GUEST SPEAKER

The Structure of the Investment-Management Industry: Revisiting the New Paradigm

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Will a new paradigm of investment management lead to concentration of the money-management business? Will the merger trend continue? Will fees decline? And what accounts for product proliferation in an industry that struggles to deliver on the implied promise of its products? This article gives answers—some that may surprise—to these questions and more.

Charles Ellis (1992) expressed the view that large, multimarket, multiproduct firms are likely to become "the new norm," ultimately coming to "dominate the investment-management business." The "new-paradigm organization," as he calls it, springs from an investment environment that abounds with complexity, so much so that "a new way of being organized is needed. . . ." The model that emerges is a firm with "superior capabilities in relationship management and relationship development, particularly strong professional investment counseling—problem delineation and problem solving, servicing the specific needs of specific clients." Mr. Ellis invokes natural selection to describe what he sees: "[T]he evidence suggests the Darwinian process of one species displacing another—because it is even better matched to the situation—is progressing very rapidly now."

The "new-paradigm" proposition has two implications for industry structure. One is that many clients, seeking to simplify, will conclude that large, multiproduct firms will serve their needs better than smaller, more specialized firms. The other is that the investment-management industry will become dominated by a relatively small number of firms managing larger sums in multiple products across multiple markets. The market-share losers would be one- or two-product specialists.

Picking up on the new-paradigm theme in October 1995, Goldman Sachs & Company forecast "that within five years, there will be 20–25 [active managers] with at least $150 billion under management. There will also be numerous small companies with less than $5 billion under management" (Hurley et al. 1995). This forecast was based on data indicating the existence then of approximately 200 managers with more than $5 billion. Of those 200, only 3 had "active" assets of $150 billion or more and the 25th-largest firm had assets of about $50 billion, suggesting a major transformation of industry structure.

Ellis has identified an important transformation occurring within the investment-management industry. Many firms have broadened their product lines, and no doubt the multiproduct-firm trend will persist. But I do not share the view that the catalyst is a desire on the part of clients to simplify their investment programs; rather, it is an adaptive response on the part of investment managers to opportunities and challenges they face. Nor do I share the view that the forces at work will result in the degree of industry concentration suggested by Ellis and forecast by Goldman Sachs. The new paradigm is an injunction to excellence, an appeal for simplification. It is not, however, a blueprint for the structure of the investment-management industry. To see why not, start with what clients expect from the managers they hire.

Performance

When a client selects an "active" product rather than an index fund, the client expects the product to provide a return, net of costs, that exceeds the return of an appropriate benchmark. Clients know they can get index-matching products for virtually any segment of public markets worldwide at very low cost. Although they may turn to investment managers for reasons such as counseling or to meet special servicing requirements, few would take exception to the proposition that active managers' *raison d'être* is performance that is superior to passive alternatives.

Superior performance, however, has proven elusive. For more than a quarter of a century, the prevailing view of financial economists has been that public securities markets are largely efficient. Of practical consequence, a sizable and growing body of evidence shows that the preponderant majority of actively managed products have failed to add value, net of costs (see Halpern, Calkins, and Ruggels 1996; Malkiel 1995; Lakonishok, Shleifer,

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and Vishny 1992; Bogle 1992; Henriksson 1984; Jensen 1968; and Sharpe 1966). Complicating matters, Ronald Kahn and Andrew Rudd (1995) demonstrated that managers' past performance does not contain useful predictive content. For these reasons, selecting managers that reliably add value has proven a daunting task for clients and consultants.

Cases of superior performance can be cited, but statistical analysis indicates that their incidence approximates that associated with chance. As clients have come to better understand the vagaries of attempting to beat the market, many have turned to "passive" products to meet at least a portion of their investment needs.

Nevertheless, by any measure, recent growth in the number of investment products has been astonishing. For example, Nelson Publications (Port Chester, New York), which reports on products for tax-exempt investors, identified approximately 9,000 products in 1996, up from 6,600 as recently as 1993. Hedge funds, which were relatively uncommon not long ago, now number approximately 4,700 (Van Hedge Fund Advisors, Nashville, Tennessee). The trend toward multiproduct firms is discerned most readily in the mutual fund industry, for which data are available on the number of managers as well as products. Between 1985 and 1995, the number of mutual fund managers more than doubled (increasing from 252 to 558) and the number of funds increased from 1,528 to 5,761 (Hurley et al.). Even allowing for the growth in the number of fund managers, the number of funds offered per manager increased from an average of 6 to 10.

