, client withdrawals. Their arguments suggest that institutions might forgo investments with high alphas, and might choose not to hold the tangency portfolio, if it means deviating too much from the market portfolio and taking on too much idiosyncratic risk. However, even if an institution is not willing to bet heavily on mispricing, it would still want to move toward the tangency portfolio by holding a portfolio with a high alpha per unit of idiosyncratic risk. Thus, my final tests ask whether institutions deviate efficiently from the market portfolio, not whether they deviate a lot.

Statistically, the test takes a simple form: I just use the institutional portfolio as an asset pricing factor in time-series regressions, i.e., I test whether alphas are zero when B/M and momentum portfolios are regressed on the market return and either institutions' aggregate return or the return of a particular type of institution. The logic of the test follows from Gibbons, Ross, and Shanken's (1989) general analysis of mean-variance tests: If an institution maximizes alpha per unit of idiosyncratic risk, given the opportunities presented by B/M and momentum portfolios, the institutional and market portfolios will together span the tangency portfolio and drive B/M and momentum alphas to zero. This is true even if the institution holds a portfolio that is very close to the market index in mean-variance space.

The results from the test are clearly negative for institutions taken as a whole or grouped by business type, turnover, growth, or the size and momentum of stocks they hold. For each of these classifications, adding the institutions' return as a second factor in CAPM regressions has little impact on B/M and momentum alphas. The implication is that none of these groups, or institutions overall, tilts toward the tangency portfolio in the way suggested by SV's limits-of-arbitrage view.

The same conclusion holds when institutions are grouped by size, past returns, or ownership of value stocks, but the results are more nuanced. Portfolios held by most groups within these classifications explain neither the B/M nor momentum effects. The exceptions are that portfolios held by medium-sized and value-oriented institutions partially explain the B/M effect, and the portfolio held by top-performing institutions partially explains momentum. (No group exploits both B/M and momentum.) The strongest results are for institutions that hold value stocks: Adding their return as a factor in CAPM regressions pushes up the alpha of low-B/M stocks from -0.36% to -0.06% quarterly and pushes down the alpha of high-B/M stocks from 1.44% to 0.71% quarterly. The t-statistic for the difference between the high- and low-B/M alphas drops from 2.97 to 1.93. Put differently, we cannot reject that value-oriented institutions tilt optimally toward the tangency portfolio achievable from B/M quintiles.

The paper is organized as follows: Section 2 describes the data; Section 3 studies institutions' aggregate performance; Section 4 studies the performance of different types of institutions; Section 5 presents the efficiency tests and relates them to SV's (1997) limits-of-arbitrage arguments; Section 6 concludes.

2. Data

My tests use data from four sources. Stock returns, market values, trading volume, and T-bill rates come from the Center for Research in Security Prices (CRSP) monthly files. Returns on the Fama-French size, B/M, and momentum factors (SMB, HML, and UMD) come from Kenneth French's website at Dartmouth College.[2] Accounting data, including the book value of assets, common equity, operating accruals, and earnings, come from the Compustat annual file, supplemented with Davis, Fama, and French's (2000) hand-collected book equity data from Moody's (available on French's website). Finally, institutional stock holdings come from the CDA/Spectrum files maintained by Thomson Financial.

The CDA/Spectrum database is compiled from institutions' 13F filings with the Securities and Exchange Commission (SEC). The SEC requires large institutional investors—those that "exercise investment discretion over $100 million or more" in so-called 13(f) securities, including institutions such as hedge funds or foreign-based funds that do not have to be registered investment advisors—to report their quarter-end holdings of US stocks and other exchange-traded securities within 45 days after the end of the calendar quarter. The only

[2] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french.

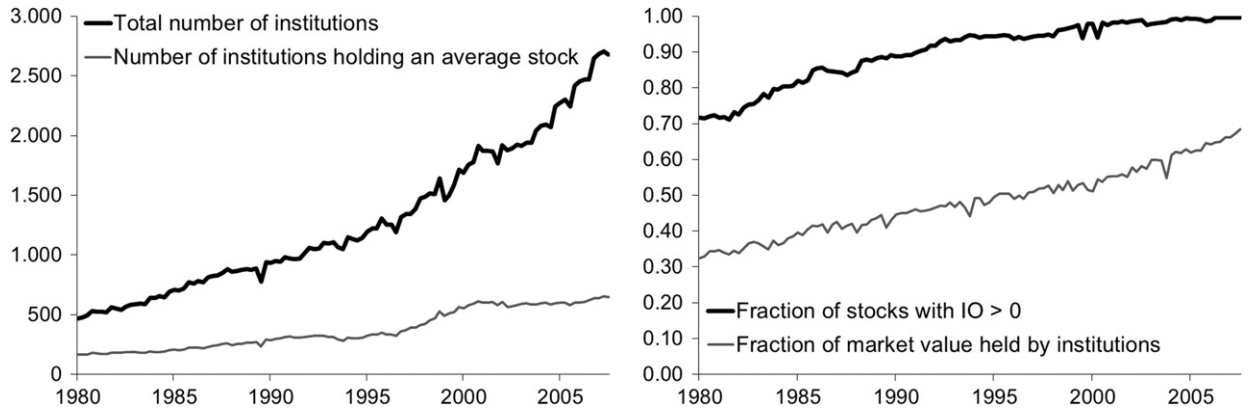

Fig. 1. Institutional ownership, 1980–2007. The left panel shows the number of institutions in the 13F files (from Thomson Financial) and the average number of institutions holding a given stock, value-weighting across common stocks on CRSP. The right panel shows the fraction of stocks with positive institutional ownership (IO) and the share of the overall market held, in aggregate, by institutions.

exceptions are for small holdings (below ten thousand shares and $200,000) or in special circumstances in which the SEC grants a confidentiality waiver. Securities are listed by CUSIP number, allowing an easy merge with CRSP and Compustat.

Institutions in the 13F database can be tracked through time, and Thomson identifies each as being one of five types: (1) banks, (2) insurance companies, (3) investment companies, (4) investment advisors, and (5) other. The last three types include mutual funds, pensions, brokerage firms, hedge funds, endowments, and all remaining institutions. Unfortunately, the breakdown into the last three categories is somewhat arbitrary and Thomson mistakenly re-classified many institutions as "other" beginning in the fourth quarter of 1998, a change that seems to affect categories (3), (4), and (5) the most, though not exclusively [see the Wharton Research Data Services (WRDS) *User Guide* for details].[3] For simplicity, then, I merge those three categories into a single group for any test that uses Thomson's classification. I also use Thomson's code at the end of 1997 for any institution that is in the database at that time instead of updating it if the classification changes.

An additional problem with the 13F database concerns late filers who miss the SEC's 45-day deadline. The WRDS *User Guide* explains that share holdings for late filers are (or might be?) adjusted for stock splits that occur after the quarter. Fortunately, less than 0.02% of the records in the 13F database seem to be affected after WRDS deletes duplicate entries, i.e., the record's filing and report dates are different, signaling a late filer, and a stock split was recorded on CRSP between the two dates. In these cases, I reverse Thomson's split adjustment using CRSP's share-price adjustment factors.

Fig. 1 illustrates a few features of the data. The sample extends from 1980Q1 to 2007Q4. At the beginning of the sample, just under five hundred institutions owned shares in 3,329 common stocks for which I could find returns and market values on CRSP (stocks that represent 72% of firms and 99% of the total market value of common stocks on CRSP). As group, institutions in the 13F database held 32% of total market cap on March 31, 1980. The number of institutions in the database steadily increases to 2,681 by the end of 2007, at which time they hold 68% of the stock market. Nearly all stocks on CRSP, representing close to 100% of market cap, are held by at least one institution at the end of the sample. The number of institutions holding shares of an average firm (including firms with no institutional ownership) rises from 164 to 649 on a value-weighted basis and from 17 to 110 on an equal-weighted basis during the sample.

As a data check, I flag observations for which institutions, in aggregate, hold more than 100% of the shares outstanding on CRSP. These observations represent less than 1% of firms and less than 0.5% of market cap in an average quarter. In about half of those cases, the number of shares held by institutions exceeds shares outstanding by less than 5%, a scenario that is plausibly attributable to short selling, not data error (shares owned and lent out are included in an institution's holdings, but shares borrowed and sold short are not). The issue, overall, appears to be minor, and my solution is just to set the maximum ownership of institutions at 100%.

3. Institutions' aggregate performance

My initial tests focus on the aggregate portfolio held collectively by all institutions. This portfolio simply sums their holdings, treating institutions as one big investor, and provides the best measure of their overall stock-picking skill before costs and fees. Returns on the portfolio are the same as institutions' size-weighted average returns (size, here, being equity under management). I also consider the aggregate portfolio held by everyone else, referred to simply, if not quite accurately, as "individuals."

Table 1 reports quarterly excess returns over T-bills for institutions, individuals, the CRSP value-weighted index (MKT), and the Fama-French size, B/M, and momentum factors. (Quarterly returns are compounded from monthly

[3] The WRDS *User Guide* is available online at http://wrds.wharton.upenn.edu.

Table 1
Institutions' quarterly returns and alphas, 1980–2007.

Panel A reports average quarterly excess returns (Avg), standard deviations (Std), and *t*-statistics (*t*-stat) for the aggregate portfolios held by institutions and individuals and for the CRSP value-weighted index (MKT) and the Fama-French size, B/M, and momentum factors (SMB, HML, and UMD). Panel B reports CAPM, three-factor, and four-factor regressions for institutions and individuals: $R=a+b\cdot\text{MKT}+s\cdot\text{SMB}+h\cdot\text{HML}+m\cdot\text{UMD}+e$. se($a$) is the standard error of a, $t(a)$ is the *t*-statistic for a, and GRS F is the Gibbons, Ross, and Shanken (1989) *F*-statistic testing whether intercepts for institutions and individuals are jointly significant (*p*-value in parentheses). Columns labeled MKT, SMB, HML, and UMD report the slope on each factor. Returns come from CRSP, institutional ownership comes from Thomson Financial, and SMB, HML, and UMD come from Kenneth French's website at Dartmouth College.

Panel A: Excess returns (percent)

Portfolio	Avg	Std	*t*-Stat
Institutions	2.18	8.33	2.76
Individuals	2.02	8.20	2.60
MKT	2.09	8.25	2.66
SMB	0.47	5.21	0.94
HML	1.15	6.35	1.91
UMD	2.44	7.14	3.60

Panel B: Regressions

Portfolio	a	se(a)	$t(a)$	MKT	SMB	HML	UMD	R^2	GRS F
Institutions	0.08	0.05	1.56	1.01				1.00	1.24
Individuals	−0.05	0.05	−1.10	0.99				1.00	(0.29)
Institutions	0.08	0.06	1.36	1.01	−0.02	0.00		1.00	1.55
Individuals	−0.02	0.05	−0.48	0.99	0.00	−0.01		1.00	(0.22)
Institutions	0.05	0.06	0.87	1.02	−0.02	0.00	0.01	1.00	1.05
Individuals	0.00	0.05	−0.05	0.99	0.00	−0.02	−0.01	1.00	(0.35)

data; I compound each side of the strategy and then difference for long-short portfolios.) The table also reports CAPM, Fama-French (1993) three-factor, and Carhart (1997) four-factor regressions for institutions and individuals.

