

The Cost of Active Investing

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ABSTRACT

I compare the fees, expenses, and trading costs society pays to invest in the U.S. stock market with an estimate of what would be paid if everyone invested passively. Averaging over 1980 to 2006, I find investors spend 0.67% of the aggregate value of the market each year searching for superior returns. Society's capitalized cost of price discovery is at least 10% of the current market cap. Under reasonable assumptions, the typical investor would increase his average annual return by 67 basis points over the 1980 to 2006 period if he switched to a passive market portfolio.

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How much do investors spend trying to beat the market? To answer this question, I start by estimating the total amount society spends to invest. I measure four components: the fees and expenses investors pay for mutual funds, including open-end funds, closed-end funds, and exchange-traded funds; the investment management costs of institutional investors; the fees investors pay for hedge funds and funds of hedge funds; and the costs all investors pay to trade. I then compare these costs to what society would pay if all investors held a passive market portfolio. The difference is the cost of active investing.

Consider a small but representative investor whose initial investment strategy is the value-weight combination of all investors' strategies. Because the value-weight combination of all investors' portfolios is the market portfolio, the representative investor's initial return is the gross return on the market minus the value-weight average of all investors' costs. How would his return be affected if he switched to a passive market portfolio? My answer depends on a key assumption: there is no net transfer between the passive market portfolio and other investors. The manager of the passive portfolio, for example, does not lose to or take advantage of other investors when he trades. With this assumption, which I support with empirical evidence below, the return on a passive market portfolio is the gross market return minus the cost of investing passively. Thus, a small representative investor who switches to a passive market portfolio increases his return by the difference between the value-weight average of all investors' costs and the cost of investing passively. Equivalently, his premium for switching is the difference, per dollar invested, between society's total cost of investing and the cost in the passive scenario. (The logic here is similar to the logic in Malkiel (1973), Sharpe (1991), and Bogle (2007).)

The no-net-transfer assumption guarantees that, in aggregate, the search for trading gains is doomed. Before considering costs, a trading gain for one active investor must be a loss for another. When we include their higher fees, expenses, and trading costs, it is clear that active investors are playing a negative sum game. This does not mean, however, that the cost of active investing is a pure loss to society. In aggregate, active investors almost certainly improve the accuracy of financial prices. This, in turn, improves society's allocation of resources. Thus, my estimate of the cost of active investing also measures society's cost of price discovery. I offer no evidence on whether society is buying too little or

too much of this good. Price discovery, however, is an externality – each active investor pays the full cost of his efforts but captures only a tiny slice of the benefit – so there is no reason to think active investors purchase the optimal amount of price discovery.

I limit the scope of the paper by considering only the costs of investing in U.S. equity. Most of the results are for 1980 to 2006, but when they are available, I include data for 2007. The average of the annual estimates for 1980 to 2006 implies investors spend 0.67% of the value of all NYSE, Amex, and NASDAQ stocks each year trying to beat the market.¹ Under the no-net-transfer assumption, this means that an investor who holds a passive market portfolio outperforms the value-weight average of all active and passive investors by 67 basis points a year from 1980 to 2006.

If the expected real return on U.S. equity is roughly 6.7% and we assume the annual dollar cost of active investing will not increase in the future, society's capitalized cost of price discovery is about 10% of the current value of the market. Estimates of the equity risk premium in Fama and French (2002) and Graham and Harvey (2005), however, suggest that the expected real return on the market is substantially below 6.7%. If so, the capitalized cost of price discovery is above 10% of the current market cap. Moreover, the data imply that the cost of active investing will grow with the aggregate market cap. This expected growth pushes the capitalized cost even higher. Thus, 10% of the current value of the market is a conservative estimate of the capitalized cost of price discovery.

The first step in my analysis, in Section I, is to estimate the allocation of publicly traded U.S. equity among groups of investors. Direct holdings by individuals decline a lot over time. Individuals hold 47.9% of the market in 1980 and only 21.5% in 2007. This decline is matched by an increase in the holdings of open-end mutual funds, from 4.6% in 1980 to 32.4% in 2007. The shift from direct holdings to open-end funds has an important implication. Some argue that mistakes by retail investors are a reliable source of trading gains for other investors. If so, competition for these gains must be fierce later in the sample as an expanding group of professional investors fights for a shrinking pool of mistakes.

¹ Bogle (2008) offers a more inclusive estimate of society's cost of investing for 2007.

I examine the cost of mutual funds in Section II. Driven by a steady decline in the loads open-end fund investors pay, the fees and expenses for mutual funds fall from 2.08% of assets under management in 1980 to 0.95% in 2006. The investment management costs for institutions, which I estimate in Section III, are lower. Their value-weight average cost is only 34 basis points in 1980 and 23 basis points in 2006. Institutional costs decline over time for two reasons. First, the costs they pay for active and passive investments decline. Second, and more interesting, institutions shift a large portion of their U.S. equity holdings from active to passive over time.

In Section IV, I use data on individual hedge funds to estimate the fees clients pay to invest in U.S. equity-related funds. The average annual hedge fund fee for 1996 to 2007 is a hefty 4.26% of assets, and, because they pay two layers of fees, the average for clients who buy through funds of hedge funds is even higher, 6.52% per year. My analysis of trading costs, in Section V, follows Stoll (1993). I use data from the Securities and Exchange Commission (SEC) to measure the total commissions and market-making gains brokers and dealers earn by trading U.S. stocks.

My bottom line is in Section VI. I compare the resources investors actually spend in the U.S. market – the fees and expenses paid for mutual funds, the investment management costs paid by institutions, the fees paid to hedge funds and funds of funds, and the transaction costs paid by all traders – with what investors would spend if everyone followed a passive strategy. The difference between the actual and passive estimates is the cost of active investors' search for superior returns.

Standardized by the total value of NYSE, Amex, and NASDAQ stocks, the amount investors spend trying to beat the market is surprisingly stable; the cost is between 61 and 74 basis points in 24 of the 27 years from 1980 to 2006 and in every year after 1990. Although the total amount is relatively constant, the components change a lot over time. Because the amount invested in mutual funds increases so much through time, for example, the expenditures on fund fees and expenses increase from 0.11% of total market cap in 1980 to 0.32% in 2006. The fees for U.S. equity-related hedge fund investments also grow a lot, from essentially zero early in the period to 0.13% of the total value of U.S. equity in 2006. These increases are offset by a dramatic drop in the cost of trading. Despite a sharp increase in trading

volume, the aggregate cost of trading U.S. equity falls from 0.55% of total market cap in 1980 to only 0.21% in 2006. Thus, measured relative to the value of U.S. equity, investors shift their expenditures from trading to asset management, but the total amount spent to beat the market is never far from the 1980 to 2006 average of 67 basis points.

My estimate of the resources consumed in the search for superior returns does not include several potentially important costs. Retail brokers, for example, borrow from their customers at below market rates and make margin loans to them at above market rates. Although the income from these activities is part of the revenue firms earn for trading – and part of their customers' cost of trading – I miss this in my estimate of the resources investors spend trying to beat the market. Fees for wealth management, such as financial and estate planning, are not a cost of active investing, but my estimate should include advisor fees that are for advice about undervalued stocks and winning investment strategies.

I intentionally omit transfers between investors. An active investor, for example, may pay a large market impact cost to trade quickly. If the counterparty is a broker, this trading cost is included in the market-making gains the broker reports to the SEC, and it is in my estimate of the resources society spends to trade. If the counterparty is another investor, however, the market impact cost is just a transfer, reducing one investor's return and increasing another's by the same dollar amount. Thus, it is not a cost to society. Similarly, to a taxable investor choosing between active and passive strategies, the extra tax burden that typically accompanies active trading is a cost. From society's perspective, however, extra taxes are just a transfer, so I do not include them in my estimate of the resources society spends to beat the market.

Most security lending payments are also transfers – one investor pays to borrow the security and the other receives the payment – so they are appropriately excluded from my estimate of the cost of active investing. The trading desk that arranges a security loan, however, typically retains part of the payment as compensation for its services and this does belong in my estimate. Similarly, the interest retail brokers earn lending securities held in street name is part of their compensation for providing trading services. The results below miss both of these costs.

I overstate the cost of active investing in at least two ways. First, the fees and expenses I measure include manager compensation. Many managers invest in their own funds, so my estimates include payments managers make to themselves. This is not much of a problem for mutual funds since managers own only a small fraction of aggregate fund assets, but it may be significant for hedge funds.

More important, I assume most investors switch to a market portfolio in the passive scenario. (Individuals with direct stock holdings and employee stock ownership plans continue to hold their actual portfolios.) There are several reasons, however, why passive investors might choose something other than a market portfolio. Taxable investors have an incentive to avoid realizing short-term gains and to defer long-term gains. Investors with specific social concerns might favor some securities over others. And, in the spirit of Merton (1973) or Ross (1976), some investors might shift away from the market portfolio because they prefer a different multifactor risk-return trade-off. To the extent that such deviations from the market portfolio increase the cost of investing in the passive scenario, I overstate the incremental cost of active investing.

Finally, I focus on the monetary cost of active investing, but most active investors bear a second cost: their portfolios are not as well diversified as the market portfolio. The fact that the average investor could increase his return and lower his risk simply by switching to a passive market portfolio raises an obvious question. Why do active investors continue to play a negative sum game? I summarize the paper and address this question in Section VII. An extensive Data Appendix completes the paper.

I. Allocations

Table I describes the ownership of U.S. common equity from 1980 to 2007. Most of the information I use to measure these allocations is from the December 6, 2007 release of the Federal Reserve Board's Flow of Funds Accounts, which reports the total amount of corporate equity held by various investor groups. The adjustments I make to convert these estimates to the allocations in Table I are described in the Data Appendix.

There are several interesting patterns in the allocations in Table I. In 1980 individuals hold the biggest share of U.S. common equity, 47.9%. Direct holdings shrink to about 27% in 1994 to 1996, jump back to 36% in 1999, 2000, and 2001, and then fall steadily to only 21.5% at the end of October 2007. The growth in open-end mutual funds is equally dramatic, from 4.6% in 1980 to 32.4% in 2007, and although the yearly changes are not perfectly aligned, the total increase about matches the reduction in direct holdings.

The shift from direct holdings to open-end funds has at least two important implications. First, in the analysis below, only the fees and expenses for hedge funds are higher than those for open-end funds. Since I assume there are no fees or expenses associated with direct holdings, the shift to funds pushes up my estimate of society's cost of investing. But there is also a benefit. Most people who hold stocks directly are more poorly diversified. (See, for example, Barber and Odean (2000) or Goetzmann and Kumar (2008).) Thus, although the shift to open-end funds reduces my estimate of society's overall return from investing, it also reduces the typical investor's risk. Second, some claim that retail investors are a reliable source of trading gains for mutual funds, hedge funds, and other institutional investors. If so, the shift from direct holdings to open-end funds suggests these gains become scarcer later in the sample as an expanding pool of professional managers competes for a shrinking pool of retail mistakes.

The Fed's allocations include not only the U.S. equity I focus on, but also foreign equity owned by U.S. residents and institutions. Table I reports the value of these foreign holdings as a fraction of U.S. investors' total equity portfolio. Readers familiar with the literature seeking to explain why investors do not diversify internationally (e.g., French and Poterba (1991), Karolyi and Stulz (2003), and Ahearne, Grier, and Warnock (2004)) may be surprised that this fraction grows from 2.0% in 1980 and 8.5% in 1990 to a substantial 27.2% in 2007. Thus, in 2007 more than one-fourth of the average U.S. investor's equity portfolio is in foreign stocks.

Table I shows a fairly steady decline in the share of U.S. equity owned by foundations, endowments, and other nonprofits, from 8.3% in 1980 to 6.0% in 1985 and 2.3% in 2007. One might be tempted to attribute the decline to the well-known shift by endowments toward alternative investments.

However, Greenwich Associates, a consulting and research firm, reports that the fraction of endowment assets invested in domestic equity drops by less than one-third between 1985 and 2006, from 47.4% to 34.2%, so this is not the full explanation. Part of the decline may be an artifact of the process I use to disentangle allocations to nonprofits and households in the Flow of Funds Accounts (described in the Data Appendix). If so, the decline in the direct holdings of individuals is even bigger than the estimates in Table I imply.

The allocation to defined contribution plans in Table I remains close to 4% throughout the period, but this is a bit misleading. To avoid double counting, the allocations to defined contribution (DC) and defined benefit (DB) plans in Table I do not include the mutual funds they own. The omission has only a modest impact on the estimates for DB plans, but it has a big impact on the estimates for DC plans. Supplemental data in the Flow of Funds Accounts imply that the mutual fund holdings of DC plans grow from 0.3% of the value of the U.S. market in 1985 to a substantial 8.5% in 2006. Although these estimates include fixed income and foreign equity funds, it is clear that by 2006 DC plans own much more U.S. equity than the 3.8% allocation in Table I suggests.

Finally, in terms of their net holdings of U.S. equity, hedge funds are relatively unimportant. They grow from 0.3% of U.S. equity in 1990 to 2.2% in 2007. But we shall see that hedge funds play a big role when we look at costs.