What accounts for product proliferation in an industry that has struggled to deliver on the implied promise of its products? A parallel in the field of natural selection does, in fact, provide the key to understanding an industry transformation that has been underway for more than a decade.

Adaptation

Biologists distinguish between two adaptive strategies—*r* and *K*—that species use in reproduction. The *r* strategy is prevalent in a challenging environment in which resources are scarce and risks are great. The *K* strategy prevails when the environment favors a particular species and, in terms of gene transmission, parents' life resources are more productively applied in protecting and nurturing offspring than in further reproduction. The pure *r* strategy involves bearing large numbers (even millions) of offspring with no parental investment. Offspring survive largely through chance. The pure *K* strategy involves bearing very few, high-quality offspring during a lifetime, with substantial parental investment. Most species combine the two strategies to some extent. Inasmuch as each organism has finite life resources to expend in reproduction, an optimal trade-off of *r* and *K* exists for each species in a given environment. Species often change strategies to adapt; unable to do so, some become extinct.

Evolution of Investment Management

These life-history adaptations, as they are known to biologists, have an analog in the evolution of investment management. In the investment-management industry, product development is analogous to procreation; investing in a product is analogous to nurturing offspring. Finite capital requires trading off product investment for product development within individual firms. To the extent that investment markets are efficient, the environment for active investment products is challenging. That is, owing to management and custody fees and trading costs, the expected value added by these products is collectively negative, which makes long-run client satisfaction problematic. The more efficient the market, the more challenging the environment—and the more product survival relies on chance.

During the past 25 years, a gradual shift has occurred in the allocation of resources in the investment-management industry. In days gone by, investment firms typically invested heavily in a single product, the investment often taking the form of a large securities analysis staff. With the passage of time, many management firms came to realize that consistently beating the market is hard to do—and risky in terms of longevity—with only one product to carry the firm. Also during this period, marketing and client-service executives were on the rise in the business, and many firms began to place greater emphasis on product development and marketing. The era and art of product development and marketing came into full flower 10–15 years ago, and product proliferation began in earnest. Fifteen years ago, for firms to have more than a few products was uncommon, and most had only one; now, having a half-dozen or more is not uncommon.

In effect, some one-product firms concluded that trying to beat the market was not a particularly good business; they discovered that there is too much randomness to make reliance on a single product pay off with a high degree of confidence. For these firms, product development and marketing became at least as important as beating the market. That realization, in my judgment, accounts for much of the product proliferation we observe today, which is the equivalent of an adaptive shift

from K to r. In competitive markets, as in nature, survival is linked to adaptability. Active product development is an appropriate adaptive response if managers perceive the markets in which they trade to be efficient.