The main message from Table 1 is that institutions as a group have returns that are only slightly higher than and almost perfectly correlated with the value-weighted index. From 1980 to 2007, institutions' returns have a correlation of 99.8% with the market index and a CAPM beta of 1.008. Institutions outperform the market by a modest 0.10% per quarter and individuals by 0.16% per quarter. Adjusting for risk, institutions have a slightly positive CAPM alpha of 0.08% quarterly and a four-factor alpha of 0.05% quarterly. Institutions' returns load a bit negatively on SMB and a bit positively on UMD, but only the three-factor slope on SMB is borderline significant (*t*-statistic of −1.97).

Statistically, Table 1 provides little evidence of institutional stock-picking skill. The *t*-statistics for alpha are insignificant (the highest is 1.56 for the CAPM) and we cannot reject that institutions and individuals perform the same or that alphas for the two groups are both zero (neither the GRS *F*-statistics in the table nor *t*-statistics testing for a difference between the groups' alphas are significant). And the small standard errors imply that the range of statistically likely true alphas is quite narrow, extending from below zero to a best-case scenario around 0.20% for all three factor models.[4]

More importantly, institutions' alphas are economically small and would be wiped out by tiny trading costs, not to mention management fees. We can get a rough, almost certainly conservative, sense of institutions' trading costs from their quarterly holdings, estimating each institution's turnover based on its split-adjusted change in holdings during the quarter (multiplied by quarter-end share prices). Institutions buy new shares equal to 12.4% of their aggregate portfolio in an average quarter and sell shares equal to 10.5% of their aggregate portfolio, for average round-trip turnover of 11.4%. Therefore, one-way trading costs of 0.25% would cut institutions' alphas by 0.06% ($0.114\times 2\times 0.0025$), to 0.00–0.03% quarterly, while one-way costs of 0.50% would push all of the estimates below zero.

Fig. 2 shows that institutions' performance is fairly stable during the sample but declines after 2000. Ten-year rolling estimates of alpha vary from roughly 0.00% to 0.20% for all factor three models. Alphas drop during the late 1990s, spike up in 2000, and decline again from 2001 to 2007. The CAPM alpha reaches a low of 0.02% quarterly at the end of 2007 (estimated from 1997Q4 to 2007Q3), while the four-factor alpha reaches a low of −0.06% quarterly at the end of the 2006 (estimated from 1997Q1 to 2006Q4).

To be fair, the alphas in Table 1 do not imply that institutions have no stock-picking skill. Like Gompers and

[4] The tests in Table 1 use only common stocks to be consistent with most asset pricing studies. Institutions' performance looks incrementally better if the tests are expanded to all securities on CRSP: Alphas increase by 0.02% quarterly for all three models and the CAPM alpha, while still

(*footnote continued*)
economically small, becomes statistically significant (*t*-statistic of 2.04). On a separate note, institutions' characteristic-adjusted average return, using the approach of Daniel, Grinblatt, Titman, and Wermers (1997), is very similar to the four-factor alpha in Table 1 (0.05% quarterly with a *t*-statistic of 1.47).

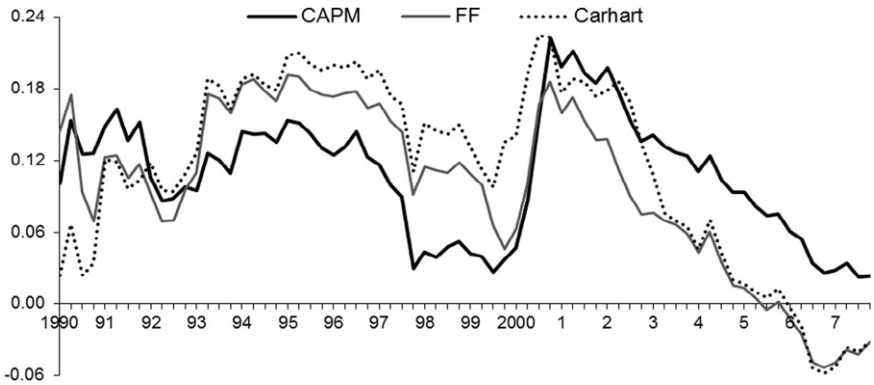

Fig. 2. The figure shows ten-year rolling estimates of institutions' quarterly CAPM, Fama-French (FF) three-factor, and Carhart four-factor alphas (in percent) from 1980 to 2007. Dates on the *x*-axis give the ending quarter for each ten-year sample. Returns come from CRSP, institutional ownership comes from Thomson Financial, and the Fama-French factors come from Kenneth French's website at Dartmouth College.

Table 2
Institutional performance and firm size, 1980–2007.

The table reports quarterly average excess returns and alphas (in percent) for institutions' holdings of small, medium, and large stocks compared with a value-weighted index of each group. Firm-size quintiles are based on NYSE breakpoints. IW is a quintile's institutional-weighted return (weighting by the institutional holdings of each stock); VW is the quintile's value-weighted return (weighting by market value); IW–VW is the difference between IW and VW. a_{CAPM}, a_{FF}, and a_{4Fac} are CAPM, Fama-French (FF) three-factor, and Carhart four-factor alphas for IW–VW, with *t*-statistics denoted by $t(\cdot)$. Returns come from CRSP, institutional ownership comes from Thomson Financial, and the Fama-French factors come from Kenneth French's website at Dartmouth College.

Size quintile	IW	VW	IW–VW	Alphas for IW–VW					
				a_{CAPM}	$t(a_{CAPM})$	a_{FF}	$t(a_{FF})$	a_{4Fac}	$t(a_{4Fac})$
Q1 (small)	2.81	2.15	0.66	0.57	2.89	0.29	1.48	0.67	3.35
Q2	2.87	2.45	0.42	0.34	2.37	0.14	0.96	0.34	2.26
Q3	2.68	2.40	0.28	0.25	2.15	0.12	1.07	0.18	1.39
Q4	2.65	2.44	0.21	0.18	2.18	0.13	1.52	0.17	1.76
Q5 (big)	2.10	2.05	0.05	0.01	0.17	0.01	0.25	−0.05	−0.94

Metrick (2001), my Appendix shows that institutional ownership (the fraction of a firm's shares held by institutions) has some cross-sectional predictive power for returns, most reliably in tests that include smaller stocks. But the evidence in Table 1 does imply that any skill washes out on an aggregate basis, which is the right metric for evaluating institutions' overall performance.

Table 2 explores the connection between firm size and institutions' stock-picking skill in more detail. I sort stocks into size quintiles (using NYSE breakpoints) and test how well institutions' holdings within each group perform relative to a value-weighted index of the stocks. Institutions' holdings of the smallest stocks (Quintile 1) beat a value-weighted index of those stocks by an impressive 0.66% quarterly, but performance drops steadily as stocks get bigger, to a low of 0.05% for Quintile 5. Adjusting for risk, the institutional portfolio significantly beats the value-weighted index in Quintiles 1–4 using the CAPM (alphas of 0.18–0.57% with *t*-statistics of 2.15–2.89) and in Quintiles 1 and 2 using the four-factor model (alphas of 0.67% and 0.34% with *t*-statistics of 3.35 and 2.26). The strong performance among smaller stocks has a modest aggregate effect, however, because Quintiles 1 and 2 together represent just 4% of institutions' overall holdings. Nearly 80% of institutions' holdings are in the top size quintile, for which there is no evidence they can beat the market. (The holdings of institutions are discussed further below.)

It is useful to note that the near-perfect correlation between institutions' aggregate returns and the market index suggests that any risk model that includes MKT would give similar results. The impact on alpha of adding a new factor to a CAPM regression can be shown to equal the Sharpe ratio of the portion of the factor that is uncorrelated with the market (an "orthogonalized" factor) multiplied by the standard deviation of the portion of returns explained by the orthogonalized factor. The second term is bounded above by the residual standard deviation of returns missed by the market, 0.54% quarterly for institutions. Thus, if we add an orthogonalized factor with, say, the same Sharpe ratio as the market, 0.25, institutions' alpha could go up or down by at most 0.13% quarterly (0.25×0.54). The actual impact would be much smaller unless the factor is highly correlated with institutions' residual returns.

The near-perfect correlation with MKT also suggests that institutions' aggregate holdings must not deviate too much from a value-weighted portfolio (and, to the extent that institutions' holdings do deviate from value weights, they must bet primarily on idiosyncratic returns). This implication

is somewhat surprising because prior research has found that institutions tilt significantly toward or away from particular types of stocks (e.g., Grinblatt, Titman, and Wermers, 1995; Del Guercio, 1996; Falkenstein, 1996; Gompers and Metrick, 2001; Bennett, Sias, and Starks, 2003). However, the literature emphasizes cross-sectional regressions of institutional ownership on firm characteristics, which have only indirect and hard-to-assess implications for aggregate portfolio weights.

As an alternative, Table 3 looks directly at the aggregate portfolio held by institutions. I sort stocks into quintiles based on a variety of firm characteristics and compare the fraction of the institutional portfolio invested in each (relative to institutions' investment in all five quintiles) with the quintile's weight in the market portfolio (the quintile's market cap relative to the market cap of all five quintiles). The weights are found each quarter, using all stocks with data for the characteristic, and the table reports the time-series averages from 1980 to 2007. The 11 characteristics are:

(1) size—market cap of the stock at the beginning of the quarter,
(2) B/M—book value of common equity for the prior fiscal year (with a four-month delay) divided by size,
(3) momentum—returns for months −12 to −2 relative to the sort date,
(4) reversals—returns for months −36 to −13 relative to the sort date,
(5) volatility—daily return volatility from month −12 to −1 relative to the sort date,
(6) beta—market beta estimated from at least 24 months and up to 60 months of past monthly returns,
(7) turnover—trading volume divided by shares outstanding over the past 12 months,

Table 3
Institutional portfolio versus market portfolio, 1980–2007.

The table compares the weight invested by institutions in each group of stocks with its weight in the market portfolio (weights are relative to the total investment in, or market cap of, stocks included in the five portfolios in each row). The weights are found quarterly, and the table reports their time-series averages. Stock portfolios are based on NYSE quintile breakpoints for each of the 11 variables listed in the table and described more thoroughly in the text. Market values come from CRSP, accounting data come from Compustat (supplemented with Davis, Fama, and French's, 2000, equity data), and institutional holdings come from Thomson Financial.