II. Average Fees and Expenses for Mutual Funds

My estimates of the resources spent trying to beat the market combine the allocations to various groups, in Table I, with estimates of each group's cost of investing. To be conservative, I assume the only expenses individuals incur when they hold shares directly are trading costs, which are included in the aggregate estimates below. I ignore, for example, the time they spend managing their portfolios and the cost of subscriptions to Value Line and Morningstar. Similarly, I assume employee stock ownership plans (ESOPs) have no investment management costs.

I use reported expense ratios, from the mutual fund database maintained by the Center for Research in Security Prices (CRSP), and estimates of annuitized loads, from the Investment Company Institute (ICI), to measure the cost of investing in open-end funds. The average expense ratios in Table II weight funds by their assets under management at the beginning of the year, and include only those that invest predominantly in U.S. common equity. (The Data Appendix describes the steps used to identify U.S. equity funds. Fama and French (2008) analyze the returns on this set of funds.)

The value-weight average expense ratio for open-end funds grows from 70 basis points in 1980 to 96 basis points in 1988. It remains in a narrow band over the next 14 years and then falls from 98 basis points in 2002 to 85 in 2006. One might suspect that the decline in the average expense ratio at the end of the period reflects a shift from active open-end funds to lower priced passive funds. Table II shows that there is a shift to passive funds, from 1.0% of fund assets in 1984 to 12.4% in 2002, but it occurs before the average expense ratio falls. The growth of exchange-traded funds (ETFs) and competitive pressure from passive open-end funds, however, probably contribute to the decline.

The behavior of the average annuitized load in Table II is striking. It falls almost monotonically from 149 basis points in 1980 to only 15 basis points in 2006. (Barber, Odean, and Zheng (2005) make a similar point.) This drop, which is driven mostly by a shift toward no-load funds, has a big impact on the total fees and expenses paid by investors. The annual costs of open-end funds shrink from 2.19% of assets under management at the beginning of the period to 1.00% at the end.

Because closed-end funds and ETFs trade on exchanges, customers pay brokerage commissions rather than loads when they buy and sell these funds. The commissions are part of the aggregate trading costs measured below. Thus, I include only expense ratios in the fees and expenses for investments in U.S. equity closed-end funds and ETFs. The data I have on these funds, from Morningstar, are not as complete as those for open-end funds; I can compute annual value-weight average expense ratios for closed-end funds only from 2000 to 2006 and for ETFs from 2001 to 2006. I use the averages of these annual estimates before 2000 and 2001. Fortunately, ETFs are 0.5% or less of U.S. equity before 2001 and the allocation to closed-end funds never exceeds 1.1%, so imprecise estimates of the annual average

expense ratios have little effect on my results. The average of the annual estimates for U.S. equity closed-end funds in Table II, 1.01%, is a bit higher than the average expense ratio for open-end funds over the same period, 0.93%. The 2001 to 2006 average for ETFs is only 19 basis points, which is not surprising given that most ETFs are variants of passive funds.

III. Institutional Costs

The information I use to measure the investment expenses of institutional investors comes from two sources. CEM Benchmarking, Inc., a Toronto-based firm that monitors the investment activities of pension plan sponsors, provided annual estimates of the costs incurred by defined benefit and defined contribution plans when they make active and passive investments in the U.S. stock market. I combine these with estimates of the active and passive U.S. equity allocations of institutional investors from Greenwich Associates.

The Greenwich estimates are from surveys of defined benefit plans, defined contribution plans, public funds, and nonprofits, which include foundations and endowments through 1999 and only endowments thereafter. Greenwich has conducted surveys annually since 1986 and the respondents control a substantial portion of all institutional investments. For example, 1,950 institutions with more than six trillion dollars participated in the 2006 survey.

The results of the Greenwich surveys are in Table III. All four groups of institutions increase their allocation to passive over time. DB plans show the smallest increase, from 21.1% in 1986 to 31.2% in 2006. Nonprofits start with a meager 2.8% of their U.S. equity holdings invested passively, but finish with 28.7%. Public funds have the highest passive allocation throughout the period, with 25.8% in 1986 and a substantial 52.7% in 2006.

CEM Benchmarking's estimates of the cost of active and passive investing are based on a smaller sample of institutions. In 2006, for example, CEM has information on 141 defined benefit plans and 99 defined contribution plans. CEM tends to focus on larger plans, however, so those in the 2006 sample have 2.78 trillion dollars in total assets, with more than one trillion invested in publicly traded U.S.

equity. The underrepresentation of smaller institutions probably has little impact on my estimates of the cost of active investing. First, because they have more assets to invest, larger institutions are more important for the aggregate values I am trying to measure. Second, estimates of what society spends to beat the market depend on the difference between the costs of active and passive investing. CEM's emphasis on large plans may reduce my overall estimates of the institutional cost of investing, but because economies of scale affect both active and passive costs, it has less effect on the difference.

CEM provides annual value-weight averages of the costs incurred by DB and DC pension plans for passive and active investments in U.S. common equity. The costs include auditing, consulting, oversight, and custodial charges, compensation and other employee costs, and investment management fees for externally managed strategies. The estimates for DB plans, which are available for 1991 to 2006, are in Table III. As expected, active strategies cost a lot more than passive strategies. The average of the annual estimates for active, 38.6 basis points, is eight times the average for passive, 4.8 basis points. Both passive and active costs decline over time. The average cost for active strategies in DB plans falls from 40.4 basis points in 1991 to 36.0 basis points in 2006, and the average cost for passive strategies falls from 7.9 basis points to only 2.9 basis points. The decline in costs is not caused by a change in the DB plans sampled. Similar declines are observed if the sample is limited to only plans with data for the whole 16-year period.

My annual estimates of the costs paid by (i) DB plans, (ii) public plans and state and local governments, and (iii) foundations, endowments, and other nonprofits, in Table III, combine the average costs of passive and active strategies in DB plans from CEM with the allocations between passive and active from Greenwich. Specifically, the investment management cost for a group is the passive cost for DB plans times the group's allocation to passive strategies plus the active cost times the group's allocation to active strategies. Since the CEM data are not available before 1991, I use the 1991 estimates of the cost of active and passive strategies for 1986 to 1990.

The CEM data for DC plans do not start until 1997. Perhaps because the sample of DC plans is smaller than the sample of DB plans, the annual cost estimates for DC plans (not reported) are more

volatile than the estimates for DB plans. Because of this volatility, I use the annual DB cost plus the average difference between the costs for DC and DB plans for 1997 to 2006 to measure the annual cost of active and passive DC strategies. The investment costs for DC plans are generally higher than the costs for DB plans. The average difference is 3.4 basis points for passive strategies and 18.2 basis points for active strategies.

The estimated costs for all four institutional groups in Table III decline between 1986 and 2006. The smallest drop is for DB plans, from 34 to 26 basis points. The cost for each of the other three groups declines by 12 or 13 basis points – from 50 to 37 basis points for DC plans, from 32 to 19 basis points for public funds, and from 39 to 27 basis points for nonprofits. These reductions are the result of the decline in the costs of active and passive strategies and, more important, the shift over time from active to passive investments. This shift toward passive strategies is in sharp contrast to the contemporaneous growth of hedge funds, examined next.

IV. Hedge Fund Fees

Hedge fund fees often have two components. A fee of “2 and 20,” for example, means that investors pay an annual management fee of 2% of the assets in the fund plus a performance fee of 20% of profits. Because of the performance fee, the aggregate compensation paid to hedge fund managers each year depends on the specific return earned by each fund in the industry. I use data from Hedge Fund Research (HFR) to estimate the fees on individual hedge funds and funds of hedge funds from May 1996 to December 2007.

Hedge funds trade stocks, bonds, currencies, and other securities in markets around the world. Since I am measuring the resources spent trying to beat the U.S. stock market, I have to estimate the fraction of hedge fund assets used in U.S. equity strategies. HFR assigns hedge funds to one of several categories, such as merger arbitrage, event driven, and sector funds. I use their categories to sort funds into three groups. I assume funds in the first group use 100% of their assets for equity strategies, those in the second use 50%, and those in the third do not use any of their assets for equity trading. I then use the

weight of the U.S. in the world equity portfolio to estimate the fraction of equity-related assets used for trading in the U.S. (The Data Appendix describes this process in detail.)

Table IV shows HFR's annual estimates of the assets invested in the hedge fund industry and my estimates of the assets in U.S. equity-related strategies. Total hedge fund assets grow rapidly during the sample period, from less than 40 billion dollars in 1991 to 185.8 billion in 1996 and 1,464.5 billion at the beginning of 2007. Investment in U.S. equity-related strategies keeps pace with the total; at the beginning of 2007 there are 458.6 billion dollars in these strategies.²

A large fraction of hedge fund assets is held by funds of funds. In 2007, for example, 655.9 billion dollars – about 45% of all hedge fund assets – are invested in funds of funds. The HFR database puts all funds of funds in the same category, so I am unable to isolate those that focus on U.S. equity-related strategies. In the analysis below I assume that funds of funds are invested proportionately between hedge funds that are related to U.S. equity and those that are not.

Table IV also reports annual value-weight averages of the fees for funds of funds and U.S. equity-related hedge funds for 1996 to 2007. Quoted hedge fund fees increase over the sample period. The value-weight average management fee rises from 0.92% in 1996 to 1.28% in 2007, and the average quoted performance fee rises from 18.24% to 19.15% over the same period. There is less variation in the average management fee for funds of funds, but their average quoted performance fee declines a lot over time, from 9.45% in 1996 and 11.41% in 1998 to 6.94% in 2007.

The often mentioned “2 and 20” overstates the typical hedge fund fee. In 2007, for example, the value-weight average management fee is 1.28%, not 2%, and the value-weight average quoted performance fee is 19.15%, not 20%. (These averages do not change much if I use all funds, not just U.S. equity-related assets.) The standard “1 and 10” is a better description of the average management fee for funds of funds, but it overstates the average quoted performance fee by about 3% after 2001.

² Because hedge funds use leverage and take long and short positions, the total assets in U.S. equity-related strategies, in Table IV, differ from the net holdings of U.S. equity implied by the allocations in Table I. The Data Appendix explains how I calculate the estimates in both tables.

How much do hedge fund investors pay to beat the market? Averaging over the annual value-weight averages for 1996 to 2007, the typical investor in U.S. equity-related hedge funds pays a management fee of 1.16% of assets and a realized performance fee of 3.11%. Equivalently, the hedge fund industry must generate average annual abnormal returns of 4.26% over this period for the typical investor to break even. The average performance fee is extraordinarily high in two of the first four years of the sample, 5.40% in 1997 and 5.91% in 1999. If we focus on the results for 2000 to 2007, the average drops a bit, but investors still pay an annual combined fee of 3.69% over this eight-year period.

Hedge fund clients who invest through funds of funds pay two layers of fees. Averaging over the annual averages for 1996 to 2007, the typical fund of fund investor pays 2.26% in fund of fund fees and 4.26% in hedge fund fees. Thus, the underlying hedge funds must generate an average abnormal annual return of 6.52% for him to break even. If we throw out the first four years, the averages are lower – 1.78% for the fund of fund fee and 5.47% for the total fee – but the threshold for investor success is still high.³

These estimates include only hedge fund and fund of fund fees. Among other things, they ignore the legal expenses, accounting and auditing fees, custody costs, and board fees that are paid by the funds. Although I am not able to measure these costs for hedge funds, I can use data from CRSP to infer the cost of comparable services for mutual funds. Specifically, the cost is the difference between a mutual fund's reported expense ratio and the sum of its management and 12b-1 fees, which are both available in the CRSP database after 2000. The average of the annual value-weight averages for U.S. equity mutual funds for 2001 to 2006 is 21 basis points.

My estimates of hedge fund costs also miss most of the payments they make to their prime brokers. These include financing costs, security lending fees, and charges for settling transactions done at other brokers. I do, however, capture the trading costs of hedge funds in the estimates I discuss next.

³ Brown, Goetzmann, and Liang (2004) use the TASS hedge fund database to estimate realized performance fees for 1995 to 2003, and their annual average is higher than mine in six of the eight years our periods overlap.

V. Trading Costs

Stoll (1993) develops a simple way to measure the aggregate cost of trading. The total commissions, bid-ask spreads, and other costs investors pay for trading services must equal the total revenue brokers and dealers receive for those services. As Stoll (1993) shows, one can measure this revenue with information from the Financial and Operational Combined Uniform Single (FOCUS) reports that registered securities firms must file with the Securities and Exchange Commission each year. The trading revenue in the FOCUS reports includes commissions, which firms earn when they facilitate agency trades as a broker, and the gains or losses firms earn from market making. The process I use to extract this information, which is described in the Data Appendix, is almost identical to that used in Stoll (1993).

The FOCUS reports do not allow me to estimate three important components of trading revenue. Firms trading for retail investors are able to borrow money from clients at below market rates (typically through cash sweep accounts), make margin loans to clients at above market rates, and earn revenue by lending securities held in street name, including those in margin accounts.