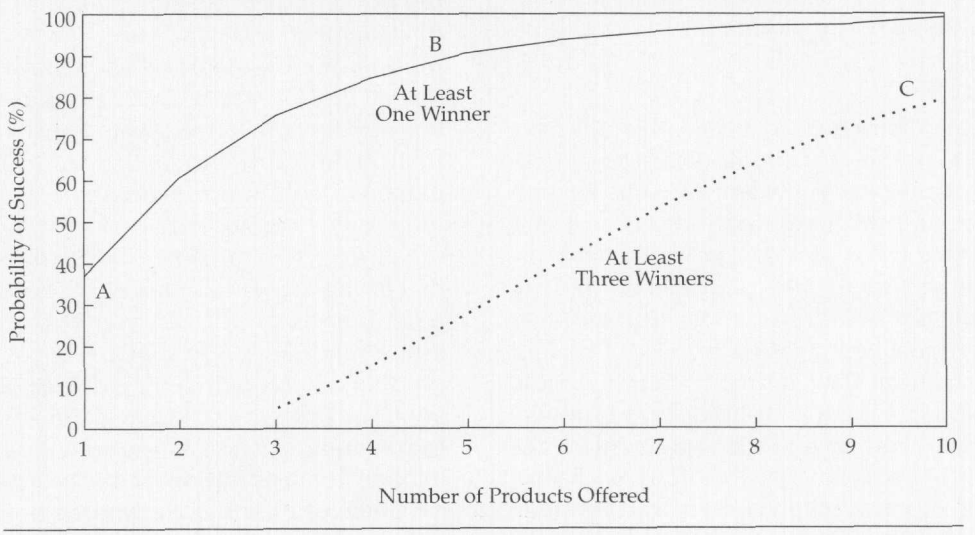
An illustration. Figure 1 illustrates the multiproduct advantage under the condition of market efficiency. It shows the relationship between the probability of success (defined as one or more products outperforming a benchmark over a decade, net of fees) and the number of products offered by a hypothetical firm. To reflect costs and the condition of market efficiency, the probability that any one product outperforms its benchmark in any given year is set arbitrarily at 0.45; that is, slightly less than 0.50. The probability of success is assumed to be independent among products and from year to year. The probability that a one-product firm will have a favorable 10-year history is 38 percent (Point A). The probability of having at least one product with a successful 10-year experience rises sharply when multiple products are offered. For a five-product firm, the probability of at least one winner is more than 90 percent (Point B). A 10-product firm enjoys an 80 percent probability of having at least three successful products (Point C). This illustration demonstrates that the likelihood of success rises sharply with the number of products offered.

Challenge amid plenty. Ironically, even though investment managers have found modern investment markets challenging (i.e., hard to beat consistently), the growth of the markets has been highly rewarding to the industry. Between 1975 and 1995, tax-exempt and mutual fund assets in the hands of the investment-management industry grew from $427 billion to $6 trillion—a 14-fold increase (Hurley et al.). Growth of this magnitude would be a boon to any industry; it has been a bonanza for an industry with very low marginal costs. Merely being present was enough to ensure financial success for most investment-management firms during the past two decades. The most successful firms during this period were those organized to excel at what has come to be called "asset gathering." During this period of plenty, having several baskets (products) facilitated and sped the gathering of assets.

Merger. Awareness of the risk of a narrow product line has had another consequence. It has led some firms to merge with another specialist firm, a diversified financial institution, or a large combine of investment-management firms, such as United Asset Management. By either route—product development or merger—the destination is the same: reduced reliance on the success of a principal product.

Citing slow postmerger growth, Arthur Zeikel (1996) concluded that "most mergers have not worked." As with so many ventures, the success of a merger depends on your point of view. From the perspective of the seller of a successful one-product, one-market firm, who is exchanging illiquid shares for publicly traded shares of a diversified firm, these mergers have worked extremely well. In pursuing merger, the individual who has built a successful, if narrow, investment-management firm is motivated as much or more by securing (diversifying) and liquefying his or her investment than by

Figure 1. Safety in Numbers: Relationship between Success and Product Line Breadth over 10 Years



the prospect of future growth. The buyer, on the other hand, is understandably concerned about future growth. *Caveat emptor*.

The Economics of Investment Management

As a competitive business activity, investment management lends itself to microeconomic analysis. We can apply standard competitive models to better understand demand, industry structure, and pricing, and we can evaluate alternative models empirically. A coherent microeconomic model of investment management requires an assumption concerning the degree of efficiency of markets in which managers trade. By way of illustration, let us begin with the active-management segment of the business under the assumption that markets are grossly inefficient.

The Business of Active Management

Were markets grossly inefficient, market share would gravitate to those investment managers with the advantage of information and/or insight at the expense of those lacking that advantage. As a consequence, we would expect to see concentrated market shares in the investment-management industry. The most successful firms would clearly realize their advantage and charge more than others. We would expect to see high fees for the services of the best firms, fees that would almost certainly take the form of a significant percentage of profits. Those firms would have no reason to settle for less.

Such inefficiency in the public markets of the United States is difficult to imagine. U.S. securities law requires extensive disclosure on the part of public issuers. Information courses quickly through public markets. Insider trading is illegal, and enforcement is real. Nevertheless, were markets grossly inefficient, concentration of investment management would be one logical consequence.