Characteristic	Weight	Stock quintile				
		Low	2	3	4	High
Size	Institutions	0.01	0.03	0.06	0.14	0.77
(market cap)	Market	0.03	0.04	0.07	0.13	0.73
	Difference	−0.02	−0.01	−0.01	0.00	0.04
B/M	Institutions	0.43	0.23	0.16	0.12	0.06
(book-to-market equity)	Market	0.41	0.22	0.17	0.13	0.07
	Difference	0.02	0.00	−0.01	−0.01	−0.01
Momentum	Institutions	0.11	0.18	0.21	0.25	0.26
(returns for months −12 to −2)	Market	0.12	0.19	0.21	0.24	0.25
	Difference	−0.01	0.00	0.00	0.00	0.01
Reversal	Institutions	0.11	0.17	0.20	0.24	0.28
(returns for months −36 to −13)	Market	0.11	0.17	0.20	0.24	0.27
	Difference	−0.01	0.00	0.00	0.00	0.00
Volatility	Institutions	0.21	0.31	0.23	0.15	0.10
(daily, past 12 months)	Market	0.23	0.30	0.22	0.14	0.11
	Difference	−0.02	0.02	0.01	0.00	−0.02
Beta	Institutions	0.14	0.24	0.22	0.21	0.19
(past 24- to 60-month estimate)	Market	0.16	0.24	0.21	0.20	0.19
	Difference	−0.02	0.00	0.01	0.01	0.01
Turnover	Institutions	0.07	0.22	0.25	0.23	0.23
(past 12 months)	Market	0.12	0.24	0.23	0.20	0.21
	Difference	−0.05	−0.02	0.02	0.03	0.03
Share issuance	Institutions	0.25	0.19	0.18	0.19	0.19
(past 12 months)	Market	0.24	0.20	0.18	0.18	0.20
	Difference	0.01	−0.01	0.00	0.01	−0.01
Accruals	Institutions	0.17	0.24	0.22	0.20	0.17
(as per Sloan, 1996)	Market	0.18	0.24	0.21	0.20	0.17
	Difference	0.00	0.00	0.00	0.00	0.00
Asset growth	Institutions	0.10	0.19	0.23	0.25	0.23
(prior year)	Market	0.11	0.19	0.23	0.24	0.23
	Difference	0.00	0.00	0.00	0.01	0.00
ROA	Institutions	0.11	0.18	0.16	0.22	0.34
(prior year)	Market	0.11	0.18	0.17	0.22	0.33
	Difference	0.00	0.00	−0.01	0.00	0.02

(8) share issuance—percent change in split-adjusted shares outstanding over the past 12 months,
(9) accruals—operating accruals, as per Sloan (1996),
(10) asset growth—percent change in the book value of total assets during the last fiscal year, and
(11) ROA—return on assets, equal to income before extraordinary items divided by lagged assets (per share).

These characteristics have been used by prior studies to predict the cross section of expected returns, for the most part successfully. My focus is not on their predictive power per se but, rather, on whether institutions under- or overweight the various quintiles relative to the market portfolio. That is, do institutions tilt their holdings toward or away from particular types of stocks?

The answer, in Table 3, is almost uniformly negative: Institutions' average holdings from 1980 to 2007 line up very closely with value weights. Institutions tilt somewhat toward large stocks (the top size quintile is 77% of the institutional portfolio compared with 73% of the market) and away from low-turnover and low-beta stocks (institutional weights of 7% and 14% for the first quintiles of those variables, compared with value weights of 12% and 16%, respectively). But for the other eight characteristics, not a single quintile has an institutional weight that differs from its value weight by more than 2 percentage points and most differ by less than 1 (looking closely, institutions take tiny bets on growth, momentum, and profitability, and against share issuers). These results suggest that, viewed from the perspective of portfolio weights, the institutional preferences found in cross-sectional regressions by Del Guercio (1996), Gompers and Metrick (2001), and Bennett, Sias, and Starks (2003) have little aggregate effect. (For comparison, the Appendix reports cross-sectional evidence that is similar to those studies.)[5]

The patterns in Table 3 are quite stable during the sample. The key exception is that institutions' bias toward large stocks declines over time. Institutions overweight the largest quintile by 10 percentage points in the early 1980s, but this bias drops steadily to zero by the end of the sample. (Part of this effect could be due to reporting requirements because the minimum holding that must be disclosed—ten thousand shares or $200,000—has not changed over time, likely increasing the reported holdings of smaller stocks.) Fig. 3 plots average institutional and market weights for select characteristic portfolios in each of the 1980s, 1990s, and 2000s.

In sum, institutions as a group seem to do little more than hold the market portfolio. They do not bet to a significant degree on any of the most important characteristics known to predict stock returns, and their aggregate returns are almost perfectly correlated with the market index. The close correspondence with market returns and the small, precisely estimated alphas provide strong evidence that institutions do not earn significant abnormal returns, even before costs and fees.

[5] I do not report statistical tests in Table 3 because it is unclear what the right notion of statistical randomness would be, since the results are essentially population values for institutions' portfolio holdings. In return tests, randomness comes from returns themselves—we are interested in expected returns but the tests use realized returns—and there is no corresponding notion of such randomness here. In any case, the differences are economically small regardless of whether they are statistically significant or not.

4. The cross section of institutional performance

A natural and important follow-up question is whether particular types of institutions have stock-picking ability, even if institutions overall do not. The groups I consider are motivated by issues that have been studied in the mutual fund literature: Do organizational or regulatory constraints affect performance? Do institutions benefit from economies of scale? Does performance persist? Does money flow to the best institutions? Does active trading help performance?

Specifically, Table 4 reports the performance of institutions sorted by (1) business type (banks; insurance companies; all others), (2) size (equity under management at the beginning of the quarter), (3) past annual returns of their equity portfolios, (4) past annual growth in equity under management, (5) past annual turnover (inferred from quarterly changes in their holdings), and (6) the type of stocks in an institution's portfolio (the holding-weighted averages of the log market cap, log B/M ratio, and 12-month momentum of the stocks). All classifications other than business type sort institutions into quartiles. As before, I focus on the aggregate holdings of each group, treating institutions within the group as one big investor. The last column in the table reports the fraction of total equity under management held by each group.

The basic conclusion from Table 4 is that some groups have a modest amount of stock-picking ability relative to the CAPM and the Fama-French three-factor model, but there is little evidence any group does so as measured by the four-factor model. The majority of groups hold portfolios that, in aggregate, closely mimic the market index: twenty out of 31 have return correlations with the market index of 99% or higher, including 15 of the 19 groups sorted by business type, size, past returns, past growth, and turnover (the other categories sort by the type of stocks held by the institution, so it is not surprising that they have lower correlations).

In Panel A, the portfolios held by banks, insurance companies, and other institutions have return correlations with the market index of 99.3%, 99.7%, and 99.7%, respectively. Banks appear, weakly, to have the best performance, with a CAPM alpha of 0.19% quarterly (t-statistic of 2.02) and a four-factor alpha of 0.12% quarterly (t-statistic of 1.31). Insurance companies and other institutions have small alphas relative to any of the factor models, with estimates of 0.01–0.07% quarterly. None of the alphas for insurance companies or other institutions is individually significant, nor are any of the GRS F-statistics testing whether alphas for the three groups are jointly significant.

In Panel B, the portfolio held by large institutions (top quartile) has the strongest correlation with the market (99.8%) and the smallest alphas (0.04–0.07% quarterly, with t-statistics of 0.69–1.21). Small and medium-sized institutions earn somewhat better returns yet also hold

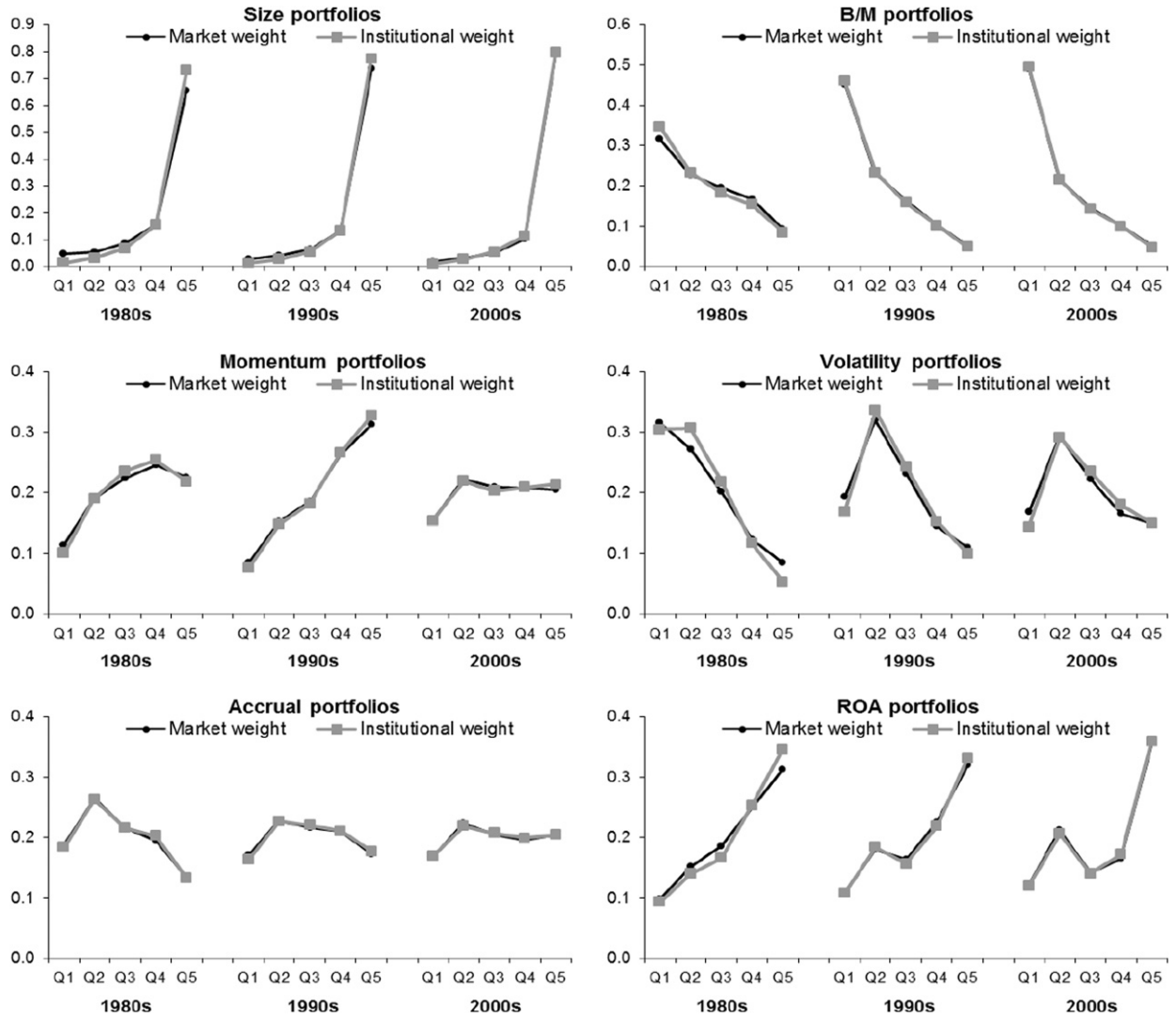

Fig. 3. Institutional and market weights during the 1980s, 1990s, and 2000s for stock quintiles (Q1–Q5) sorted by size, B/M, momentum (returns from month −12 to −2), volatility (daily for past 12 months), accruals (per Sloan, 1996), and ROA (earnings per share before extraordinary items divided by lagged assets per share). The weights are found quarterly, and the figure shows the time-series average each decade. Market values come from CRSP, accounting data come from Compustat, and institutional holdings come from Thomson Financial.