Consider Charles Schwab, a large discount brokerage firm. The firm's financial statements show that in 2006 Schwab brokerage clients had an average daily balance of 17.86 billion dollars in interest bearing cash accounts, with an average return of 2.38%. At the same time, Schwab lent clients 10.25 billion in margin loans at an average rate of 8.17%. As a rough estimate, the 5.79% spread in interest implies Schwab added 590 million dollars to its 2006 revenue by borrowing 10.25 billion dollars from some clients and lending it to others. And that still leaves 7.61 billion in the cash accounts. If Schwab invested this money in 30-day Treasury bills, which returned 4.81% in 2006, the opportunity to borrow 7.61 billion at 2.38% added another 185 million to its income. The total revenue Schwab earned by borrowing from and lending to its brokerage clients in 2006, 775 million dollars, almost matches the 785 million it reported in commissions and trading gains for the year.

Of course, this revenue is not free. In a competitive market, it is simply part of the compensation Schwab and other firms receive for providing brokerage services. This revenue and the revenue retail

brokers earn by lending securities held in street name belong in my estimates of the total cost of trading. Unfortunately, I cannot isolate this income in the FOCUS data and few firms provide Schwab's level of detail in their financial statements. As a result, the revenue is missing from my estimates of trading costs.

Before turning to the estimates of cost, it is useful to look at the amount of trading investors do each year. Figure 1 shows the annual turnover of U.S. stocks from 1926 to 2007. The estimates use data from CRSP and include NYSE, Amex (starting in July 1962), and NASDAQ (1973) stocks with share codes of 10 or 11. (The Data Appendix explains how I deal with the double counting of trades on NASDAQ.) The turnover for a year is the sum of the 12 monthly estimates, which I measure as the ratio of the total dollar volume for the month (shares traded times beginning-of-month price) divided by the total market cap at the beginning of the month.

The general pattern in Figure 1 is striking. Turnover is above 110% in the 1920s. It reaches a high of 143% in 1928, then plunges with the market to 52% in 1932. By 1938 it is below 20%. In light of recent experience, it is perhaps surprising that annual turnover remains close to or below 20% from 1938 to 1975. Turnover rises fairly steadily over the next three decades, however, from 20% in 1975 and 59% in 1990, to an impressive 173% in 2006 and 215% in 2007.

Because they are not operating companies with CRSP share codes of 10 or 11, ETFs are not in the turnover in Figure 1. During the last few years of the sample, however, ETFs are heavily traded. Standard & Poor's Depository Receipts (Spiders) are the most extreme, with total volume of 2.3 billion dollars in 2006 and 5.9 billion in 2007. If I include domestic equity ETFs in my measure, aggregate turnover jumps from 173% to 208% in 2006 and from 215% to 284% in 2007.

What explains the extraordinary growth in trading between 1975 and 2007? Reduced costs are surely part of the story. The introduction of negotiated brokerage commissions in 1975, the development of electronic trading networks, the decimalization of stock prices in 2000 and 2001, and the SEC's implementation of rules designed to increase market transparency and liquidity, such as Reg NMS, all reduce the cost of trading U.S. equities during this period. But even at the end of the sample, trading is

not free. From the perspective of the negative sum game, it is hard to understand why equity investors pay to turn their aggregate portfolio over more than two times in 2007.

The estimates from the FOCUS data, in Table V, confirm that the cost of trading falls a lot between 1980 and 2006. In fact, despite the explosive growth of trading during the last six years of the period, the *total* amount investors pay to trade declines by more than 35%, from 50.7 billion dollars in 2000 to 32.1 billion in 2006. The decline in the cost of trading is even more striking if we standardize by the amount traded. Measured relative to total volume, the cost of trading declines (or remains constant) in all but three years between 1980 and 2006. The cumulative effect is a 92% reduction in trading costs, from 146 basis points in 1980 to a tiny 11 basis points in 2006. As we see next, this reduction has a significant effect on the resources investors spend in their search for superior returns.

VI. The Cost of Trying to Beat the Market

Table VI summarizes my estimates of the amount society pays to invest in the U.S. stock market. There are four components: the fees and expenses paid by those who purchase open-end funds, closed-end funds, and exchange-traded funds; investment management costs paid by institutions; fees paid by hedge fund investors; and trading costs paid by all investors. To make the costs easier to interpret, I standardize each year's dollar cost by the average capitalization of NYSE, Amex, and NASDAQ stocks during the year. The components of the standardized cost are in Figure 2.

A. The Total Cost of Investing

The average of the total standardized costs for 1980 to 2006, in Table VI, is 79 basis points. On average, society spends 0.79% of the aggregate value of U.S. equity to invest each year. Although the path is not smooth, the sum of the four components in Figure 2 falls gradually over time. The investment process consumes 0.82% of total market cap in 1980 and 0.75% in 2006.

There is a much larger drop in the standardized cost of trading. Investors spend 0.55% of the value of NYSE, Amex, and NASDAQ stocks to trade in 1980 and only 0.21% in 2006 (Table VI). Thus, during a 26-year period in which annual turnover grows from 42% to 173%, the trading revenue of

brokers and dealers declines from about two-thirds of society's total cost of investing to less than one-third.

Much of the decline in trading costs is offset by an increase in the cost of mutual funds. Driven mostly by falling open-end loads, the value-weight average cost per dollar invested in U.S. equity funds, in Table VI, drops fairly steadily from a stiff 2.08% in 1980 to 0.95% in 2006. But the allocation to mutual funds increases by more, from only 5.2% of U.S. equity in 1980 to 34.0% in 2006. The net result is a tripling of the standardized cost, from 11 basis points in 1980 to 32 basis points in 2006. Almost all of this growth occurs before 1995. During the last 12 years of the sample, society's annual cost of investing in mutual funds is between 0.28% and 0.32% of aggregate market cap.

Institutional investors hold between 37.5% and 56.7% of the U.S. market during the 1980 to 2006 period. Because of their large allocation, the management costs institutions incur have a big impact on the total resources society spends to invest. Per dollar invested, the value-weight average cost for institutions is always much lower than the average fees and expenses of mutual funds (Table VI). (I use the costs of the four groups in 1986 to compute the value-weight average for institutions in 1980 to 1985.) The biggest difference is in 1981, when the value-weight average cost is 2.25% for funds and only 0.33% for institutions. Although institutional costs do not fall as quickly as fund costs, the shift by institutions toward passive equity strategies and the reduction in the costs institutions pay for both active and passive investments (Table III) lower their average cost substantially, from 0.34% of institutional assets in 1980 to 0.23% in 2006. This decline, coupled with first an increase then a decrease in the institutional allocation, creates almost a step function in Figure 2. From 1980 to 1995, institutional investors pay between 0.14% and 0.17% of the value of all NYSE, Amex, and NASDAQ stocks to manage their U.S. equity portfolios. The annual cost to society drops by about six basis points during the next two years, and remains between 8 and 11 basis points from 1997 to 2006.

If we ignored hedge funds, Figure 2 would say that society's cost of investing in U.S. equity falls a lot over time, from 0.82% of aggregate market cap in 1980 to 0.62% in 2006. Although the big shift from direct holdings to mutual funds pushes up the cost of investing, this effect is overwhelmed by the

reduction in trading costs and, to a lesser extent, the decline in institutional management costs. The net effect would be a 24% reduction in the cost of investing per dollar of stock market wealth.

But we cannot ignore hedge funds. Measured in dollars, hedge fund and fund of fund fees on U.S. equity-related assets jump from 2.8 billion in 1996 to 19.4 billion in 2006 and 25.0 billion in 2007 (Table IV). The standardized cost is equally impressive. Fees on U.S. equity-related hedge fund assets, in Table VI, grow from 0.04% of the value of the market in 1996 to 0.13% in 2006. Given the relatively small size of the industry, these seem like big numbers. The fees hedge fund and fund of fund clients pay to invest 458.6 billion dollars in 2006, for example, are 36% higher than all the costs institutions pay to invest 6.18 trillion.

Hedge fund fees absorb about two-thirds of the reduction in the other costs of investing, but they do not claim them all. Though the process is not smooth, the total cost of investing – including hedge fund fees – falls from 0.82% of aggregate market cap in 1980 to 0.75% in 2006.

B. The Cost of Investing if Everyone Is Passive

Passive investors incur some costs. Thus, the incremental cost of active investing is the difference between society's total cost, in Table VI and Figure 2, and the resources that would be consumed if all investors followed a passive strategy. I make several assumptions to estimate society's cost of investing passively. First, investors in mutual funds switch to a passive mutual fund whose cost matches the highest expense ratio among the share classes of Vanguard's Total Stock Market Index, an open-end fund that holds NYSE, Amex, and NASDAQ stocks.⁴ (Vanguard started the fund in 1992, so I use the expense ratio for that year as the cost before 1992.) Second, institutions also move their U.S. equity investments to a passive market portfolio. For most institutions, the cost of this portfolio is the cost of the passive DB investments monitored by CEM Benchmarking. Defined contribution plans pay a bit more. As in the estimates in Table III, their cost is the passive DB cost plus the average difference

⁴ Vanguard holds large stocks in proportion to their market caps, but it samples small stocks, overweighting some and holding no shares of others. Sampling reduces the fund's custodial costs and expense ratio. Its impact on trading costs is ambiguous.

between the costs of passive DC and DB plans. (I use the 1991 estimates for 1980 to 1990.) Third, I continue to assume that there are no fees and expenses associated with direct holdings and ESOPs. Fourth, in the passive scenario hedge fund investments are reallocated proportionately among direct holdings, mutual funds, and institutions.

Finally, I assume that if all investors follow a passive strategy, total turnover is 10% a year. This assumption has a big impact on my results and, because the cost of trading declines over time, the impact is bigger early in the period. Lowering the assumed turnover to 5%, for example, cuts my estimate of the cost of passive investing by 6.7 basis points in 1980 and only 0.5 basis points in 2006. Passive investors trade for two reasons, to accommodate cashflows and to maintain target risk-return tradeoffs. When thinking about the appropriate turnover for the passive scenario, it is important to remember that a large slice of the market would be held by passive institutions with only modest inflows and outflows. Moreover, most flows from mutual fund clients would cross at the fund level, without any need for trading. Although a lower passive turnover may be appropriate, the 10% assumption is conservative because it pushes up the estimated cost of passive investing and lowers my estimate of the resources investors spend to beat the market.

The results of these calculations are in Table VII. The components of society's cost of investing in the passive scenario are muted versions of the actual costs in Table VI. Because of the shift from direct holdings to mutual funds (Table I), the standardized cost of mutual funds increases from 1.1 basis points in 1980 to 6.5 basis points in 2006. The 60% reduction in the institutional cost of passive investing (Table III) and the modest reduction in the allocation to institutions over time (Table VI) combine to lower institutional costs from 3.6 basis points to only 1.2 basis points. Though not surprising, the drop in trading costs is most dramatic. The standardized cost in 1980, 13.3 basis points, is 11 times the cost of 1.2 basis points in 2006. The net result is a 50% reduction in the standardized cost of passive investing, from 0.180% of the value of all NYSE, Amex, and NASDAQ stocks in 1980 to 0.089% in 2006.

C. The Cost of Active Investing

We are now ready to answer the central question. The average difference between the actual standardized cost of investing and the passive cost for the 1980 to 2006 period, in Table VII, is 67 basis points. On average, active investors spend 0.67% of the total market cap each year on what, in aggregate, is a futile search for superior returns. If we assume that society will continue to spend the current real dollar cost of active investing forever and that the expected real return on the U.S. stock market is a constant 6.7%, the capitalized cost is 10% of the current value of the market. This estimate is conservative. First, the estimates in Fama and French (2002) and Graham and Harvey (2005) suggest that the long-term equity risk premium is far below 6.7%. If so, the expected real return on the market is almost certainly below 6.7%. Second, the data imply that the annual dollar cost of active investing will grow with the aggregate market cap. Positive expected growth and a lower discount rate both push the capitalized cost above 10%. In short, if the social benefit of active investing is price discovery, the annual cost is 0.67% of the aggregate value of the market and the capitalized cost is at least 10% of the value.

Figure 3 plots the difference between the actual and passive costs of investing. Standardized by aggregate market cap, the cost of active investing is remarkably stable. All but three of the 27 estimates for 1980 to 2006 – including all of the estimates after 1990 – are between 61 and 74 basis points. There is also little evidence of a time trend in the incremental cost. The average difference between the actual and passive costs in Table VII is 66 basis points for the first half of the period and 68 basis points for the second half. Of course, the lack of a time trend is driven in part by the assumption of 10% turnover in the passive scenario. If passive turnover is 5%, the standardized cost of trying to beat the U.S. stock market falls by three basis points from 1980 to 2006, and if passive turnover is 15%, the standardized cost rises by eight basis points over the period.

Table VII also reports the dollar cost of active investing. This is the aggregate market cap (from Table VI) times the difference between the standardized actual and passive costs of investing. With 10% passive turnover, the incremental cost per dollar invested is relatively constant over time, so the total dollar cost grows with the market. The cost of active investing is 7.0 billion dollars in 1980, 30.5 billion

in 1993, and 101.8 billion in 2006. Thus, in 2006 investors searching for superior returns in the U.S. stock market consume more than 330 dollars in resources for every man, woman, and child in the United States.