Moving along the continuum of market efficiency from grossly inefficient toward efficient, investment-management industry structure is transformed from concentrated to fragmented as the economic basis for concentration ebbs. To illustrate one dynamic at work—the economics of information-motivated trading—assume that public markets are marginally inefficient; that is, some investors can profitably exploit market inefficiencies some of the time. Assume further that a particular manager possesses information or insight unavailable to some other managers. As this manager's portfolio grows, the cost of implementing its ideas increases because transaction costs vary inversely with trade size (see Loeb 1983 and Perold and Salomon 1991). This relationship gives rise to diseconomy of scale for active management. As a result, small managers have an edge over large managers, *ceteris paribus*. Thus, the economics of information-motivated trading militates against concentration of the active-management segment of the industry when markets are marginally inefficient.

Marshaling staff is another obstacle to sustaining large firms. Investment professionals are as mobile as they are independent. Breaking away from one organization to join or found another has become commonplace for individuals and groups perceived as possessing genuine talent. Mobility of key resources, combined with low barriers to entry, is another factor militating against concentration of investment management.

For markets that are efficient, or at least operationally efficient, investors cannot expect to outperform the stock and bond markets of the principal developed countries, net of costs, in the long run. (This characterization admits a degree of informational inefficiency, but not one so great as to justify the cost of attempting to exploit it.) With respect to industry structure, under operationally efficient markets, market shares of active managers would conform to the model identified by Lakonishok, Shleifer, and Vishny.

Lakonishok et al. captured the essence of the active-management segment as monopolistic competition. The principal characteristics of this competitive model are (1) many buyers and sellers, (2) easy entry and exit, and (3) slightly differentiated products. The authors observed that active managers differentiate their products by style of management (e.g., "growth" versus "value") and by proprietary technique within style, thus rendering every product at least nominally unique. They observed that the active-management sector of the industry is fragmented, with market share divided fairly evenly and spread widely. They also found individual firms' market shares highly unstable over time, even among industry leaders. They concluded that the instability of market shares "appears to be the result of sponsor responsiveness to past performance."

If markets are operationally efficient, chance or marketing acumen are the only bases for concentration of the active-management sector, but neither is a basis for enduring concentration. Thus, unconcentrated, unstable market shares constitute the equilibrium industry structure for active managers under efficient markets.

Demand. Clients' perceptions of the efficacy of active management shape demand for investment-management services. Clients who

expect to profit from active management hold three views: (1) Markets are inefficient, (2) clients can identify (select) managers that have the advantage of information or insight, and (3) manager compensation and trading costs are not so great as to eliminate likely gains. If and as any of these views dissolves, a shift would occur in the demand for investment-management services. The number of active managers would contract, and indexing would grow.

Pricing. Even under the condition of market efficiency, the firmness of active-management fees will surprise some. For example, in their study, Hurley et al. reasoned that competition from low-cost indexers and lackluster manager performance, among other factors, will drive down active-management fees. The fallacy is that although active-management fees may be high for what the average client gets, they are not high for what clients buy. Clients are buying the prospect of gains from active management. Paying "high" fees validates the purchase of active management in the sense that rational, if optimistic, buyers realize they cannot expect to get something for nothing. An appropriate response to dissatisfaction with active management is indexing. To seek lower fees, however, is tantamount to saying, "This product does not work; you'll have to charge less if you want to keep me as a customer." Sufficient growth of indexing no doubt would contribute to squeezing active managers out of business as clients make the shift. But neither the indexing option nor the performance of the average active manager is sufficient to drive down fees accepted by hopeful investors, and open competition among active managers on the basis of price would be their death knell.

Having made this important point, it is equally important to acknowledge that discounting does occur, albeit not overtly. For example, clients commonly negotiate fees with active managers after expressing the intention to hire. Some clients use performance-based fees to control costs. Clients are also increasingly asking investment managers to consult, as well as manage money, which amounts to negotiating a lower investment-management fee. And although "enhanced index" products are differentiated in the marketplace in their degree of risk control, another real difference is price: Enhanced index products are available at about a 40 percent discount to comparable traditional active equity products.[1]

The Indexing Business

The passive-management segment resembles pure oligopoly. The product—matching the performance of standard market indexes—is consistently deliverable and undifferentiated. Large indexers develop globally broad, integrated product lines, which makes it easy, as well as cost-effective, for clients to use a single indexer for all their passive-investment needs. They are also uniquely positioned to provide valuable ancillary services. For example, a client can accomplish periodic portfolio rebalancing with a large indexer with a broad product line—often without transaction cost because of "crossing" opportunities arising among the firm's many clients. Economies of scale create significant barriers to entry. As a result, this segment is concentrated. Concentrated market shares of indexers would thus coexist with unconcentrated market shares of active managers, to the extent that markets are efficient.