portfolios with greater than 99% correlation with the market. The middle two quartiles have the best CAPM and three-factor performance, with statistically significant alphas of 0.16–0.24% quarterly. Small institutions (Quartile 1) have insignificant CAPM and three-factor alphas but, interestingly, the highest four-factor alpha of 0.26% (*t*-statistic of 2.68). The GRS *F*-statistic, testing the joint significance of the groups' alphas, has a *p*-value just greater than 0.05 for both the CAPM and four-factor model. Loadings on the Fama-French factors suggest that the bottom three quartiles all tilt a bit toward small, value stocks.[6]

In Panels C and D, institutions with the best past annual returns and growth have the highest CAPM and three-factor alphas, largely a consequence of momentum in stock returns. The spread between the best- and worst-performing institutions is greatest using three-factor alphas: Institutions with the highest past returns have a big positive alpha of 0.64% quarterly (*t*-statistic of 3.37), while institutions with the lowest past returns have a big negative alpha of −0.50% quarterly (*t*-statistic of −2.30). Likewise, the fastest-growing institutions have a three-factor alpha of 0.31% quarterly (*t*-statistic of 2.97), while the slowest-growing institutions have a three-factor

[6] Sorting institutions based on the number of stocks they hold—closely related to institutional size—gives similar results. Institutions in the middle two quartiles have the best performance, with quarterly CAPM alphas of 0.29% and 0.19% (*t*-statistics of 3.79 and 2.58) and four-factor alphas of 0.21% and 0.16% (*t*-statistics of 2.30 and 1.86).

(*footnote continued*)
Those groups account for roughly 20% of total equity under management.

Table 4
The cross section of institutional performance, 1980–2007.

The table reports quarterly CAPM, three-factor, and four-factor regressions for institutional investors grouped by business type, size (equity under management), past annual returns, past annual growth, past turnover, and by the average market cap, B/M ratio, or momentum of stocks in an institution's portfolio (the last three are based on the holding-weighted average of the log market cap, log B/M ratio, and return from month −12 to −2 of stocks held by the institution). Groups are quartiles except those for business type; the last rows in Panels B–H show results for the top quartile minus the bottom quartile. The regression is: $R=a+b$ MKT$+s$ SMB$+h$ HML$+m$ UMD$+e$, where R is a group's excess return, MKT is the excess return on the CRSP value-weighted index, and SMB, HML, and UMD are the Fama-French size, B/M, and momentum factors from Kenneth French's website at Dartmouth College. $t(a)$ is the t-statistic for a and F is the Gibbons, Ross, and Shanken (1989) F-statistic testing whether alphas for the groups are jointly significant (with p-value below). %Assets is the fraction of total institutional assets held by each group. Bold indicates estimates of s, h, or m that are greater than 1.96 standard errors from zero. Returns come from CRSP, accounting data come from Compustat, and institutional holdings come from Thomson Financial.

	CAPM					Three factor							Four factor								%Assets
	a	$t(a)$	b	R^2	F	a	$t(a)$	b	s	h	R^2	F	a	$t(a)$	b	s	h	m	R^2	F	
Panel A: Grouped by business type																					
Banks	0.19	2.02	0.94	0.99	1.65	0.09	1.19	0.98	**−0.11**	**0.04**	0.99	0.73	0.12	1.31	0.98	**−0.11**	**0.04**	−0.01	0.99	0.62	0.27
Insurance	0.04	0.58	1.00	0.99	0.18	0.02	0.36	1.01	**−0.04**	0.00	0.99	0.54	0.03	0.44	1.01	**−0.04**	0.00	0.00	0.99	0.61	0.09
All others	0.04	0.71	1.04	0.99		0.07	1.06	1.03	0.02	−0.01	0.99		0.01	0.18	1.03	0.02	0.00	0.02	0.99		0.63
Panel B: Grouped by size																					
Small	0.17	1.61	1.03	0.98	2.44	0.10	1.10	1.01	**0.13**	**0.04**	0.99	1.68	0.26	2.68	1.00	**0.12**	0.02	**−0.05**	0.99	2.45	0.01
2	0.21	2.61	1.02	0.99	0.05	0.16	2.18	1.00	**0.09**	**0.03**	0.99	0.16	0.14	1.68	1.01	**0.09**	**0.03**	0.01	0.99	0.05	0.03
3	0.24	2.89	1.01	0.99		0.17	2.16	1.01	**0.07**	**0.04**	0.99		0.14	1.55	1.01	**0.07**	**0.04**	0.01	0.99		0.09
Large	0.07	1.21	1.01	1.00		0.07	1.16	1.02	**−0.03**	0.00	1.00		0.04	0.69	1.02	**−0.03**	0.00	0.01	1.00		0.86
L–S	−0.11	−1.03	−0.02	0.02		−0.04	−0.50	0.01	**−0.16**	**−0.04**	0.58		−0.22	−3.11	0.01	**−0.15**	−0.02	**0.05**	0.68		
Panel C: Grouped by past returns																					
Low	−0.22	−1.07	1.03	0.94	2.61	−0.50	−2.30	1.08	0.00	**0.13**	0.95	2.84	0.03	0.13	1.05	−0.05	0.06	**−0.16**	0.96	0.35	0.14
2	0.07	0.64	0.99	0.98	0.04	−0.11	−1.08	1.03	−0.03	**0.08**	0.99	0.03	0.03	0.30	1.02	**−0.04**	**0.06**	**−0.04**	0.99	0.84	0.34
3	0.20	2.94	0.98	0.99		0.14	1.96	1.01	**−0.04**	**0.03**	0.99		0.02	0.24	1.01	**−0.03**	**0.04**	**0.04**	0.99		0.36
High	0.40	2.19	1.03	0.95		0.64	3.37	0.98	0.05	**−0.11**	0.96		0.12	0.71	1.00	**0.10**	−0.04	**0.16**	0.97		0.17
H–L	0.63	1.70	0.01	−0.01		1.14	3.00	−0.11	0.05	**−0.24**	0.08		0.09	0.28	−0.05	**0.15**	−0.11	**0.32**	0.42		
Panel D: Grouped by past growth																					
Low	0.01	0.08	1.02	0.96	1.22	−0.24	−1.38	1.06	0.01	**0.12**	0.96	2.19	0.14	0.86	1.04	−0.03	**0.07**	**−0.12**	0.97	0.34	0.12
2	0.07	0.73	0.99	0.99	0.31	−0.06	−0.69	1.02	−0.03	**0.06**	0.99	0.08	0.06	0.60	1.01	**−0.04**	**0.04**	**−0.04**	0.99	0.85	0.28
3	0.12	1.95	1.00	0.99		0.09	1.46	1.02	**−0.05**	0.01	1.00		0.03	0.49	1.02	**−0.04**	0.02	**0.02**	1.00		0.38
High	0.16	1.52	1.04	0.99		0.31	2.97	1.00	0.03	**−0.07**	0.99		0.04	0.38	1.02	**0.06**	**−0.04**	**0.09**	0.99		0.22
H–L	0.15	0.60	0.03	0.00		0.55	2.26	−0.06	0.02	**−0.19**	0.14		−0.10	−0.49	−0.02	**0.08**	**−0.11**	**0.20**	0.44		
Panel E: Grouped by turnover																					
Low	0.24	2.66	0.94	0.99	6.07	0.09	1.17	0.99	**−0.10**	**0.06**	0.99	6.52	0.17	1.99	0.99	**−0.11**	**0.05**	**−0.02**	0.99	3.47	0.32
2	0.09	1.27	0.99	0.99	0.00	−0.03	−0.47	1.02	**−0.03**	**0.05**	0.99	0.00	0.04	0.50	1.02	**−0.03**	**0.05**	**−0.02**	0.99	0.01	0.31
3	−0.03	−0.36	1.07	0.99		0.11	1.41	1.04	0.03	**−0.06**	0.99		0.00	0.01	1.05	**0.04**	**−0.05**	**0.03**	0.99		0.25
High	0.06	0.38	1.15	0.97		0.41	2.93	1.05	**0.16**	**−0.15**	0.98		0.14	0.99	1.06	**0.18**	**−0.12**	**0.08**	0.99		0.11
H–L	−0.18	−0.79	0.21	0.36		0.31	1.75	0.06	**0.26**	**−0.21**	0.66		−0.03	−0.19	0.07	**0.29**	**−0.17**	**0.11**	0.72		
Panel F: Grouped by market cap of holdings																					
Small	0.17	0.67	1.14	0.93	1.16	0.10	0.64	1.04	**0.47**	**0.07**	0.98	1.26	0.04	0.22	1.04	**0.48**	**0.07**	0.02	0.98	0.53	0.07
2	0.15	1.35	1.04	0.98	0.33	0.03	0.27	1.04	**0.11**	**0.07**	0.99	0.29	0.01	0.11	1.04	**0.11**	**0.07**	0.00	0.99	0.71	0.20
3	0.06	0.97	1.00	0.99		0.07	1.27	1.01	**−0.06**	−0.01	1.00		0.05	0.75	1.01	**−0.05**	−0.01	0.01	1.00		0.49
Large	0.10	0.85	0.94	0.98		0.17	1.88	0.98	**−0.18**	**−0.04**	0.99		0.13	1.36	0.98	**−0.18**	**−0.04**	0.01	0.99		0.24
L–S	−0.07	−0.21	−0.20	0.17		0.07	0.39	−0.07	**−0.65**	**−0.11**	0.80		0.10	0.47	−0.07	**−0.66**	**−0.11**	−0.01	0.80		

Table 4 (*continued*)