Finally, the results in Table VII allow me to address a closely related question. How would a small but representative investor's return change if he switched from the value-weight combination of all investors' strategies to a passive market portfolio? Because the combination of all investors' portfolios is the market portfolio, the representative investor's initial return is the gross return on the market minus the value-weight average of all investors' costs. Any trading gains, losses, and other transfers between investors happen within his portfolio and have no effect on his return. This is not the case if the representative investor switches to a passive market portfolio. Trading gains and security lending fees paid by active investors to borrow shares from the passive portfolio, for example, push up his return and trading losses lower it. Thus, to use the cost of investing in the passive scenario to measure the return when the representative investor switches, I have to assume there is no net transfer between the passive market portfolio and other investors. With this assumption, the return on the passive market portfolio is the gross return minus the passive cost in Table VII, and the representative investor increases his return by the difference between the actual and passive costs when he switches to the passive market portfolio.

The performance of Vanguard's Total Stock Market Index suggests the no-net-transfer assumption is conservative. The fund underperforms the value-weight market return from the Center for Research in Security Prices (CRSP) by only 2.1 basis points a month, or about 25 basis points a year, from its inception in 1992 to September 2006. If we add the fund's average expense ratio of 21 basis points to its return, the shortfall drops to four basis points per year. A small fraction of the fund's assets is typically in cash. Reversing this cash drag would add another seven basis points to the fund's average gross return, pushing it three basis points *above* the average market return. This positive net transfer is almost exactly equal to the fund's average annual revenue from security lending from 1998 to 2007. And if I were able to add back the commissions the fund pays to trade, the difference between the fund's gross return and the market return would rise even further. The standard error of the monthly difference

between the fund return and the market return is about 1.5 basis points, so it is important to not put too much weight on these results. Nonetheless, there is no evidence that investors in Vanguard's Total Stock Market Index suffer at the hands of active investors. Analysis of Fidelity's Spartan Total Market Index Fund produces a similar conclusion.

The evidence from the Vanguard and Fidelity funds suggests the no-net-transfer assumption is conservative. Thus, it seems safe to use the cost of investing in the passive scenario to estimate the returns one could earn on a passive market portfolio. If so, a representative investor who switches to a passive market portfolio would increase his average annual return by 67 basis points from 1980 to 2006.

VII. Summary and Conclusions

I compare the resources society spends to invest in the U.S. stock market with what would be spent if everyone followed a passive strategy. My estimate of the actual cost of investing – the fees and expenses paid for mutual funds, the investment management costs paid by institutions, the fees paid to hedge funds and funds of funds, and the transaction costs paid by all traders – is 0.82% of the value of all NYSE, Amex, and NASDAQ stocks in 1980 and 0.75% in 2006. In the passive scenario, investors pay passive fees, annual turnover is 10%, and there are no hedge funds. As a result, the cost of investing is only 0.18% of the aggregate market cap in 1980 and 0.09% in 2006.

The difference between the actual and passive estimates measures the cost of active investing. The average difference for 1980 to 2006 is 0.67%. Thus, from society's perspective, the average annual cost of price discovery is 0.67% of the total value of domestic equity and the capitalized cost is at least 10% of the current market value. From a typical investor's perspective, the message is more challenging. If there is no net transfer between a passive market portfolio and other investors, the average annual return on the passive portfolio is 67 basis points higher than the value-weight average of all investors' returns. Thus, if a representative investor switched to a passive market portfolio, he would increase his average annual return by 67 basis points over the 1980 to 2006 period.

Hedge fund fees in 2007 are a stark illustration of the negative sum nature of active trading. The value-weight average fee on U.S. equity-related hedge fund assets in 2007 is 4.63% and the average fund of fund fee is 1.85%. Since fund of fund investors must pay both their own funds' fees and the fees of the underlying hedge funds, the typical fund of fund investor does not break even in 2007 unless U.S. equity-related hedge funds generate average abnormal returns of 6.48%. There are 458.6 billion dollars invested in hedge funds at the beginning of 2007, so even if we ignore the other costs they incur, hedge funds must take 29.7 billion dollars in abnormal profits from other U.S. equity investors for their fund of fund clients to break even. The total capitalization of the U.S. market is 16.53 trillion dollars at the beginning of 2007, so a 29.7 billion dollar transfer would reduce the value-weight average return of all non-hedge fund investors by about 18 basis points. Of course, if passive investors do not participate in the transfer the burden for active investors is even higher. They must contribute about 22 basis points of their U.S. equity holdings in 2007 for fund of fund investors to break even. And these losses would be on top of the active investors' own fees, expenses, and trading costs.

Whether fund of fund investors break even or not, a passive market portfolio produces a higher return than the aggregate of all active portfolios. Why do active investors continue to play a negative sum game? Perhaps the dominant reason is a general misperception about investment opportunities. Many are unaware that the average active investor would increase his return if he switched to a passive strategy. Financial firms certainly contribute to this confusion. Although a few occasionally promote index funds as a better alternative, the general message from Wall Street is that active investing is easy and profitable. This message is reinforced by the financial press, which offers a steady flow of stories about undervalued stocks and successful fund managers.

Overconfidence is probably the other major reason investors are willing to incur the extra fees, expenses, and transaction costs of active strategies. There is evidence that overconfidence leads to active trading. (See, for example, Odean (1998), Barber and Odean (2001), and Statman, Thorley, and Vorkink (2006).) Investors who are overconfident about their ability to produce superior returns are unlikely to be discouraged by the knowledge that the average active trader must lose.

Statman (2004) offers another behavioral explanation for active investing. He suggests that, in addition to expected return and risk, investors are concerned with what he calls the expressive characteristics of their portfolios. Thus, some investors may accept a lower expected return in exchange for the bragging rights that come with a fund that has performed well. Others may give up the low cost and diversification of a passive mutual fund for the prestige of their own separate account.

Finally, some investors trade actively because they really are able to produce superior returns. The existence of superior investors, however, does not explain the behavior of the average investor. Active investing is still a negative sum game. Every dollar a superior investor earns must increase the aggregate losses of all other active investors.

Data Appendix

A.1. Allocation of Equity

The main source for the allocation of U.S. publicly traded common equity in Table I is the December 6, 2007 release of the Federal Reserve Board's Flow of Funds Accounts. Table L.213 of the Flow of Funds Accounts reports the value of corporate equity held by various groups of investors, such as households and nonprofits, mutual funds, and insurance companies. The Fed uses the household and nonprofit sector as a residual. Its allocation is the aggregate value of corporate equity minus the combined values of the other sectors. Thus, the household and nonprofit sector includes not only the publicly traded common equity held by households and nonprofits, but also preferred stock and closely held corporations. Many of the calculations in this section are to separate these pieces.

I start by eliminating preferred stock. In personal correspondence, Standard and Poor's generously provided estimates of the total value of preferred stock from their internal stock and bond database for most of the years from 1980 to 2007.⁵ I use exponential interpolation to fill in the missing years, 1981 to 1985 and 1987. To expedite the discussion, below I refer to what remains in the household

⁵ I thank Shrikant Dash for this information.

and nonprofit sector after subtracting preferred stock as simply the value of the household and nonprofit sector.

The Federal Reserve reports separate estimates of the holdings of nonprofits for 1988 to 2000 (Flow of Funds Accounts Table L.100a) and I use them to calculate the allocations for those years in Table I. I estimate the holdings of nonprofits in each year before 1988 as the value of the household and nonprofit sector for the year times the 1988 ratio of nonprofit holdings to the value of the household and nonprofit sector, and I use the ratio for 2000 to estimate nonprofit holdings for 2001 to 2007.

The direct holdings of households in Table I build on estimates in Kennickell (2003, 2006). He uses information in the Fed's triennial Survey of Consumer Finances (SCF) to measure the amount of publicly traded equity households own directly in 1989, 1992, 1995, 1998, 2001, and 2004. Kennickell's estimates are adjusted for inflation. After converting them back to nominal dollars, I adjust his estimates by the annual value-weight average return on U.S. stocks, from CRSP, to infer the value of direct holdings for the missing years between 1989 and 2004. My estimate for 2002, for example, is the nominal value of Kennickell's estimate for 2001 times one plus the market return for 2002 and my estimate for 2003 is the 2004 value divided by one plus the market return for 2004. I estimate the value of direct holdings for each year before 1989 and after 2004 as the value of the household and nonprofit sector for the year times either the 1989 or 2004 ratio of direct holdings to total household and nonprofit holdings. I assume Kennickell's measure of households' direct holdings of publicly traded equity includes the value of ETFs. Since the Flow of Funds Accounts has a separate allocation for ETFs, I reduce my estimate of direct holdings by the Fed's estimate of the value of ETFs.

Although investment costs differ across defined benefit plans, defined contribution plans, and ESOPs, the Federal Reserve combines their allocations in Table L.213 of the Flow of Funds Accounts. The Fed does report the value of U.S. equity held by DB plans and DC plans in 1985 to 2006 in Tables L.118b and L.113c. To estimate the U.S. equity held by DB plans in 2007, I assume they do not change the ratio of their holdings of U.S. equity relative to all private pension plan assets from 2006 to 2007. The Department of Labor's website reports the total assets in DB plans and in DC plans (including ESOPs) for

1975 to 2005.⁶ I assume the DB plans' share of the U.S. equity held by private pensions in 1980 to 1984 is proportional to their share of the total assets in private pensions. Thus, to estimate the U.S. equity held by DB plans in 1980 to 1984, I multiply the total allocation to private pensions in Table L.213 by the ratio of the total assets in DB plans divided by the total assets in DB and DC plans.

Both the Federal Reserve and the Department of Labor combine ESOPs with other DC plans in their estimates. The annual survey results for 1980 to 2006 from Greenwich Associates include the value-weight average fraction of DC plan assets allocated to a company's own stock. I use this fraction to separate ESOPs from other DC plans. Thus, I start by estimating the total assets in DC plans for 1980 to 2007 using the approach I describe for DB plans above. I then use the data from Greenwich Associates to split ESOPs from other DC plans. (The 2007 split uses the Greenwich estimate for 2006.) To be clear, the allocation to DC plans in Table I does not include ESOPs.

The Federal Reserve's allocations in Table L.213 include the foreign equity held by U.S. investors. Thus, my next step is to remove these securities by assuming they are held proportionately by all U.S. investors except ESOPs.

The Flow of Funds Accounts do not include a separate allocation to hedge funds. As I describe in Section A.4 below, I use estimates of the total assets invested in hedge funds, from HFR, to compute hedge fund and fund of fund fees. To avoid double counting, however, I have to reduce the U.S. equity allocations of other groups of investors by the net holdings of hedge funds. Because hedge funds invest in a variety of assets, hold short and long positions, and use leverage, their net holdings of U.S. equity differ from the total assets invested. My indirect measure of net holdings multiplies HFR's estimate of total hedge fund assets by the slope coefficient from a regression of hedge fund returns on U.S. market returns. For example, a 100 million dollar portfolio with long and short U.S. equity positions of 250 and 200 million dollars has net holdings of 50 million and a slope on the U.S. market of about 0.5.

I estimate the aggregate slope for all hedge funds by regressing the monthly return (in excess of the U.S. Treasury bill rate) on the CSFB/Tremont Hedge Fund Index, a broad value-weight index of

⁶ The information is at www.dol.gov/ebsa/pdf/privatepensionplanbulletinhistoricaltables.pdf.

hedge funds, against the excess returns on the CRSP value-weight index of NYSE, Amex, and NASDAQ stocks. To control for correlations with other markets, I also include excess returns on MSCI's Emerging Markets and World Ex-U.S. (developed markets) Indices in the regression. The estimated slopes (and standard errors) for January 1994, the start of the CSFB/Tremont index, to September 2007 are given by:

$$R_{HF,t} = 0.44 + 0.19 R_{US,t} - 0.04 R_{Dev,t} + 0.11 R_{Emrg,t} + e_t. \quad (A1)$$

(0.11) (0.06) (0.06) (0.03)

In this regression, $R_{HF,t}$ is the hedge fund return in month t and $R_{US,t}$, $R_{Dev,t}$, and $R_{Emrg,t}$ are the returns on the U.S., developed markets, and emerging markets indices. The adjusted regression R^2 is 0.34.

Asness, Krail, and Liew (2001) find that the returns on some components of the CFSB/Tremont index are correlated with lagged market returns during their 1994 to 2000 sample. When I add lagged market returns to regression (A1), however, the lagged slopes are indistinguishable from zero and the contemporaneous slopes are essentially unaffected. Thus, I use regression (A1) to measure the sensitivity of hedge fund returns to the U.S. market. In short, the allocation to hedge funds in Table I is 19% of the total hedge fund assets reported by Hedge Fund Research.

The Federal Reserve uses cross-border flows to estimate the U.S. equity held by foreign investors. As a result, the U.S. equity held by foreign-domiciled hedge funds is included with the holdings of other foreign investors. The U.S. equity held by hedge funds domiciled in the U.S. is in the Fed's residual category, households and nonprofits. I use individual fund data from HFR to measure the fraction of hedge fund assets domiciled in the U.S. I remove that fraction of the net holdings of hedge funds from my estimate of direct holdings and I subtract the rest from the holdings of foreign investors.