If the "passive" segment is competitive, pricing will follow marginal cost, which varies inversely with assets under management. Thus, fees continue to decline as assets grow, as long as competition exists.

Pension plan sponsors managed $144.4 billion of their indexed assets internally in 1995.[2] Most plan sponsors do so on the premise that internal management lowers operating cost, and for some, if not many, no doubt internal management is cost effective. As commercial indexers' assets grow and prices fall, however, internal management becomes more difficult to justify on the basis of cost.

Small indexers face two competitive disadvantages. The obvious one is that their average cost is greater than that of large firms, and buyers of undifferentiated products are price sensitive. The other is a limited product line with fewer ancillary services. Small indexers must differentiate their products cleverly to succeed, and that is not easy to do. Small indexers are more likely to find success—in the short run, anyway—off rather than on the beaten path: in small company stocks, customized portfolios, or other specialized products with the potential for product differentiation.

Self-Interest, Strategy, and Selection

If managers perceive markets in which they trade to be operationally efficient and yet some clients still seek gains from active management, it would pay the managers to emphasize product development and marketing over investment in their product(s). Product proliferation and multiproduct firms would be common, if not the norm. Successful multiproduct firms master developing and marketing their products and building client relationships, which facilitate cross-selling and aid business retention during periods of poor performance. Through adaptation that serves their self-interest, firms emerge that bear a striking resemblance to the new-paradigm firm. But are these

multiproduct firms and the new-paradigm firm one and the same?

The multiproduct firm becomes the new-paradigm firm only when clients concentrate the management of their assets with such firms. Is this concentration likely to occur? It will occur only if multiproduct firms emerge that consistently add value across their product lines and over time. Clients will inevitably use fewer managers if they index more, but it will take more than a broad product line to induce clients to consolidate their investments with a small number of active managers, even those that respond adroitly to Mr. Ellis's injunction to excellence. Clients spent many years locked in the embrace of large insurance companies and money center bank trust departments, several of which were regarded as exemplary in their time. The clients invariably found these relationships unsatisfactory and replaced them with ones that afforded them control over their fund's asset allocation and greater flexibility in the use of investment managers; that is, less dependence on particular managers. Few clients are likely to relinquish the control or the flexibility unless they become convinced that doing so will pay them. But there is no reason to believe that simply consolidating assets with a few, very large, complex managers will enable clients to improve performance. Indeed, because of diseconomies of scale deriving from the relationship of transaction costs and trade size, managers of extremely large active portfolios are competitively disadvantaged relative to managers of small portfolios, *ceteris paribus*.

Greater indexing and unconcentrated, unstable market shares of active managers are consistent with market efficiency. Multiproduct firms are, too, but the new-paradigm active-management firm is not. Indeed, realization of the new paradigm would militate against the efficient market hypothesis. Thus, the new-paradigm proposition—with its implied concentration of active management—offers another interesting test of market efficiency.

Industry Trends

Trends that are evident in the investment-management industry in recent years are a reduction in the number of managers and an increase in indexing, as opposed to active management.

The number of active managers electing to participate in *Pensions & Investments'* annual directory of tax-exempt asset managers grew steadily between 1986 and 1989, rising from 894 to 1,005. The number then steadily declined to 725 by 1995. This contraction amounted to a decline of 28 percent in the number of active managers during the six-year period.