	CAPM					Three factor							Four factor								%Assets
	a	*t*(*a*)	*b*	R^2	*F*	*a*	*t*(*a*)	*b*	*s*	*h*	R^2	*F*	*a*	*t*(*a*)	*b*	*s*	*h*	*m*	R^2	*F*	
Panel G: Grouped by B/M ratio of holdings																					
Low	−0.12	−0.55	1.13	0.94	2.70	0.55	3.64	1.00	−0.05	**−0.33**	0.98	3.97	0.10	0.74	1.02	−0.01	**−0.27**	**0.13**	0.99	1.94	0.17
2	0.03	0.35	1.00	0.99	0.03	0.08	1.05	1.01	**−0.08**	**−0.03**	0.99	0.00	0.06	0.69	1.01	**−0.08**	−0.03	0.01	0.99	0.11	0.34
3	0.27	2.46	0.96	0.98		0.03	0.27	1.01	−0.01	**0.12**	0.99		0.16	1.60	1.00	−0.02	**0.10**	**−0.04**	0.99		0.33
High	0.58	2.21	0.92	0.89		−0.20	−1.24	1.05	**0.15**	**0.39**	0.96		0.03	0.20	1.03	**0.13**	**0.36**	**−0.07**	0.97		0.15
H–L	0.70	1.55	−0.20	0.11		−0.75	−2.96	0.05	**0.20**	**0.72**	0.76		−0.07	−0.28	0.01	**0.15**	**0.64**	**−0.20**	0.83		
Panel H: Grouped by momentum of holdings																					
Low	−0.05	−0.17	0.96	0.89	1.82	−0.61	−2.53	1.06	0.04	**0.28**	0.92	5.29	0.14	0.70	1.03	−0.02	**0.18**	**−0.22**	0.95	0.94	0.13
2	0.12	0.99	0.95	0.98	0.13	−0.15	−1.41	1.02	**−0.06**	**0.13**	0.98	0.00	0.01	0.12	1.01	**−0.07**	**0.11**	**−0.05**	0.99	0.45	0.31
3	0.14	1.87	0.99	0.99		0.13	1.75	1.01	**−0.06**	0.00	0.99		0.07	0.81	1.01	**−0.05**	0.01	0.02	0.99		0.38
High	0.32	1.51	1.13	0.95		0.78	4.23	1.01	**0.08**	**−0.22**	0.97		0.12	0.86	1.04	**0.13**	**−0.14**	**0.19**	0.98		0.18
H–L	0.36	0.83	0.17	0.08		1.39	3.71	−0.05	0.04	**−0.50**	0.40		−0.02	−0.08	0.02	**0.15**	**−0.32**	**0.41**	0.75		

alpha of −0.24% quarterly (*t*-statistic of −1.38). Abnormal performance all but vanishes, however, once we control for momentum using the four-factor model: alphas of the two top quartiles shrink to 0.12% and 0.04%, alphas of the two bottom quartiles jump to 0.03% and 0.14%, and none of the estimates (or GRS *F*-statistics) remains statistically significant.

In Panel E, institutions that trade the least seem to have the best performance, a result that would undoubtedly be strengthened by trading costs. Low-turnover institutions trade just 4.7% of their holdings in an average quarter and tilt toward large, value stocks. They are the only group with significant CAPM and four-factor alphas, of 0.24% and 0.17%, respectively (*t*-statistics of 2.66 and 1.99). In contrast, high-turnover institutions tend to invest in small, low-B/M, high-momentum stocks and trade 28.8% of their holdings in an average quarter. They have small CAPM and four-factor alphas but a significant Fama-French alpha of 0.41% quarterly (*t*-statistic of 2.93).

Finally, in Panels F, G, and H, institutions grouped by the characteristics of stocks they hold (small-cap versus large-cap; growth versus value; losers versus winners) also show evidence of stock-picking ability relative to the CAPM and the three-factor model but not relative to the four-factor model. As one might expect, institutions that tilt the most toward small, value, or winner stocks have the highest CAPM alphas within each panel, with quarterly estimates of 0.17%, 0.58%, and 0.32%, respectively (only the middle number is significant, with a *t*-statistic of 2.21). Those compare with insignificant CAPM alphas of 0.10%, −0.12%, and −0.05% for institutions that hold the opposite types of stocks. Again, alphas essentially vanish using the four-factor model. The point estimates all become slightly positive and insignificant, ranging from 0.01% to 0.16% quarterly for the 12 groups in Panels F, G, and H. Loadings on the Fama-French factors exhibit the expected patterns as institutions invest in progressively smaller, higher-B/M, or higher-momentum stocks. None of the four-factor GRS *F*-statistics is statistically significant.

Overall, a number of institutional groups appear to have stock-picking ability relative to the CAPM, but their abnormal performance is almost fully explained by the groups' modest tilts toward small, value, and high-momentum stocks. Across all 31 groups in Table 4, only two (small and low-turnover institutions) have four-factor alphas greater than 0.17% quarterly with *t*-statistics that are individually significant (not accounting for the implicit data-mining we do by searching across groups). Returns earned by most groups closely mimic market returns.

5. Limits of arbitrage

The tests above ask whether institutions have stock-picking ability, i.e., do their equity holdings have positive alphas? Evidence that some groups do when performance is measured by the CAPM implies that those groups' portfolios, when combined appropriately with the market index, would achieve a higher Sharpe ratio than provided by the market portfolio alone.

Table 5
B/M and momentum portfolios, 1980–2007.

The table reports quarterly excess returns and CAPM regressions (in percent) for B/M and momentum quintiles. Avg, Std, and t(Avg) are the average, standard deviation, and t-statistic of excess returns, respectively. a_{CAPM} is the CAPM alpha with t-statistic $t(a_{CAPM})$; Beta is the slope on the market portfolio; R^2 is the regression adjusted R^2; GRS F is the Gibbons, Ross, and Shanken (1989) F-statistic (with p-value immediately below) testing whether intercepts for the five quintiles are jointly significant. The portfolios are value-weighted with breakpoints determined by NYSE percentiles. B/M quintiles are formed in June each year based on B/M as of the prior December. Momentum quintiles are formed monthly based on returns from months −12 to −2 relative to the sort date. Returns and market values come from CRSP; book values come from Compustat and Kenneth French's website at Dartmouth College.

Variable	Portfolio	Avg	Std	t(Avg)	a_{CAPM}	$t(a_{CAPM})$	Beta	R^2	GRS F
B/M	Low (G)	1.95	9.47	2.17	−0.36	−1.48	1.11	0.93	2.50
	2	2.28	8.31	2.89	0.27	1.12	0.97	0.92	0.04
	3	2.31	7.66	3.17	0.51	1.80	0.86	0.85	
	4	2.51	7.61	3.48	0.82	2.29	0.81	0.77	
	High (V)	3.02	7.59	4.19	1.44	3.38	0.76	0.67	
	V-G	1.07	6.80	1.65	1.80	2.97	−0.35	0.17	
Momentum	Low (L)	0.68	11.30	0.63	−1.75	−3.00	1.17	0.72	4.87
	2	1.85	8.08	2.42	0.05	0.13	0.87	0.78	0.00
	3	1.45	7.25	2.11	−0.26	−1.04	0.82	0.87	
	4	2.33	7.41	3.32	0.57	2.33	0.85	0.89	
	High (W)	3.20	9.66	3.49	0.91	2.72	1.10	0.87	
	W-L	2.52	8.55	3.11	2.67	3.18	−0.07	0.00	

My final tests ask a stronger question: Does any group deviate *efficiently* from the market portfolio, i.e., does any group have a CAPM alpha that is high relative to the amount of idiosyncratic risk it takes on, given the investment opportunities available in the market? This question is obviously strongly than asking whether institutions have a positive alpha, and, as I explain below, the test provides a measure of how effectively the groups exploit anomalies in returns.

One motivation for the test comes from the limits-of-arbitrage view of Shleifer and Vishny (SV, 1997). SV argue that institutions may be reluctant to bet heavily on anomalies, even those thought to reflect mispricing, out of fear that mispricing might widen in the short run, leading to short-term losses and client withdrawals (this reluctance provides one reason that mispricing may not get fully arbitraged away in equilibrium). SV's arguments suggest that institutions might limit investments in stocks with high alphas, and might elect not to hold the tangency portfolio, if it would require the institution to deviate too much from the market portfolio and take on too much idiosyncratic risk. However, even if institutions do act in this way, a smart institution would still want to move toward the tangency portfolio by holding a portfolio with a high alpha per unit of idiosyncratic risk (though it might take only a modest bet on this portfolio). In other words, the limits-of-arbitrage view suggests that we should test whether institutions deviate efficiently from the market portfolio, not whether they deviate a lot.[7]

Statistically, the test takes a simple form: I just use the institutional portfolio as an asset pricing factor in time-series regressions, i.e., I test whether alphas are zero when B/M and momentum portfolios are regressed on the market return and either institutions' aggregate return or the return of a particular group of institutions. The logic here follows from Gibbons, Ross, and Shanken's (1989) general analysis of mean-variance tests: If institutions maximize alpha per unit of idiosyncratic risk, given the opportunities presented by B/M and momentum portfolios, then some unspecified combination of the institutional and market portfolios should produce the tangency portfolio and explain expected returns on the B/M and momentum portfolios. Thus, testing whether the institutional return shrinks B/M and momentum alphas toward zero (when added to the CAPM) provides a way to assess whether institutions tilt optimally toward the tangency portfolio and, in particular, take advantage of the mean-variance opportunities provided by B/M and momentum portfolios. (I focus on B/M and momentum effects because they are well known and significant during my sample, but the tests could be expanded to other portfolios.)

Table 5 reports descriptive statistics for the B/M and momentum portfolios. Both sets of portfolios are value-weighted, with breakpoints determined by NYSE quintiles. Following Fama and French (1993), the B/M quintiles are re-formed in June each year using stocks with positive B/M ratios as of the prior December (to allow for a lag in reporting). The momentum quintiles are formed monthly based on returns from months −12 to −2 relative to the sort date.

The table shows that the B/M and momentum effects are strong from 1980 to 2007. Focusing on alphas for the extreme quintiles, high-B/M stocks outperform low-B/M

[7] My discussion here assumes that institutions care about market-adjusted returns, but the tests are valid even if absolute performance is important. In that case, an arbitrageur would want to hold the tangency portfolio, which is just a special case of a portfolio with a high alpha per unit of idiosyncratic risk—indeed, all portfolios that maximize alpha per unit of idiosyncratic risk represent different combinations of the market and tangency portfolios. Also, I use the phrase "limits of arbitrage" to refer exclusively to the problems highlighted by SV caused by delegated portfolio management. The literature sometimes uses the phrase more generally to refer to any trading friction (e.g., Pontiff, 1996). My tests do not address whether institutions forgo positive-alpha investments because of other frictions.

(*footnote continued*)

stocks by 1.80% per quarter (t-statistic of 2.97) and high-momentum stocks outperform low-momentum stocks by 2.67% per quarter (t-statistic of 3.18). The GRS F-statistic, testing whether the portfolios' alphas are jointly significant, is marginal for the B/M portfolios, with a p-value of 0.04, but strong for the momentum portfolios, with a p-value of 0.00.