Finally, I allocate the U.S. equity holdings of foreign investors proportionately among direct holdings, mutual funds, closed-end funds, ETFs, defined benefit plans, and banks, insurance companies, and broker/dealers. This allocation excludes nonprofits, defined contributions plans, ESOPs, public plans, and state and local governments.

A.2. Mutual Funds

The data used to compute the value-weight average mutual fund fees in Table II are from the September 2006 version of the Survivor Free Mutual Fund Database from the Center for Research in Security Prices at the University of Chicago. The major challenge is identifying U.S. equity funds. I use S&P objective codes, policy codes, area codes, Weisenberger fund types, and fund names to classify funds. A fund's name and style codes can change over time. I exclude a fund during any period in which I cannot infer that its assets are both domestic and primarily equity.

The S&P objective code is not available until 1993, the area code begins in July 2003, and the policy code is not available after 1990. The Weisenberger code is imprecise. Thus, although it begins earlier, I use it only during 1991, 1992, and 1993, when no other style codes are available.

The process I use to infer the nature of a fund's assets from its name is based on a mapping from 977 character strings I identify to 78 investment styles. Municipal bond funds in the CRSP database, for example, typically have "Municipal," "Muni," or "Mu Tr" in their names. Including different capitalizations, I identify 22 strings associated with small cap value and two for small/mid value. This mapping has many exceptions. "High yield," for example, usually signals a bond fund, but not if it is followed by "stock." Similarly, none of the funds with "Barclays Global" in the name are actually global. The algorithm to interpret fund names has more than 250 overrides for specific cases like these.

I try to determine whether a fund is definitely equity and definitely domestic during each month it is in the database. Sometimes the style codes and fund name contradict each other. The S&P objective code appears to be the most reliable so a definite classification based on this code trumps almost all other information. For example, if the S&P code says a fund is definitely not equity in 2001, I exclude the fund from my calculations for that year. I override the S&P code only if the fund's current name implies its assets are definitely not equity or definitely not domestic. If the S&P code is not available or does not reveal the investment region, I turn to the area code. The Weisenberger code is next, followed by fund name. Finally, I use the policy code for any month in which the fund's region or asset class remains uncertain. In short, I look at a fund's S&P objective code, area code, Weisenberger code, name, and

policy code sequentially each month. I include the fund in the sample only if the codes and fund name say that the fund is definitely domestic equity before they say it is definitely not equity or definitely not domestic.

The average mutual expense ratios in Table II weight funds by their assets under management at the beginning of the year. Replacing missing expense ratios with the equal-weight average expense ratio of funds of similar size has a negligible effect on the results.

The calculations used to estimate the average annuitized loads for mutual funds in Table II are from the Investment Company Institute and are described in Rea and Reid (1998).⁷ The averages I use weight funds by their sales. Switching to asset-weight averages increases the average annuitized load – and my estimate of society’s cost of trying to beat the market – by an average of one basis point a year.

A.3. Hedge Fund Fees

Hedge fund and fund of fund managers often charge two fees, a management fee that is a fixed percent of current assets and a performance fee that depends on the fund’s profits. Funds usually pay the management fee more frequently, but the performance fee is almost always paid only once a year, typically at the end of December. The performance fee may depend on a high water mark or a hurdle rate, which may be a constant, such as 10%, or the return on a financial instrument, such as one-month Treasury bills. To understand how high water marks and hurdle rates affect performance fees, define a fund’s adjusted gross return for a year as its gross return minus its management fee. If there is a hurdle rate and no high water mark, the annual performance fee is the maximum of zero and the difference between the current adjusted gross return and the hurdle rate; the fee depends on only this year’s return. A high water mark puts memory in the process. With a high water mark, the annual performance fee for a new investor is the maximum of zero and the difference between the cumulative adjusted gross return since he invested and the cumulative hurdle rate. The annual performance fee for an investor who has

⁷ Sean Collins of the ICI kindly provided the asset-weight and sales-weight averages of the annuitized load for 1980 to 2006.

paid at least one fee is the maximum of zero and the difference between the cumulative adjusted return since his last performance fee and the cumulative hurdle rate.

Management and performance fees accrue until they are paid. Most funds report their monthly net return, which is the gross return minus the change in the accrued fees for an investor who was in the fund the last time a performance fee was paid. Although the realized performance fee is one-sided – the manager does not contribute money if the fund does poorly – accrued performance fees can be recovered. Thus, if a fund starts the month with a positive accrued performance fee and then performs poorly, the fund's net return is increased by a reduction in the accrued fee.

Because high water marks make performance fees a function of past returns, they complicate calculations to convert net returns into gross returns and performance fees. Fortunately, the link with past returns is broken when a performance fee is paid. The relations among net returns, gross returns, quoted fees, and actual fees for a fund with a high water mark depend on only the fund's returns since its most recent positive performance fee. In the equations below, I denote the date of that fee as time zero, $t = 0$, and I assume management fees and performance fees are paid yearly, so each period is one year.

Define M as the fund's annual management fee (for example, 2%) and P as the quoted performance fee (e.g., 20%). Also define $H(t)$ as one plus the hurdle rate for year t , $G(t)$ as one plus the gross return, and $G'(t)$ as the adjusted gross return, $G'(t) = G(t) - M$. Finally, define $N(t)$ as the compounded value of the adjusted gross return, $N(0) = 1$ and $N(t) = N(t-1) * G'(t)$.

An investor does not pay a performance fee in year t unless the value of his investment before subtracting the fee is above the high water mark. Consider an investor with one dollar in the fund at time $t = 0$. His high water mark is the compounded hurdle rate, $HWM(0) = 1$ and $HWM(t) = HWM(t-1) * H(t)$, and his net return in year t is the adjusted gross return, $G(t) - M$, minus the performance fee. If the next positive performance fee is in year T , his investment is worth the compounded value of the adjusted gross return, $N(t)$, at the end of each year before T and it is worth $N(T)$ before subtracting the performance fee in T . Thus, for each dollar invested at time 0, the performance fee in year t is $P * \text{Max}[0, N(t) - HWM(t)]$. Since his investment is worth $N(t-1)$ at the beginning of year t , the net return for year t is

$$\begin{aligned}
R(t) &= G(t) - M - P * \text{Max}[0, N(t) - HWM(t)] / N(t-1) \\
&= G'(t) - P * \text{Max}[0, G'(t) - hwm(t)],
\end{aligned}
\tag{A2}$$

where $hwm(t) = HWM(t) / N(t-1)$ is the high water mark at the end of year t relative to the investment at the beginning of t .

I use a sequential process to convert the net returns firms typically report into gross returns and realized performance fees, $P * \text{Max}[0, G'(t) - hwm(t)]$. I assume each fund has just paid a performance fee when it is added to the database. I then compare the net return and the relative high water mark for each successive year t . If the net return is less than the relative high water mark, the fund did not pay a performance fee and the gross return is the net return plus the management fee. And if the net return is greater than the relative high water mark, the fund did pay a performance fee, the gross return is the net return plus both fees, and I restart the process.⁸

I use the December 2007 version of Hedge Fund Research's live and graveyard databases to measure hedge fund and fund of fund fees. The live database contains funds that are currently active and willing to have their performance reported to HFR's clients. The graveyard database contains historical data on dead funds and on active funds that withdraw from the live database. HFR maintains a private database of active funds that are not in the live database. The information in this database, which is from a variety of sources including fund of fund managers, other fund investors, and the funds themselves, is used to estimate aggregate hedge fund assets and the performance of hedge fund indices.

The HFR data have several virtues. First, the graveyard database minimizes survival bias. Second, HFR records the date each fund is added to the databases, so it is easy to avoid backfill bias. Third, HFR reports details of each fund's fee, including whether there is a high water mark or a hurdle rate and, if there is a hurdle rate, how it is set.

⁸ Suppose the adjusted gross return is less than the relative high water mark, $G'(t) < hwm(t)$. Then equation (A2) implies $R(t) = G'(t)$ and the net return is also less than the relative high water mark. Similarly, if the adjusted gross return is greater than the relative high water mark, $G'(t) \geq hwm(t)$, we can rewrite (A2) as $R(t) - hwm(t) = (1-P) [G'(t) - hwm(t)]$ and, since $P < 1$, the net return is greater than the relative high water mark.

Despite these virtues, the HFR data are not perfect. HFR reports only the most recent fee for each fund. Funds rarely change their quoted fees, however, so this is not a big problem. More important, the fees in the databases are quoted prices, not the contractual fees investors actually pay. Since deals with individual clients are private, this problem afflicts every study of hedge funds, but it may not be severe. Total assets invested in hedge funds grow rapidly during the last seven years of the sample, from less than 500 billion dollars at the beginning of 2001 to 1.81 trillion dollars in 2007. Some industry experts suggest that, on a value-weight basis, actual fees are not far from quoted fees, particularly during the period of explosive growth when the demand for access to funds forces many if not most investors to pay list price.

The HFR's public databases are also not comprehensive. A fund is included only if the manager chooses to provide the necessary information. If the manager stops reporting, HFR searches for a final return and moves the fund to its graveyard database. Inclusion in the (live) database is perceived to be helpful to managers who are trying to raise assets. Thus, the database is probably biased toward younger and smaller funds. It is not clear how the tilt away from more established funds affects average returns, but it probably pushes the sample toward funds with higher return variances and realized performance fees.

The live and graveyard databases report monthly performance and assets under management. They also report: (i) the current management and performance fees for live funds or the last fees for graveyard funds; (ii) whether the fund has a high water mark; (iii) whether the fund has a hurdle rate and, if so, how the hurdle rate is determined; (iv) whether the reported returns are net of all fees, net of only the management fee, or gross of fees; (v) whether the fund is domiciled outside the U.S.; and (vi) the currency in which the returns and assets under management are denominated.

Since my goal is to estimate the resources spent trying to produce superior returns in the U.S. stock market, I want to measure only the hedge fund and fund of fund fees paid for U.S. equity-related investments. I use categories assigned by HFR to sort funds into three groups. I assume funds in the first

group use 100% of their assets for equity trading strategies, those in the second use 50%, and those in the third do not use any of their assets for equity trading.

100% Equity	50% Equity	No Equity
Convertible Arbitrage	Distressed Securities	Emerging Markets
Equity Hedge	Event Driven	Fixed Income
Equity Market Neutral	Macro	Managed Futures
Equity Non-Hedge	Market Timing	Foreign Exchange
Merger Arbitrage	Regulation D	
Sector Funds	Relative Value Arbitrage	
Short Selling		

I assume Regulation D funds invest only in the U.S., but other funds invest around the world. Since HFR has a separate category for emerging markets funds, I use the weight of the U.S. in the portfolio of all developed market equities, from S&P/Citigroup, to estimate the fraction of equity-related hedge fund assets invested in the U.S.

The results summarize the fees for 3,714 hedge funds in the 50% and 100% equity categories and the graveyard database has 2,666. The databases have 2,452 and 783 funds of funds. I use exchange rates from Reuters (provided by Dimensional Fund Advisors) to convert foreign currencies to dollars. I drop one hedge fund and three funds of funds denominated in European currency units (ECU), and one hedge fund denominated in Czech krona. HFR provides information only for the most recent currency. Thus, I do not know the initial currency of six hedge funds and two funds of funds that convert to the Euro when this currency is introduced in 1998.

I also drop a fund if HFR does not report either its management or performance fee. This requirement rules out 102 hedge funds and 35 funds of funds from the graveyard database and 23 hedge funds and 60 funds of funds from the live database. I drop 22 funds from the graveyard database and 38 funds from the live database because both the reported management fee and the reported performance fee are zero. Five funds in the live database and 14 funds in the graveyard database are missing at least one monthly return. I replace the missing data with zero when calculating the results in Table IV, but dropping the 19 funds completely has a negligible effect on my estimates. There are many more funds

with missing assets. I do not include a fund until the first month assets are available after the fund is added to the HFR database and I assume assets grow at the fund's reported return when they are missing.

HFR uses all three of its databases to measure total assets in each category and the hedge fund assets in Table IV are based on these estimates. To estimate the U.S. equity-related fund of fund assets in Table IV, I multiply total fund of fund assets by the ratio of U.S. equity-related hedge fund assets relative to all hedge fund assets. The fees in Table IV are averages of the value-weight average for each category. Thus, I use individual fund data to compute the value-weight average for each category, then I weight each average by the category's total beginning-of-year assets times the fraction of its assets in U.S. equity-related strategies.

A.4. Trading Costs

Registered securities firms must file Financial and Operational Combined Uniform Single (FOCUS) reports with the SEC each year. These reports contain detailed financial statements, including information about the revenue firms earn by trading. I use aggregate values of these data, from the SEC, to estimate the exchange commissions, over-the-counter (OTC) commissions, and trading gains in Table V. The process I use is almost identical to the process in Stoll (1993).

The relevant FOCUS data for 1980 to 2006 are in Table A1. There are two versions of the reports. Firms that clear trades or carry customer accounts use Part II and those that do neither use the simpler Part IIA. The commissions and market-making gains in Table IV combine the revenues for Part II and Part IIA firms.