Aggregate indexed assets exceeded $1 trillion for the first time in 1996. The market share of the passive segment of the industry has grown such that approximately one dollar in four of large pension funds is now indexed.[3]

Patterns of Investment Management

Large pension funds continue to use many active managers. Approximately 25 percent of the 200 largest defined-benefit funds use 10 or more active domestic equity managers, and another 65 percent use between 4 and 9. The mean number of active equity managers was 8.0 in 1995 and 8.2 in 1996.[4]

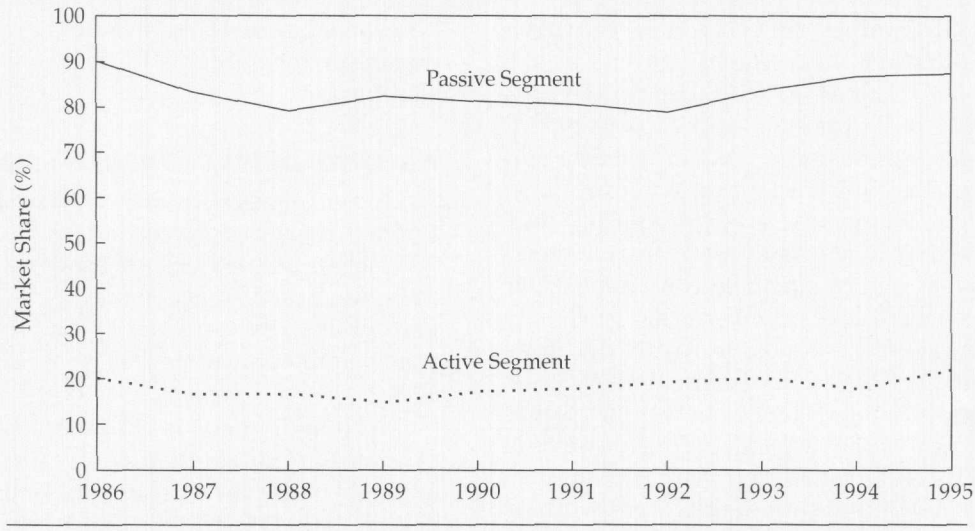
Although there is no indication that large funds are trimming their equity manager rosters, evidence of greater indexing does exist. In 1995, 56 percent of the 200 largest defined-benefit funds also used stock index funds in managing their domestic equity portfolios; this figure rose to 62 percent in 1996. Collectively, these funds indexed 30 percent of their domestic equities in 1995, and the figure rose to 36 percent in 1996. Based on these overall patterns of investment management—an average of 36 percent indexed in combination with eight active managers—the average R^2 of these equity portfolios approximates 99 percent.

No doubt the marketlike portfolios of large pension funds are deliberate, but diversifying with active managers is uneconomical. Large pension funds pay their domestic equity managers approximately 45 basis points, on average.[5] Indexlike returns can be gotten for a small fraction of that amount through passive management—as little as a basis point or two for large funds. Some evidence indicates that fund managers are becoming concerned with paying so much for what they are getting. In two recent surveys conducted by my firm, the vast majority of chief investment officers of several dozen of the largest corporate and public funds expressed the view that best practices in fund management increasingly will include reducing the number of managers employed, as well as the cost of investment management. Seventy-five percent of public fund investment executives expect to see greater indexing in the years ahead.[6]

Industry Structure

Figure 2 illustrates trends in concentration of the active- and passive-management segments of the business. Market shares of the active-management segment are unconcentrated. The 10 largest firms had aggregate market share of 20 percent in 1986 and 23 percent in 1995. The concentration ratio has increased slightly in recent years, which partly

Figure 2. Concentration of Tax-Exempt Assets, 10 Largest Firms



reflects the disappearance of 28 percent of the firms during the past six years. Nevertheless, the active-management segment has been, and remains, unconcentrated in terms of market share.

In sharp contrast, the passive-management segment has been concentrated throughout the decade. The 10 largest firms had aggregate market share of 90 percent in 1986 and 88 percent in 1995. The five largest firms—Barclays Global Investors, Bankers Trust, State Street Global Advisors, Mellon Capital Management, and ANB Investment Management—controlled nearly 80 percent of the market in 1995.