The CAPM alphas provide a benchmark for the tests, in Table 6, that add institutions' returns as a second factor. A portion of the CAPM results are reproduced in Panel A of Table 6 for ease of reference. The remaining panels show regressions that add either the aggregate institutional return (Panel B) or the return of a particular group of institutions (Panels C–J) as a second factor:

$$R_i = a_i + b_i \mathrm{MKT} + g_i \mathrm{INST} + e_i, \quad (1)$$

where R_i is the excess return on a B/M or momentum portfolio and INST is the excess return on the institutional portfolio. Again, testing whether the B/M and momentum portfolios' alphas are zero in this regression is equivalent to asking whether institutions maximize their CAPM alpha per unit of idiosyncratic risk. For brevity, I report only estimates of a_i and g_i for the long-short B/M and momentum strategies (Quintile 5 minus Quintile 1), along with the GRS F-statistics for all five B/M and momentum portfolios. Rows that are in bold indicate institutional groups that have statistically significant stock-picking ability relative to the CAPM (see Tables 1 and 4).

The overall conclusion from Table 6 is that no group of institutions tilts optimally toward the tangency portfolio achievable from B/M and momentum portfolios. The portfolios held by a few groups help explain either the B/M or momentum effects—never both—but the improvements are generally modest, with a couple of exceptions.

Panel B shows that institutions' aggregate return explains almost none of the B/M and momentum effects, as measured by alphas for long-short B/M and momentum strategies (V-G and W-L, respectively). The B/M effect increases slightly, from 1.80% to 1.85% quarterly, and the momentum effect decreases slightly, from 2.67% to 2.56% quarterly, when the aggregate institutional portfolio is added as a factor. Both alphas remain significant, and we cannot reject that institutions' aggregate return has no explanatory power. These results are consistent with my finding that institutions add little beyond the market index.

Similarly, portfolios held by most subgroups of institutions explain only a small portion of the B/M and momentum effects. For classifications based on business type (Panel C), turnover (Panel G), and the market cap of an institution's holdings (Panel H), no group of institutions has a meaningful effect on the alphas of V-G and W-L when the group's portfolio is added to the regression. Among those groups, the largest effect is for institutions that hold moderately small stocks (group 2 in Panel H). Adding their portfolio to the regressions decreases the B/M effect from 1.80% to 1.45% quarterly but increases the momentum effect from 2.67% to 2.92% quarterly. Both alphas remain significant.

Institutions grouped by size (Panel D), past growth (Panel F), or the momentum of their stock holdings (Panel J) have a somewhat larger impact on alphas, but still no group within those classifications explains either the B/M or momentum effect. Among these groups, the portfolio held by medium-sized institutions (Quartile 3 in Panel D) has the biggest impact on the value effect, reducing V-G's alpha to 1.27% quarterly and its t-statistic to 2.10. The fastest-growing and most winner-oriented institutions have the biggest impact on momentum, each reducing W-L's alpha from 2.67% to 1.83% quarterly, but the t-statistics remain greater than 2.50. Thus, even institutions that invest most strongly in winners do not tilt optimally toward the tangency portfolio that is achievable from momentum portfolios (let alone from B/M portfolios). It is useful to note, too, that short-sale constraints do not seem to explain this result: When the winner-oriented group's return is added as a factor, both the long and short sides of the W-L portfolio continue to have significant alphas (not shown in the table). Quintile 1 has an alpha of −1.31% quarterly with a t-statistic of −2.56, and Quintile 5 has an alpha of 0.51% quarterly with a t-statistic of 2.45.

The groups that best take advantage of the B/M or momentum effects (no group exploits both) are the best-performing institutions (in Panel E) and institutions that invest most in value stocks (in Panel I). In particular, the portfolio held by the most value-oriented institutions, when used as a factor, accentuates the momentum effect but reduces V-G's alpha to 0.76% quarterly (t-statistic of 1.93), down from a CAPM alpha of 1.80%. Conversely, the portfolio held by the top-performing institutions accentuates the B/M effect but reduces W-L's alpha to 1.39% quarterly (t-statistic of 2.03), down from a CAPM alpha of 2.67%. Thus, on a statistical basis, we cannot reject that value-oriented institutions fully exploit the opportunities presented by B/M portfolios and we can only marginally reject that top-performing institutions exploit the opportunities presented by momentum portfolios.

Overall, the results provide little support for the limits-of-arbitrage view that (1) the B/M and momentum effects reflect exploitable mispricing and (2) the anomalies persist because professional traders are reluctant to bet too heavily on them. In practice, institutions overall or grouped by type often do not exploit the anomalies at all and certainly not in a way that maximizes alpha (per unit of idiosyncratic risk). Remarkably, no group in Table 6 simultaneously takes advantage of both the B/M and momentum effects: When I use the groups' portfolios as factors, not once do the alphas of V-G and W-L both decrease.[8] The results suggest that the anomalies persist either because institutions do not take advantage of them for reasons other than SV's (1997) limits-of-arbitrage arguments or because institutions themselves have the same biases that create the anomalies in the first place.

[8] The point estimates for V-G and W-L simultaneously drop in a single case, when the portfolio held by above-average performing institutions (Group 3 in Panel E) is used as a factor, but the decline in V-G's alpha is not statistically significant. The drop is not obvious in the table because the time period used for Panels E, F, and G differs from the other panels, beginning in 1981 instead of 1980, a result of requiring one year of past data for the sorts in those panels. The quarterly CAPM alphas of V-G and W-L are 1.90% and 2.52%, respectively, for the matching time period.

Table 6
Testing the efficiency of institutional portfolios, 1980–2007.

The table reports quarterly CAPM and two-factor regressions for B/M and momentum quintiles. Intercepts are in percent. V-G is B/M Quintile 5 minus B/M Quintile 1. W-L is momentum Quintile 5 minus momentum Quintile 1. Panel A reports CAPM regressions: $R=a+b\cdot\text{MKT}+e$, where R is the excess return for either V-G or W-L and MKT is the excess return on the CRSP value-weighted index. Panels B–J report regressions that add the return for the specified group of institutions (INST) as a second factor: $R=a+b\cdot\text{MKT}+g\cdot\text{INST}+e$. MKT is included in the regressions but its slope is not reported. $t(a)$ is the t-statistic for a; the column labeled INST shows the slope on INST, with t-statistic t(INST); R^2 is the regression adjusted R^2; GRS F is the Gibbons, Ross, and Shanken (1989) F-statistic testing whether intercepts for all five B/M or momentum quintiles (not just V-G and W-L) are jointly significant and F pval is its p-value. The B/M and momentum quintiles are value-weighted with breakpoints determined by NYSE stocks. B/M is measured as of the prior December, with a six-month delay; momentum is based on returns from months −12 to −2 relative to the sort date. Returns and market values come from CRSP, book values come from Compustat and Ken French's website at Dartmouth College, and institutional ownership comes from Thomson Financial. Bold rows indicate institutional groups that have statistically significant CAPM alphas in Tables 1 or 4.

Portfolio	Institutional group used as a factor	a	$t(a)$	INST	t(INST)	R^2	GRS F	F pval
Panel A: CAPM benchmark								
V-G		1.80	2.97			0.17	2.50	0.04
W-L		2.67	3.18			0.00	4.87	0.00
Panel B: All institutions and individuals								
V-G	All institutions	1.85	3.01	−0.64	−0.58	0.17	2.24	0.06
	Individuals	1.75	2.87	−0.92	−0.72	0.17	2.30	0.05
W-L	All institutions	2.56	3.02	1.25	0.82	−0.01	4.29	0.00
	Individuals	2.69	3.17	0.40	0.23	−0.01	4.56	0.00
Panel C: Institutions grouped by business type								
V-G	**Banks**	**1.84**	**2.97**	**−0.22**	**−0.35**	**0.17**	**2.05**	**0.08**
	Insurance	1.82	3.00	−0.73	−0.80	0.17	2.41	0.04
	All others	1.82	2.98	−0.44	−0.46	0.17	2.40	0.04
W-L	**Banks**	**2.63**	**3.07**	**0.17**	**0.20**	**−0.01**	**4.26**	**0.00**
	Insurance	2.66	3.15	0.27	0.21	−0.01	4.76	0.00
	All others	2.61	3.10	1.41	1.07	0.00	4.76	0.00
Panel D: Institutions grouped by size								
V-G	Smallest	1.48	2.54	1.81	3.54	0.25	1.96	0.09
	2	**1.35**	**2.25**	**2.08**	**3.04**	**0.23**	**1.56**	**0.18**
	3	**1.27**	**2.10**	**2.22**	**3.31**	**0.24**	**1.47**	**0.20**
	Largest	1.87	3.08	−1.15	−1.09	0.17	2.34	0.05
W-L	Smallest	3.31	4.43	−3.72	−5.67	0.22	6.47	0.00
	2	**3.07**	**3.60**	**−1.91**	**−1.96**	**0.02**	**4.48**	**0.00**
	3	**3.01**	**3.48**	**−1.44**	**−1.49**	**0.01**	**4.21**	**0.00**
	Largest	2.54	3.02	1.84	1.27	0.00	4.48	0.00
Panel E: Institutions grouped by past returns								
V-G	Low returns	2.07	3.48	0.72	2.63	0.21	3.94	0.00
	2	1.80	3.06	1.61	2.93	0.22	2.81	0.02
	3	**1.82**	**2.87**	**0.43**	**0.50**	**0.16**	**2.21**	**0.06**
	High returns	**2.23**	**3.69**	**−0.81**	**−2.58**	**0.21**	**3.72**	**0.00**
W-L	Low returns	1.98	2.91	−2.43	−7.79	0.36	4.22	0.00
	2	2.74	3.50	−3.20	−4.36	0.14	4.51	0.00
	3	**1.64**	**1.99**	**4.30**	**3.88**	**0.11**	**2.69**	**0.03**
	High returns	**1.39**	**2.03**	**2.83**	**7.96**	**0.37**	**3.46**	**0.01**
Panel F: Institutions grouped by past growth								
V-G	Low growth	1.89	3.23	1.02	3.01	0.23	3.20	0.01
	2	1.82	3.03	1.23	1.95	0.19	2.60	0.03
	3	2.00	3.24	−0.83	−0.86	0.16	2.46	0.04
	High growth	2.13	3.56	−1.41	−2.55	0.21	3.44	0.01
W-L	Low growth	2.56	3.61	−2.77	−6.73	0.29	4.99	0.00
	2	2.74	3.43	−3.19	−3.79	0.11	4.63	0.00
	3	2.13	2.54	3.32	2.52	0.04	3.61	0.00
	High growth	1.83	2.53	4.39	6.60	0.28	3.97	0.00
Panel G: Institutions grouped by turnover								
V-G	**Low turnover**	**1.74**	**2.77**	**0.69**	**1.07**	**0.17**	**1.79**	**0.12**
	2	1.70	2.87	2.33	2.88	0.22	2.28	0.05
	3	1.84	3.16	−2.25	−3.20	0.23	2.72	0.02
	High turnover	1.96	3.30	−0.88	−2.49	0.21	3.17	0.01
W-L	**Low turnover**	**2.83**	**3.26**	**−1.28**	**−1.43**	**0.01**	**4.32**	**0.00**
	2	2.82	3.43	−3.29	−2.93	0.06	4.47	0.00
	3	2.61	3.21	3.03	3.09	0.07	4.73	0.00
	High turnover	2.42	3.00	1.60	3.36	0.09	4.43	0.00