I make three adjustments to the data in Table A1. First, the exchange and OTC commissions for equity trades include the commissions, clearing fees, and floor brokerage fees that one securities firm pays to another. These transactions are transfers, rather than an additional cost of trading, so they should be eliminated from reported commissions. The FOCUS reports show the total value of transfers between firms, but there is not a separate line for just U.S. equity transactions. Thus, to eliminate the transfers, I follow Stoll (1993) and assume the transfers for each group of trades are proportional to the commissions

for those trades. For example, I reduce exchange commissions by the total value of the transfers times the ratio of exchange commissions to total commissions. Second, the FOCUS reports pool many equity commissions with commissions from other sources. The “Other” line includes all commissions except (i) those for listed options and listed equity (Part II firms), or (ii) those for listed options and listed equity traded on an exchange (Part IIA firms). I use Stoll’s (1993) estimate that 90% of these “Other” commissions are for trading equity. Third, the market-making gains for Part IIA firms include all trading gains except those from market making in options on an exchange. I follow Stoll (1993) again and assume that 50% of the reported gains are from trading U.S. equity.

I use the following notation:

C_{Total}	= Total commissions
$C_{Listed,Exch}$	= Commissions for listed equity on an exchange
$C_{Listed,OTC}$	= Commissions for listed equity traded over the counter
C_{Other}	= Other commissions
T	= Transfers between securities firms
G	= Market-making gains
k_1	= $C_{Listed,Exch} / C_{Total}$
k_2	= $C_{Listed,OTC} / C_{Total}$
k_3	= C_{Other} / C_{Total}

The commissions and market-making gains for Part II and Part IIA firms are:

	Part II	Part IIA
Commissions on Exchanges Trades	$C_{Listed,Exch} - k_1T$	$C_{Listed,Exch} - k_1T$
Commissions on OTC Trades	$C_{Listed,OTC} + 0.9C_{Other} - (k_2 + 0.9k_3)T$	$0.9C_{Other} - 0.9k_3T$
Market-making Gains	G	$0.5G$

A.5. Turnover

Most NYSE and Amex transactions are direct trades from one public customer to another. NASDAQ developed as a dealer market in which public investors sell shares to dealers who then sell them to other public investors. Thus, a transaction that transfers 100 shares from one public investor to another would typically be recorded as 100 shares traded on the NYSE and Amex, but as 200 shares traded on NASDAQ. Researchers often deal with this inconsistency by dividing reported NASDAQ volume by two. The evolution of the NASDAQ market, however, makes this rule of thumb obsolete later

in the sample period. Electronic communication networks (ECNs), which allow public investors to bypass the dealer, account for a large and growing fraction of NASDAQ volume by 2001. Because ECN trades are between two public customers, there is no double counting in these transactions. Changes in the reporting rules for riskless principal transactions also reduce double counting. After 2001, a dealer who covers a client's purchase or sale with a contemporaneous trade at the same price must report the transaction as a single trade. Because of these changes, when computing the turnover in Figure 1 I divide reported NASDAQ volume by 2.0 until 2001, by 1.5 in 2002 and 2003, and by 1.25 thereafter. If I always divide NASDAQ volume by 2.0, turnover for the aggregate market in 2007 drops from 215% to 194%.

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Table I
Allocation of Publicly Traded U.S. Common Equity, in Percent, 1980 to 2007

The table reports the percent of U.S. equity held by various investors. Most of the data are from the December 6, 2007 release of the Federal Reserve's Flow of Funds Accounts. The steps used to compute the allocations are described in the Data Appendix. Direct Holdings is the fraction of U.S. equity held by individuals. The allocation to closed-end funds, CEFs, includes unit investment trusts. The holdings of Foreign Investors are included in the other categories and Foreign Holdings is the fraction of U.S. investors' equity portfolio in foreign stock.

	Direct Holdings	Open-end Funds	CEFs	ETFs	DB Plans	DC Plans	ESOPs	Public Funds	Non-profits	Banks & Insurance	Hedge Funds	Foreign Investors	Foreign Holdings
1980	47.9	4.6	0.5	0.0	18.1	3.9	2.8	4.4	8.3	9.4	0.0	7.6	2.0
1981	45.9	4.4	0.5	0.0	19.0	3.7	3.5	5.1	7.9	10.1	0.0	8.1	1.9
1982	42.4	5.0	0.4	0.0	21.1	3.5	4.6	5.5	7.2	10.2	0.0	8.2	1.7
1983	39.5	6.3	0.4	0.0	21.4	3.4	5.0	6.7	6.7	10.5	0.0	8.4	2.2
1984	37.3	7.0	0.3	0.0	21.8	3.0	6.7	7.4	6.3	10.2	0.0	8.4	2.2
1985	35.4	7.6	0.3	0.0	22.5	3.3	7.7	7.2	6.0	10.1	0.0	8.4	2.9
1986	37.4	9.4	0.4	0.0	20.3	2.6	6.6	7.6	6.2	9.4	0.0	9.7	4.1
1987	36.1	10.4	0.6	0.0	18.4	3.9	6.9	8.5	6.0	9.3	0.0	9.9	5.2
1988	39.3	9.6	0.7	0.0	15.5	3.8	6.1	9.5	6.5	8.9	0.0	10.2	6.4
1989	38.3	10.3	0.7	0.0	14.8	3.7	6.6	9.9	7.2	8.5	0.0	10.6	7.8
1990	35.4	10.5	0.9	0.0	15.3	4.3	6.4	11.1	7.6	8.2	0.3	10.1	8.5
1991	35.0	10.4	0.9	0.0	15.5	4.0	6.9	11.8	6.3	8.7	0.4	9.3	9.1
1992	33.0	12.4	0.9	0.0	14.9	3.8	7.4	11.9	6.5	8.6	0.5	9.0	9.4
1993	29.7	15.7	0.9	0.0	14.4	4.1	7.4	11.8	6.1	9.1	0.8	8.6	13.7
1994	26.8	17.9	1.0	0.0	14.1	4.3	6.9	11.9	6.8	9.5	0.8	8.9	15.4
1995	26.7	19.6	1.1	0.0	13.2	4.1	6.3	12.3	6.6	9.5	0.7	9.2	14.7
1996	27.2	22.2	1.1	0.0	11.5	3.9	5.4	12.1	6.5	9.3	0.8	8.8	14.8
1997	29.5	23.4	1.0	0.1	9.8	3.9	4.4	11.7	6.1	9.3	0.8	9.4	13.6
1998	30.2	24.3	1.0	0.2	9.2	4.3	4.0	11.1	5.8	9.4	0.7	10.4	13.9
1999	36.0	24.7	0.8	0.2	7.4	3.5	3.1	9.9	4.9	8.9	0.6	10.3	14.3
2000	36.2	24.4	0.6	0.5	8.1	3.6	2.6	9.5	4.6	9.1	0.7	10.8	13.7
2001	36.0	23.6	0.5	0.7	8.8	3.5	3.0	10.0	4.0	9.2	0.8	11.4	13.1
2002	32.1	23.7	0.5	1.1	9.9	3.6	3.0	10.8	3.6	10.5	1.3	12.3	14.5
2003	29.9	25.5	0.6	1.2	9.8	3.7	3.2	11.0	3.4	10.4	1.3	13.2	16.8
2004	27.1	27.6	0.8	1.6	9.7	3.9	3.1	11.0	3.1	10.7	1.4	13.6	18.6
2005	26.1	28.8	0.9	2.0	9.1	3.9	3.0	10.9	2.9	10.8	1.5	14.0	22.3
2006	24.2	30.5	1.0	2.5	8.6	4.0	2.8	10.7	2.6	11.2	1.9	15.1	25.3
2007	21.5	32.4	1.1	3.0	8.5	3.8	2.8	10.6	2.3	11.8	2.2	16.3	27.2

Table II
Fees and Expenses for Mutual Funds, in Basis Points, 1980 to 2006

The Expense Ratio for open-end mutual funds is the value-weight average of the reported values for U.S. equity funds in the CRSP mutual fund database. The Annuitized Load is from the Investment Company Institute and measures the value-weight average load paid by investors in equity funds. Total is the sum of the open-end expense ratio and annuitized load. Percent Passive is also from the ICI and measures the fraction of U.S. equity fund assets invested in index funds. The value-weight average Expense Ratios for U.S. equity closed-end funds (CEFs) and U.S. equity exchange-traded funds (ETFs) are estimated using data from Morningstar.

	Open-end Mutual Funds				Expense Ratio	
	Expense Ratio	Annuitized Load	Total	Percent Passive	CEFs	ETFs
1980	70	149	219			
1981	71	167	237			
1982	75	128	203			
1983	76	113	190			
1984	82	114	196	1.0		
1985	80	105	185	1.1		
1986	81	101	183	0.8		
1987	86	96	182	0.9		
1988	96	97	193	1.2		
1989	94	84	178	1.6		
1990	93	76	169	2.3		
1991	90	65	155	2.9		
1992	96	59	155	3.6		
1993	96	50	146	3.9		
1994	98	47	145	3.9		
1995	96	42	139	4.7		
1996	93	40	134	5.8		
1997	92	35	126	7.3		
1998	90	30	120	9.0		
1999	91	27	117	9.7		
2000	96	24	119	9.8	96	
2001	97	19	116	10.9	92	20
2002	98	18	116	12.4	101	17
2003	96	17	113	12.4	98	18
2004	91	18	108	12.7	104	19
2005	87	16	103	12.5	103	20
2006	85	15	100	12.6	109	21

Table III
Percent of U.S. Equity Investments Allocated to Passive Strategies by Institutions and Investment Management Costs Incurred by Institutions, in Basis Points, 1986-2006

The Percent Invested Passively, from Greenwich Associates, is the value-weight average fraction of their U.S. equity investments institutions allocate to passive strategies. The four institutional groups are Defined Benefit (DB) plans, Defined Contribution (DC) plans, Public funds, and Nonprofits, which include foundations and endowments through 1999 and only endowments thereafter. The Passive and Active Investment Management Costs for DB Plans are value-weight averages, from CEM Benchmarking. The Investment Management Costs for DB Plans, Public funds, and Nonprofits are weighted averages of the passive and active DB costs. The Investment Management Costs for DC Plans use the annual passive and active DB costs plus the average annual difference between DC and DB costs. The average difference is 3.4 basis points for passive and 18.2 basis points for active. I use the 1991 estimates of passive and active costs for 1986 to 1990.

	Percent Invested Passively				Investment Management Cost					
					DB Plans		DB Plans	DC Plans	Public	Nonprofits
	DB Plans	DC Plans	Public	Nonprofits	Passive	Active				
1986	21.1	17.9	25.8	2.8			34	50	32	39
1987	24.6	26.2	29.0	9.6			32	46	31	37
1988	22.3	29.6	39.0	9.2			33	45	28	37
1989	25.6	29.7	46.0	12.7			31	45	25	36
1990	28.5	29.4	43.1	12.5			31	43	26	36
1991	32.5	31.9	44.6	14.3	7.9	40.4	30	43	28	36
1992	26.8	35.0	39.2	11.1	5.9	42.1	32	42	28	37
1993	25.6	33.8	46.4	17.0	6.7	43.1	34	44	26	37
1994	27.8	31.7	43.4	19.0	7.4	45.4	35	47	29	38
1995	27.5	32.2	40.0	23.8	6.0	43.4	33	45	28	34
1996	30.7	32.1	48.5	23.2	5.4	37.9	28	41	22	30
1997	29.5	33.7	52.2	18.1	4.9	36.3	27	39	20	31
1998	27.1	30.6	52.9	17.9	4.6	34.2	26	39	19	29
1999	30.0	34.0	54.2	20.2	3.8	34.0	25	37	18	28
2000	29.4	35.1	57.1	20.7	4.3	35.6	26	38	18	29
2001	30.5	32.5	51.9	22.0	4.5	37.2	27	40	20	30
2002	30.4	35.0	52.4	23.5	4.2	41.3	30	41	22	33
2003	32.7	34.6	55.2	36.4	2.8	37.8	26	39	18	25
2004	34.4	33.2	53.6	29.4	2.6	35.8	24	38	18	26
2005	31.2	34.6	53.7	25.8	2.7	37.0	26	38	19	28
2006	31.2	35.7	52.7	28.7	2.9	36.0	26	37	19	27

Table IV

Assets Invested in Hedge Funds and Funds of Hedge Funds, 1991 to 2007, and Hedge Fund and Fund of Fund Fees, 1996 to 2007

Assets Invested are in billions of dollars and are measured at the beginning of the year. The total for All Hedge Funds is from Hedge Fund Research (HFR). I use HFR's categorization of funds and the U.S. weight among all developed equity markets to estimate the U.S. Equity-related Hedge Fund assets. The estimate of U.S. Equity-related Fund of Fund assets assumes funds of funds invest proportionately among hedge fund categories. All but the last column of fees are value-weight averages of individual fund fees computed using the HFR database and are in percent. The last column is in billions of dollars. The management fee (Mgmt Fee) is a fixed percent of assets in the fund. The Quoted Performance Fee is a fraction of the fund's profits. The Actual Performance Fee is measured relative to the beginning-of-year assets. The Data Appendix describes how the actual performance fee is computed. Averages of the annual fees (and standard errors) are reported for 1996 to 2007 and 2000 to 2007. The data for 1996 start in May. The management fee and quoted performance fee for 1996 are annualized, but the actual performance fee is not.