I also examined the degree of stability of market share rankings from year to year between 1986 and 1995. Confirming the findings of Lakonishok et al., I observed distinctly different patterns for active and passive managers. Market share ranks of active managers are unstable, and for the most part, the industry leaders of 1986 were not the industry leaders of 1995. Market share ranks of indexers, on the other hand, are stable. The five largest firms maintained virtually identical market share rankings throughout the period. These findings provide support for the position that unstable, unconcentrated market shares constitute the equilibrium industry structure for active managers, which is consistent with efficient markets.

Pricing

Active-management fees paid by large funds have been static for five years at 45 basis points for stocks and 30 for bonds, despite contraction in the number of active managers and the growth of indexing.[7] This fact lends support to the proposition that clients continue to pay high fees because they are buying the prospect of gains from active management.

Conclusion

There is no evidence that pension funds are concentrating their assets with relatively few investment managers—at least not with active managers. The active segment of the investment-management industry remains unconcentrated, and pension funds continue to use many specialists. Evidence does exist for (1) contraction in the number of active managers; (2) product proliferation, with a trend toward multiproduct firms; and (3) a gradual, continuing shift to passive management on the part of pension funds. Collectively, these indications are more consistent with growing concerns regarding the efficacy of active management than of a new paradigm for investment management.

If markets are operationally efficient and increasingly perceived as such, we can anticipate the following:

- The number of active managers of tax-exempt funds will continue to contract. Clients will index more in order to reduce the cost of earning marketlike returns. Indexed assets will continue to grow as a percentage of total plan assets.
- Product development, marketing, and building strong client relationships will remain vital functions within the majority of the surviving firms. Multiproduct firms will be prevalent, but unstable and unconcentrated market shares will persist.
- The passive-management segment of the market will remain highly concentrated, with a handful of firms handling upward of a trillion dollars before long.

- Merger activity will continue as investment-management entrepreneurs seek to diversify and liquefy their personal portfolios and strategic buyers seek growth through high-margin acquisitions.
- Although downward pressure on management fees will exist, fees for traditional products will likely exhibit resilience, even as contraction of the segment proceeds. Significant discounting is more likely to occur with the advent of new products, for example, as in the case of enhanced index funds. Passive-management fees will decline with marginal cost as long as the segment is competitive; barriers to entry will become even greater than at present.
- Clients are unlikely to establish new-paradigm relationships extensively with active managers. Such relationships are more likely to evolve between clients and a handful of passive managers.

Marketing remains a potent force in shaping the business of investment management. In the end, however, demand for investment management is determined largely by clients' perceptions of the efficacy of active management, and industry structure by the prevailing degree of market efficiency.[8]

Notes

1. Ennis, Knupp & Associates investment manager research. Based on samples of 13 leading enhanced index products and 20 leading traditional (large-capitalization, growth, value, and core) domestic equity products. For four categories of account size ($25 million, $50 million, $75 million, and $100 million), the average quoted fees were 38.7 basis points and 67.4 basis points, for an average discount of 43 percent.
2. *Pensions & Investments*, January 22, 1996. This figure excludes TIAA-CREF, which managed $46.6 billion of indexed assets internally.
3. *Pensions & Investments*, January 20, 1997. Between 1980 and 1996, the 200 largest defined-benefit funds increased their allocations to stock and bond index funds (excluding dedicated and immunized assets) from about 2 percent to 24 percent of aggregate plan assets.
4. *Pensions & Investments*, January 22, 1996, and January 20, 1997. The number of active managers per fund was estimated from 111 funds reporting identities of individual domestic equity managers for 1995 and 110 for 1996.
5. Greenwich Associates (1996).
6. Proprietary surveys conducted by Ennis, Knupp & Associates, Chicago, of 34 of the largest corporate funds (1995) and 39 of the largest public funds (1996). For a summary, see Richard M. Ennis, "Best Practices Require Better Measurement," *Pensions & Investments*, August 19, 1996.
7. Greenwich Associates (total funds).
8. I am grateful for the helpful comments of Keith Ambachtsheer, Jack Bogle, David Brief, Gary Brinson, Paul Burik, Mike Clowes, Ken Codlin, Pattie Dunn, Parker Hall, Philip Halpern, Josef Lakonishok, Tom Larkin, Bill Sharpe, Wayne Wagner, and Arnie Wood. I am also appreciative of the assistance of colleagues Liz Hamilton, Joe Lin, and Lyda Walls.

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