Table 6 (*continued*)

Portfolio	Institutional group used as a factor	a	$t(a)$	INST	t(INST)	R^2	GRS F	F pval
Panel H: Institutions grouped by market cap of holdings								
V-G	Small stocks	1.65	2.90	0.82	3.91	0.27	2.39	0.04
	2	1.45	2.61	2.26	4.83	0.31	2.10	0.07
	3	1.92	3.22	−2.11	−2.24	0.20	2.48	0.04
	Large stocks	2.00	3.58	−2.03	−4.55	0.30	2.91	0.02
W-L	Small stocks	2.80	3.41	−0.76	−2.52	0.04	5.01	0.00
	2	2.92	3.53	−1.70	−2.44	0.04	4.75	0.00
	3	2.51	3.02	2.71	2.07	0.02	4.60	0.00
	Large stocks	2.47	3.04	1.96	3.02	0.07	4.69	0.00
Panel I: Institutions grouped by B/M ratio of holdings								
V-G	Low B/M stocks	1.55	3.89	−2.07	−12.07	0.64	4.00	0.00
	2	1.87	3.25	−2.57	−3.66	0.26	2.56	0.03
	3	**1.08**	**1.97**	**2.70**	**5.69**	**0.36**	**1.29**	**0.27**
	High B/M stocks	**0.76**	**1.93**	**1.78**	**12.62**	**0.66**	**1.76**	**0.13**
W-L	Low B/M stocks	2.93	4.28	2.21	7.49	0.33	6.02	0.00
	2	2.60	3.16	2.45	2.45	0.04	5.17	0.00
	3	**3.50**	**4.42**	**−3.15**	**−4.60**	**0.15**	**6.15**	**0.00**
	High B/M stocks	**3.57**	**4.74**	**−1.55**	**−5.80**	**0.23**	**6.27**	**0.00**
Panel J: Institutions grouped by momentum of holdings								
V-G	Low ret stocks	1.85	3.51	1.14	6.00	0.37	4.80	0.00
	2	1.56	2.78	2.01	4.48	0.30	2.62	0.03
	3	1.97	3.23	−1.25	−1.64	0.19	2.44	0.04
	High ret stocks	2.21	4.01	−1.29	−5.21	0.33	4.66	0.00
W-L	Low ret stocks	2.56	4.25	−2.20	−10.13	0.48	5.55	0.00
	2	2.98	3.81	−2.69	−4.30	0.13	5.11	0.00
	3	2.27	2.74	2.78	2.68	0.05	4.03	0.00
	High ret stocks	1.83	2.87	2.66	9.24	0.43	4.39	0.00

Table A1
Quarterly stock returns regressed on IO and other characteristics, 1980–2007.

The table reports Fama-MacBeth cross-sectional regressions (slope estimates are followed by t-statistics) of quarterly stock returns (in percent) on institutional ownership (IO) and other firm characteristics. The left-hand columns use all firms, while the right-hand columns use only firms with market cap above the NYSE median. Regressors are measured at the end of the prior quarter and winsorized at the 1st and 99th percentiles. IO is the fraction of a firm's shares held by institutions; LogSize is log market cap; LogB/M is log book equity for the most recent fiscal of year (with a four-month delay) minus LogSize; $\text{Returns}_{-12\text{ to }-2}$ are returns from month −12 to −2; $\text{Returns}_{-36\text{ to }-13}$ are returns from month −36 to −13; $\text{Volatility}_{-12\text{ to }-1}$ is the daily standard deviation of returns during the prior 12 months; Beta is the market beta estimated from at least 24 and up to 60 months of past monthly returns; $\text{Turnover}_{-12\text{ to }-1}$ equals shared traded divided by shares outstanding for the prior 12 months; $\text{Issuance}_{-12\text{ to }-1}$ is the log growth in split-adjusted shares outstanding during the prior 12 months; Accruals_{-1} are operating accruals, as per Sloan (1996); Asset growth_{-1} is the log growth in the book value of total assets during the prior fiscal year; and ROA_{-1} is earnings per share before extraordinary items divided by lagged assets per share. N is the average number of firms in the sample. All regressions require firms to have data for LogSize, LogB/M, $\text{Returns}_{-12\text{ to }-2}$, and IO. Returns, market cap, shares outstanding, and turnover come from CRSP, accounting data come from Compustat, and institutional holdings come from Thomson Financial.

	All stocks				Large stocks			
LogSize	−0.24		−0.37	−0.35	−0.11		−0.18	−0.24
	−1.25		−2.11	−3.52	−0.71		−1.09	−1.82
LogB/M	1.57		1.50	0.67	0.68		0.68	0.52
	5.29		5.11	3.10	2.09		2.11	2.04
$\text{Returns}_{-12\text{ to }-2}$	3.19		3.19	2.80	2.70		2.71	2.73
	5.79		5.71	7.28	3.87		3.88	4.78
IO		**−0.27**	**1.82**	**1.95**		**0.93**	**1.20**	**0.62**
		−0.21	**2.58**	**3.24**		**1.40**	**1.77**	**1.05**
$\text{Returns}_{-36\text{ to }-13}$				−0.13				0.09
				−0.53				0.29
$\text{Volatility}_{-12\text{ to }-1}$				−1.61				−11.71
				−0.42				−1.77
Beta				0.56				0.20
				1.58				0.42
$\text{Turnover}_{-12\text{ to }-1}$				−9.84				1.68
				−3.66				0.64
$\text{Issuance}_{-12\text{ to }-1}$				−2.84				−2.54
				−5.20				−3.66
Accruals_{-1}				−2.68				−2.47
				−3.04				−1.92
Asset growth_{-1}				−2.77				−1.36
				−8.14				−3.24
ROA_{-1}				3.48				4.53
				3.20				2.74
N	4,661	4,661	4,661	3,633	1,090	1,090	1,090	906

6. Conclusions

The performance of institutional investors has been the subject of much research. Prior studies suggest that institutions have some stock-picking skill even though they deliver mediocre returns, at best, to their clients. That view has important effects on how we think about institutions' role in capital markets, the economics of the money management industry, and market efficiency more generally. For example, it supports Berk and Green's (2004) contention that many stylized facts about mutual fund performance and flows are consistent with a rational, competitive mutual fund industry.

My results provide a more pessimistic view of the value added by institutional investors. Quite simply, institutions as a whole seem to do little more than hold the market portfolio, at least from the standpoint of their pre-cost and pre-fee returns. Institutions' aggregate returns almost perfectly mimic the value-weighted index, with an economically small CAPM alpha of 0.08% quarterly, and institutions take essentially no aggregate bet on any of the most important firm characteristics known to predict stock returns. The implication is that, to the extent that institutions deviate from the market portfolio, they seem to bet primarily on idiosyncratic returns—bets that do not deliver much value.

The same conclusions apply, for the most part, to different types of institutions. I find modest stock-picking ability relative to the CAPM for banks, medium-sized and low-turnover institutions, institutions with strong past performance, and institutions that invest in high-B/M or high-momentum stocks, but their performance is almost entirely explained by the B/M and momentum effects in returns. Only two groups out of 31 total have a four-factor alpha that is greater than 0.17% quarterly. And even groups that have some stock-picking ability relative to the CAPM do not take advantage of the risk-return opportunities presented by B/M and momentum portfolios. Put differently, the B/M and momentum effects can explain the groups' returns, but the groups' returns cannot, in turn, explain the B/M and momentum effects.

Table A2
IO-sorted portfolios, 1980–2007.

The table reports average quarterly excess returns (in percent) for institutional-ownership (IO) portfolios. Stocks are sorted into quintiles (using NYSE breakpoints) based on the fraction of a firm's shares held by institutions at the beginning of the quarter. The top row shows the average value-weighted IO of each portfolio. Returns-VW and Returns-IW are the portfolios' value-weighted and institutional-weighted excess returns, respectively (institutional weights are determined by institutions' holdings of each stock). Weight-MKT is the fraction of the market portfolio invested in each portfolio and Weight-INST is the fraction of institutions' total holdings invested in each portfolio. All numbers are time-series averages from 1980 to 2007. Returns and market values come from CRSP and institutional holdings come from Thomson Financial.

	IO portfolio				
	Low	2	3	4	High
IO	0.07	0.27	0.43	0.57	0.72
Returns-VW	1.41	2.11	2.19	2.16	2.25
Returns-IW	2.09	2.14	2.20	2.17	2.24
Weight-MKT	0.08	0.14	0.29	0.28	0.22
Weight-INST	0.01	0.09	0.26	0.32	0.33

Table A3
IO and firm characteristics, 1980–2007.

The table reports the correlation between institutional ownership (IO) and firm characteristics and slopes from Fama-MacBeth regressions of IO on all of the characteristics taken together. The correlations and regression slopes are estimated quarterly; the table reports the average (Avg), standard deviation (Std), and fraction that are positive (Pos) of the quarterly estimates. The left-hand columns use all firms while the right-hand columns use only firms with market cap above the NYSE median. All variables other than IO are winsorized at the 1st and 99th percentiles. IO is the fraction of a firm's shares held by institutions; LogSize is log market cap; LogB/M is log book equity for the most recent fiscal of year (with a 4-month delay) minus LogSize; $\text{Returns}_{-12\text{ to }-2}$ are returns from month −12 to −2; $\text{Returns}_{-36\text{ to }-13}$ are returns from month −36 to −13; $\text{Volatility}_{-12\text{ to }-1}$ is the daily standard deviation of returns during the prior 12 months; Beta is the market beta estimated from at least 24 and up to 60 months of past monthly returns; $\text{Turnover}_{-12\text{ to }-1}$ equals shared traded divided by shares outstanding for the prior 12 months; $\text{Issuance}_{-12\text{ to }-1}$ is the log growth in split-adjusted shares outstanding during the prior 12 months; Accruals_{-1} are operating accruals, as per Sloan (1996); Asset growth_{-1} is the log growth in the book value of total assets during the prior fiscal year; and ROA_{-1} is earnings per share before extraordinary items divided by lagged assets per share. All of the estimates require firms to have data for LogSize, LogB/M, $\text{Returns}_{-12\text{ to }-2}$, and IO. Returns, stock prices, shares outstanding, and turnover come from CRSP, accounting data come from Compustat, and institutional holdings come from Thomson Financial.