	Assets Invested			Fees									
	All	U.S. Equity-related		U.S. Equity-related Hedge Funds				Funds of Hedge Funds				Hedge Fund plus	
	Hedge Funds	Hedge Funds	Funds of Funds	Mgmt Fee	Performance Fee		Total	Mgmt Fee	Performance Fee		Total	Percent	Dollars
				Quoted	Actual			Quoted	Actual				
1991	38.9	8.3	0.4										
1992	58.4	14.1	4.8										
1993	95.7	24.9	9.6										
1994	167.8	39.8	17.9										
1995	167.4	38.6	17.2										
1996	185.8	46.2	14.0	0.92	18.24	3.79	4.71	1.16	9.45	3.41	4.57	9.27	2.8
1997	256.7	72.4	14.8	1.05	18.40	5.40	6.45	1.28	9.29	2.57	3.85	10.30	5.2
1998	367.6	126.5	25.5	0.98	18.25	2.56	3.54	1.18	11.41	0.21	1.39	4.93	4.8
1999	374.8	141.4	28.6	1.03	18.24	5.91	6.94	1.33	8.24	1.68	3.01	9.95	10.7
2000	456.4	176.1	29.4	1.09	18.42	2.35	3.44	1.26	7.99	0.38	1.64	5.08	6.5
2001	490.6	203.3	34.6	1.20	18.93	1.51	2.71	1.24	7.22	0.27	1.51	4.22	6.0
2002	539.1	243.4	46.3	1.24	19.09	1.38	2.62	1.11	7.12	0.34	1.45	4.07	7.0
2003	625.6	253.1	83.7	1.25	19.12	3.40	4.65	1.14	6.96	1.23	2.37	7.02	13.8
2004	820.0	313.4	112.1	1.23	19.03	2.28	3.51	1.12	6.98	0.78	1.90	5.41	13.1
2005	972.6	348.1	128.4	1.26	19.03	2.18	3.44	1.15	7.09	0.47	1.62	5.06	14.1
2006	1105.4	372.8	133.1	1.27	18.95	3.25	4.52	1.17	7.12	0.76	1.93	6.45	19.4
2007	1464.5	458.6	205.4	1.28	19.15	3.35	4.63	1.12	6.94	0.73	1.85	6.48	25.0
1996-2007				1.16	18.74	3.11	4.26	1.20	7.98	1.07	2.26	6.52	
				(0.03)	(0.11)	(0.41)	(0.39)	(0.02)	(0.41)	(0.29)	(0.30)	(0.63)	
2000-2007				1.23	18.97	2.46	3.69	1.16	7.18	0.62	1.78	5.47	
				(0.02)	(0.08)	(0.28)	(0.29)	(0.02)	(0.12)	(0.11)	(0.10)	(0.38)	

Table V
Annual Revenue Received by Securities Firms for Executing Trades of U.S. Equity, 1980-2006

The data come from the FOCUS reports that broker and dealers file annually with the SEC. Commissions from Exchange Trades and OTC Trades are commissions received for executing trades on an exchange and over the counter. Gains from Market Making include trading profits from OTC equities, gains on derivative trading desks in equity products, and gains on firm security trading accounts with associated hedges. Total Revenue and the three components of total revenue are measured in billions of dollars. The Data Appendix describes how these values are calculated. Cost Relative to Volume, in basis points, is Total Revenue divided by total dollars traded on the NYSE, Amex, and NASDAQ.

	Commissions from		Gains from Market Making	Total Revenue	Cost Relative to Volume
	Exchange Trades	OTC Trades			
1980	4.1	1.0	1.0	6.1	146
1981	3.8	1.1	0.8	5.8	131
1982	4.3	1.2	0.9	6.4	117
1983	5.9	2.0	1.9	9.8	106
1984	5.0	1.7	1.3	8.0	88
1985	5.8	2.2	1.8	9.7	82
1986	7.2	2.8	2.5	12.5	73
1987	8.7	3.2	2.6	14.5	63
1988	6.2	2.5	2.0	10.7	66
1989	7.2	2.6	2.2	12.1	64
1990	6.1	2.6	2.0	10.7	64
1991	7.2	3.3	3.2	13.8	71
1992	7.8	4.1	3.9	15.8	69
1993	9.1	5.3	4.8	19.2	64
1994	8.6	5.2	4.5	18.3	57
1995	10.3	6.5	5.5	22.2	51
1996	11.3	8.3	6.6	26.2	45
1997	13.2	9.5	7.2	29.8	37
1998	14.6	10.4	7.7	32.7	32
1999	16.3	14.2	9.3	39.8	27
2000	18.2	17.6	14.9	50.7	23
2001	16.3	12.7	8.0	36.9	23
2002	16.0	12.8	4.6	33.4	21
2003	14.0	13.8	3.8	31.7	22
2004	13.8	15.0	3.6	32.4	16
2005	13.0	13.9	3.9	30.7	13
2006	12.2	13.7	6.2	32.1	11

Table VI
Society's Standardized Cost of Investing, in Basis Points, 1980 to 2006

The Standardized Cost is the total dollar cost of investing divided by the aggregate Market Cap, which is the average of the 12 beginning-of-month values of all NYSE, Amex, and NASDAQ stocks with CRSP share codes of 10 or 11. The aggregate Market Cap is in billions of dollars. The contribution of Mutual Funds to the standardized cost is the total percent of U.S. equity in funds, from Table I, (Allocation, in percent) times the value-weight average of the fees and expenses of mutual funds, in Table II (Fees, in basis points). Similarly, the contribution of Institutions is the sum of their allocations, from Table I, times the average of their investment management costs, from Table III. The contribution of Hedge Funds is the dollar cost of hedge fund and fund of fund fees, in Table IV, divided by total market cap, and the contribution of Trading costs is the dollar cost, in Table V, divided by total market cap. The four components of the standardized cost and the Total are in basis points.

	Market Cap	Mutual Funds		Institutions		Standardized Cost				
		Allocation	Fees	Allocation	Fees	Mutual Funds	Institutions	Hedge Funds	Trading	Total
1980	1,103	5.2	208	46.9	34	11	16		55	82
1981	1,269	4.9	225	49.1	33	11	16		46	73
1982	1,166	5.5	196	52.1	32	11	17		55	82
1983	1,635	6.6	185	53.9	32	12	17		60	89
1984	1,639	7.3	192	55.4	31	14	17		49	80
1985	1,853	7.9	182	56.7	30	14	17		53	84
1986	2,335	9.8	180	52.8	31	18	16		54	87
1987	2,720	11.0	178	53.0	29	20	16		53	88
1988	2,470	10.4	187	50.3	30	19	15		43	78
1989	2,824	11.1	173	50.7	28	19	14		43	76
1990	2,837	11.4	165	52.9	28	19	15		38	71
1991	3,210	11.4	151	53.2	27	17	14		43	74
1992	3,771	13.3	152	53.1	28	20	15		42	77
1993	4,344	16.6	144	52.8	29	24	15		44	83
1994	4,624	19.0	143	53.4	30	27	16		40	83
1995	5,381	20.7	137	52.0	29	28	15		41	85
1996	6,881	23.3	132	48.8	25	31	12	4	38	85
1997	8,768	24.5	125	45.1	24	31	11	6	34	82
1998	10,864	25.4	119	43.6	23	30	10	4	30	75
1999	13,235	25.7	116	37.6	22	30	8	8	30	76
2000	15,675	25.6	117	37.5	24	30	9	4	32	75
2001	13,068	24.8	114	38.4	25	28	10	5	28	71
2002	11,288	25.3	112	41.3	27	28	11	6	30	75
2003	10,814	27.3	109	41.5	23	30	10	13	29	81
2004	13,183	30.0	104	41.5	22	31	9	10	25	75
2005	14,324	31.7	98	40.6	24	31	10	10	21	72
2006	15,450	34.0	95	40.0	23	32	9	13	21	75

Table VII
Standardized Cost of Passive Investing, in Basis Points, and Incremental Cost of Active Investing,
in Basis Points and Billions of Dollars, 1980 to 2006

The Standardized Cost of Passive would be the cost of investing if all U.S. equity were held passively and is measured relative to the market cap of all NYSE, Amex, and NASDAQ stocks. Actual – Passive, the incremental cost of active in basis points, is the standardized cost of investing (Table VI) minus the passive cost. The average of the annual differences is reported for 1980 to 2006. Price Discovery, the incremental cost of active in billions of dollars, is Actual – Passive times the aggregate market cap.

	Standardized Cost of Passive				Incremental Cost of Active	
	Mutual Funds	Institutions	Trading	Total Cost	Actual – Passive	Price Discovery
1980	1.1	3.6	13.3	18.0	64	7.0
1981	1.0	3.7	11.7	16.5	56	7.2
1982	1.1	3.9	10.8	15.8	67	7.8
1983	1.4	4.0	10.6	15.9	74	12.0
1984	1.5	3.9	8.7	14.2	66	10.8
1985	1.7	4.0	8.1	13.8	70	13.1
1986	2.1	3.7	7.2	13.0	74	17.4
1987	2.3	3.8	6.3	12.4	76	20.7
1988	2.2	3.6	6.6	12.4	65	16.1
1989	2.3	3.6	6.4	12.3	64	18.0
1990	2.4	3.8	6.4	12.6	59	16.6
1991	2.4	3.8	7.0	13.2	61	19.6
1992	2.7	2.9	6.9	12.4	65	24.4
1993	3.3	3.2	6.4	13.0	70	30.5
1994	4.7	3.6	5.7	14.1	69	31.9
1995	4.1	2.9	5.1	12.2	73	39.1
1996	4.7	2.5	4.5	11.6	73	50.5
1997	4.9	2.2	3.7	10.7	71	62.1
1998	5.1	2.0	3.2	10.2	65	70.5
1999	5.1	1.4	2.7	9.3	67	88.8
2000	5.1	1.6	2.3	9.1	66	103.9
2001	5.0	1.7	2.3	9.0	62	80.4
2002	5.1	1.7	2.1	8.9	66	74.8
2003	5.5	1.2	2.2	8.9	72	78.3
2004	5.7	1.2	1.8	8.6	66	87.3
2005	6.0	1.2	1.4	8.6	63	90.7
2006	6.5	1.2	1.2	8.9	66	101.8
1980-2006					67	

Table A1
Commissions and Market-making Gains from Trading U.S. Equity, in Millions of Dollars, 1980 to 2006

Part II firms clear trades or carry customer accounts; Part IIA firms do not. Total commission revenue is C_{Total} ; $C_{Listed,Exch}$ and $C_{Listed,OTC}$ are commissions from trading listed equity on an exchange and over the counter. Other commissions, C_{Other} , for Part II firms are total commissions minus those on listed equity and listed options. For Part IIA firms, C_{Other} is total commissions minus those on listed equity traded on an exchange and on listed options. Transfers, T , are payments to other securities firms for commissions, floor brokerage, and clearance for Part II firms, and commissions paid to other brokers for Part IIA firms. Market-making gains, G , for Part II firms in 2005 and 2006 are gains from market making in OTC equities and gains on firm securities trading accounts with associated hedges. Before 2005, this revenue also includes gains on derivative trading desks in equity products. Market-making gains for Part IIA firms are all gains except those from trading options on an exchange.

	Part II Firms						Part IIA Firms				
	$C_{Listed,Exch}$	$C_{Listed,OTC}$	C_{Other}	C_{Total}	T	G	$C_{Listed,Exch}$	C_{Other}	C_{Total}	T	G
1980	4,181	97	923	5,934	633	863	504	272	843	228	213
1981	3,859	134	943	5,566	587	746	529	375	972	300	203
1982	4,336	113	959	6,163	679	789	662	464	1,208	368	232
1983	5,853	191	1,606	8,454	912	1,623	987	837	1,938	568	507
1984	4,983	172	1,315	7,306	931	1,049	932	926	1,963	653	553
1985	5,845	214	1,718	8,692	1,089	1,476	1,046	1,098	2,263	863	716
1986	7,342	301	2,243	11,076	1,380	2,065	1,315	1,427	2,900	1,165	911
1987	8,843	185	2,722	13,102	1,850	2,184	1,681	1,619	3,473	1,171	750
1988	6,162	117	2,103	9,084	1,421	1,587	1,411	1,325	2,849	867	864
1989	7,134	174	2,103	10,234	1,580	1,686	1,684	1,383	3,218	898	986
1990	5,971	203	1,984	8,836	1,454	1,537	1,613	1,435	3,196	974	900
1991	6,914	324	2,535	10,429	1,490	2,482	1,903	1,715	3,780	1,160	1,494
1992	7,533	457	3,201	11,837	1,717	2,848	2,103	2,088	4,412	1,479	2,053
1993	8,812	709	4,043	14,277	2,152	3,459	2,522	2,779	5,628	2,086	2,744
1994	8,538	637	4,154	14,105	2,548	3,263	2,582	2,867	5,742	2,105	2,399
1995	9,908	848	4,886	16,521	2,602	3,803	2,995	3,468	6,694	2,329	3,363
1996	11,073	1,010	6,630	19,674	2,997	4,350	3,269	4,683	8,191	3,493	4,585
1997	13,141	1,191	7,707	23,277	3,533	4,601	3,771	5,273	9,385	4,309	5,199
1998	14,793	1,460	8,564	26,250	4,138	5,239	4,202	5,828	10,446	5,074	4,837
1999	16,647	2,024	11,763	32,247	4,894	5,813	4,794	8,369	13,691	7,370	6,951
2000	18,054	2,370	14,339	37,020	5,356	8,188	5,786	10,646	17,087	8,946	13,449
2001	16,843	1,743	10,188	30,569	4,839	3,982	4,785	8,893	14,194	7,982	7,940
2002	17,001	2,291	10,472	31,160	4,956	1,415	4,573	8,804	13,841	8,742	6,454
2003	14,964	2,561	11,367	30,313	5,253	1,087	4,620	10,084	15,226	9,788	5,496
2004	14,860	2,945	12,798	31,992	5,327	949	4,542	10,235	15,577	10,673	5,308
2005	14,695	3,179	12,570	31,894	5,737	1,134	4,124	9,873	14,545	11,314	5,397
2006	14,901	3,036	14,269	34,018	7,924	1,769	4,272	9,894	14,845	12,286	8,034

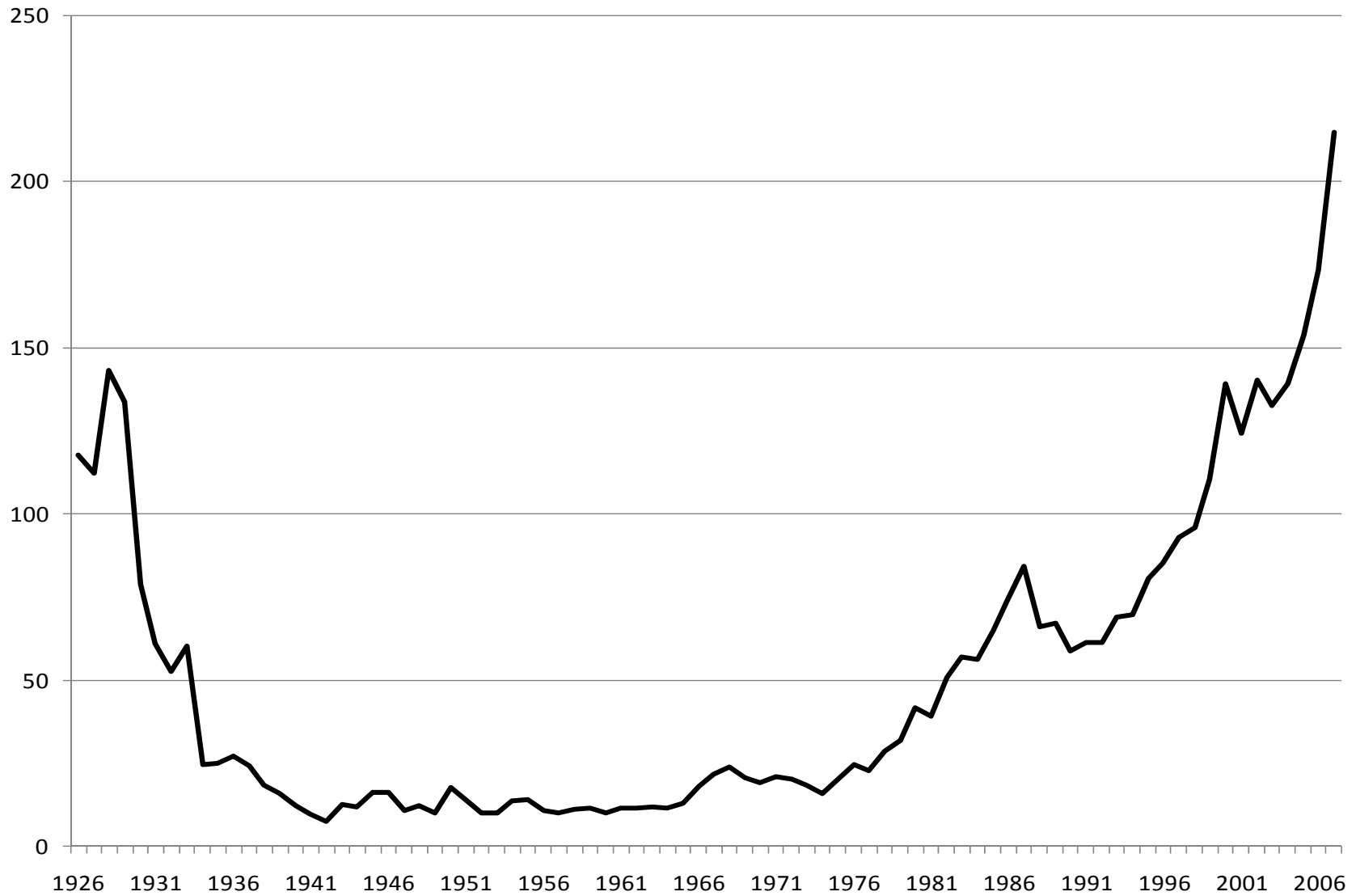


Figure 1. Annual Turnover of NYSE, Amex, and NASDAQ Stocks, in Percent, 1926 to 2007.

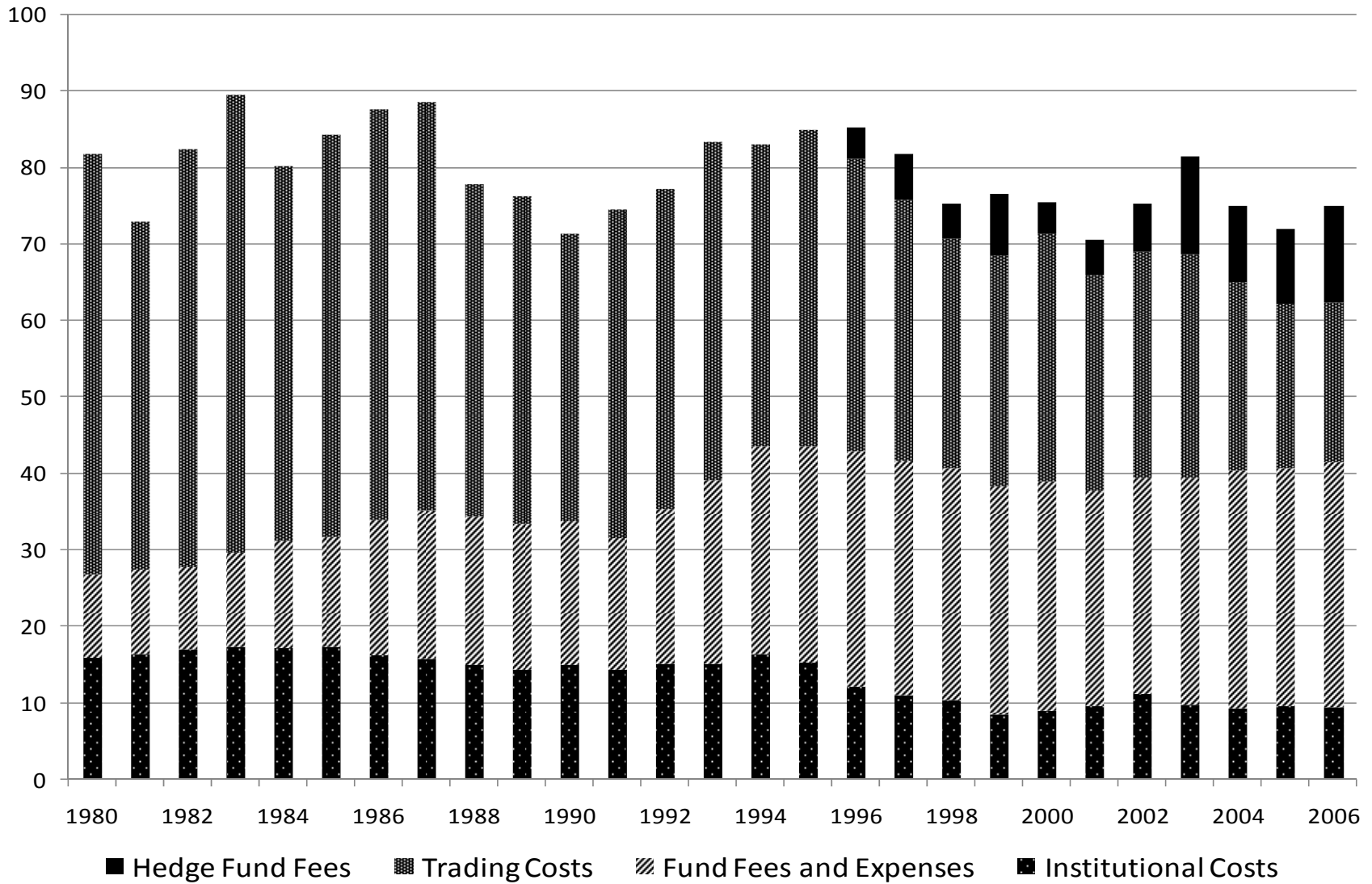


Figure 2. Fees, Expenses, and Trading Costs Relative to Aggregate Market Cap, in Basis Points, 1980 to 2006.

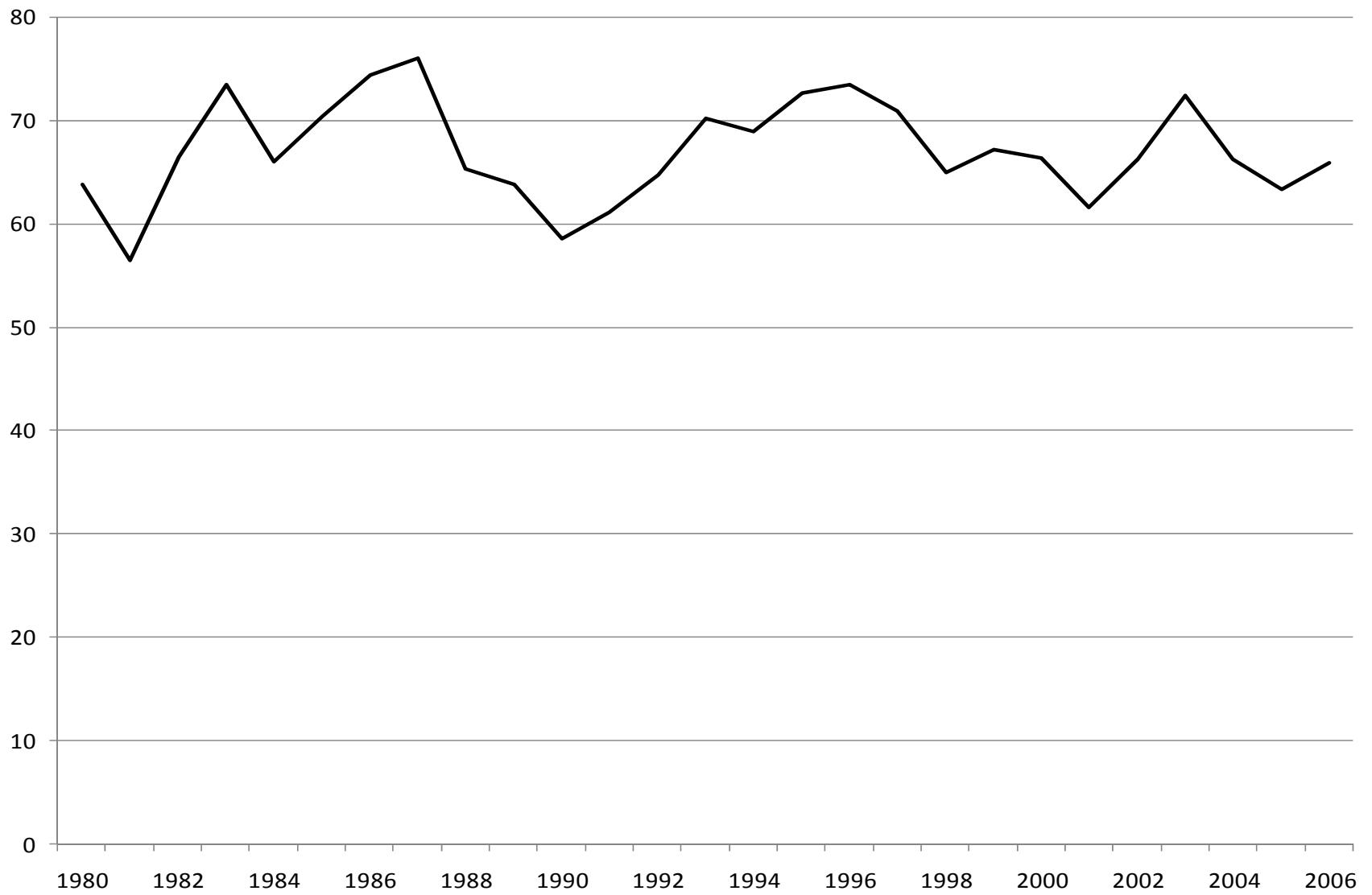


Figure 3. The Difference between the Actual and Passive Costs of Investing, in Basis Points, 1980 to 2006.