Characteristic	All stocks						Large stocks					
	Correlation			Regression slope			Correlation			Regression slope		
	Avg	Std	Pos	Avg	Std	Pos	Avg	Std	Pos	Avg	Std	Pos
LogSize	0.68	0.03	1.00	0.07	0.01	1.00	0.11	0.14	0.82	0.02	0.02	0.85
LogB/M	−0.10	0.08	0.05	0.02	0.02	0.86	−0.06	0.07	0.23	−0.02	0.02	0.26
$\text{Returns}_{-12\text{ to }-2}$	0.09	0.09	0.79	−0.02	0.02	0.19	0.03	0.09	0.63	−0.01	0.05	0.45
$\text{Returns}_{-36\text{ to }-13}$	0.20	0.11	0.93	−0.02	0.02	0.14	0.03	0.08	0.67	−0.02	0.04	0.26
$\text{Volatility}_{-12\text{ to }-1}$	−0.42	0.07	0.00	−0.46	0.34	0.00	0.05	0.11	0.76	−1.49	0.67	0.00
Beta	0.10	0.11	0.77	0.02	0.02	0.89	0.18	0.13	0.96	0.08	0.08	0.79
$\text{Turnover}_{-12\text{ to }-1}$	0.27	0.12	0.99	0.71	0.30	1.00	0.29	0.11	0.96	1.14	0.60	1.00
$\text{Issuance}_{-12\text{ to }-1}$	−0.09	0.05	0.08	−0.08	0.04	0.02	−0.05	0.06	0.26	−0.13	0.10	0.08
Accruals_{-1}	0.02	0.03	0.72	−0.06	0.07	0.20	0.01	0.04	0.64	−0.02	0.13	0.45
Asset growth_{-1}	0.07	0.05	1.00	−0.03	0.02	0.07	0.00	0.06	0.50	−0.04	0.06	0.26
ROA_{-1}	0.28	0.04	1.00	0.11	0.04	0.99	0.06	0.05	0.90	0.10	0.16	0.69

Appendix A

Section 3 shows that institutions, taken in aggregate, have little stock-picking skill and place almost no bet on the main characteristics known to predict returns. For comparison with prior studies, this Appendix explores the same issues via cross-sectional regressions, i.e., I test whether institutional ownership (IO), equal to the fraction of a firm's shares owned by institutions, is correlated with a firm's future returns and the firm characteristics considered in Section 3.

Table A1 reports Fama-MacBeth regressions of quarterly stock returns on IO and other characteristics

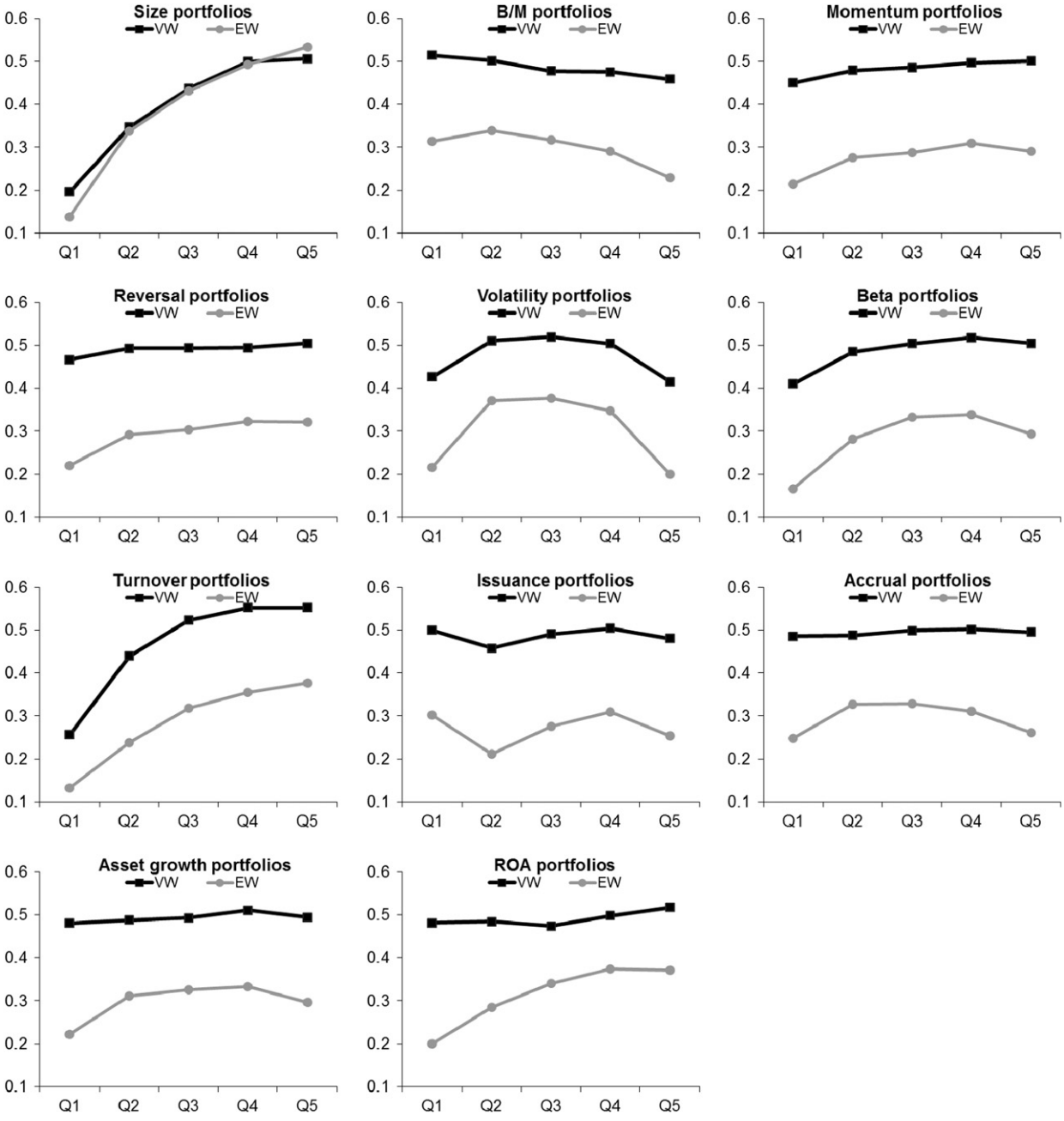

Fig. A1. Institutional ownership for characteristic-sorted portfolios, 1980–2007. The figure shows equal-weighted (EW) and value-weighted (VW) institutional ownership for stock quintiles (Q1–Q5) sorted by size (market value), B/M (book equity for the most recent fiscal of year divided by size), momentum (returns from month −12 to −2), reversals (returns from month −36 to −13), volatility (daily standard deviation during the prior 12 months), beta (estimated from at least 24 and up to 60 months of past monthly returns), turnover (shared traded divided by shares outstanding for the prior 12 months), issuance (growth in split-adjusted shares outstanding during the prior 12 months), accruals (as per Sloan, 1996), asset growth (growth in the book value of total assets during the prior fiscal year), and ROA (earnings per share before extraordinary items divided by lagged assets per share). Returns, market cap, shares outstanding, and turnover come from CRSP, accounting data come from Compustat, and institutional holdings come from Thomson Financial.

(t-statistics are reported below the slopes). The regressors, defined in the table, are measured at the end of the prior quarter and winsorized at the 1st and 99th percentiles. Results in the left-hand columns use all stocks, while results in the right-hand columns use only stocks larger than the NYSE median value.

IO has little direct correlation with future returns (used alone, IO has a t-statistic of -0.21 for all stocks and 1.40 for large stocks) but becomes statistically significant after controlling for size, B/M, and momentum (a t-statistic of 2.58 for all stocks and 1.77 for large stocks). A 25 percentage point increase in IO (roughly one standard deviation) predicts an increase in next quarter's return of 0.46% in regressions with all stocks and 0.30% in regressions with large stocks, assuming no change in size, B/M, or momentum. The slope on IO remains significant when other characteristics are added to the all-stock regression but the t-statistic drops to 1.05 in the large-stock regression. In short, IO seems to have reliable predictive power for returns in the full sample but relatively weak predictive power for larger stocks.

The weaker effect among large stocks helps explain why institutions' aggregate returns only slightly beat the market index. Additional evidence is provided in Table A2, which reports summary statistics for IO-sorted portfolios (quintiles based on NYSE breakpoints). Like the regressions in Table A1, the portfolios suggest that IO is positively related to expected returns: high-IO stocks outperform low-IO stocks by a significant 0.84% quarterly (value-weighted excess returns, with a t-statistic of 2.08). But the table also shows that the effect is largely concentrated in portfolio 1—the spread between portfolios 1 and 2 is 0.70% quarterly, while the spread between portfolios 2 and 5 is 0.14% quarterly—which makes up a small fraction of both the market portfolio (8%) and the aggregate institutional portfolio (1%). Thus, while institutions seem to have some stock-picking skill, the impact on their aggregate returns is small.

Table A2 also shows that, to the extent institutions do invest in low-IO stocks, they tend to hold better ones: the institutional-weighted average return for low-IO stocks is significantly higher than the value-weighted average return, 2.09% versus 1.41% quarterly (t-statistic of 2.42). But, again, the impact on institutions' aggregate returns is tiny because low-IO stocks represent just 1% of their holdings.

Table A3 and Fig. A1 explore the correlation between IO and firm characteristics. Statistical inference in these tests is complicated by the fact that IO is very persistent (see also footnote 5 in the text). For this reason, Gompers and Metrick (2001) and Bennett, Sias, and Starks (2003) simply emphasize how frequently their quarterly estimates are positive versus negative. I follow that approach here. In particular, Table A3 shows that, in the full sample of stocks, IO is positively correlated with firm size, momentum, long-term past returns, beta, turnover, asset growth, and ROA in more than 75% of the quarters and negatively correlated with B/M, volatility, and share issuance in more than 90% of the quarters. The results are similar, but weaker, among large stocks (only the correlation with volatility changes sign). The results are also similar in multiple regressions that include all variables, with three notable differences: (1) The relation between IO and B/M becomes positive in the full sample of stocks, while the simple correlation is negative (the slope and correlation are both negative among large stocks); (2) the slopes on momentum, long-term past returns, and asset growth all become negative, compared with simple correlations that are all positive; and (3) the slope on volatility is strongly negative for both samples of stocks, whereas the simple correlation is negative for all stocks but positive for large stocks. These results are generally consistent with the findings of Gompers and Metrick and Bennett, Sias, and Starks (to the extent our variables overlap).

The strength of the correlations is easiest to see in Fig. 1A, which shows how IO varies across characteristic-sorted portfolios. Focusing on the value-weighted results, IO varies substantially across size, volatility, beta, and turnover portfolios and has some correlation with all of the other variables (except perhaps with accruals). The patterns are typically more pronounced for equal-weighted IO. The bottom line is that institutions clearly display a preference for certain types of stocks—preferences that show up significantly when IO is regressed on firm characteristics—but, as emphasized in Section 3, the impact on institutions' aggregate portfolio weights is quite small.

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