

401(k) Investment Options, Portfolio Choice and Retirement Wealth

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Abstract: A key issue in designing any individual accounts program is how many and what mix of investment options to provide to participants. While standard economic theory suggests that more choice is always better, this paper provides evidence from 401(k) plans that more choice does not necessarily lead to better outcomes. We first document the rapid growth in the average number of fund options, and show that this growth is dominated by actively managed equity funds. We then show that the resulting change in the mix of fund options leads to a higher average allocation of plan assets into actively managed equity funds, partly at the expense of lower cost passively managed equity funds. Indeed, as the number of actively managed equity funds in a plan increases, we show that asset-weighted average expenses of the 401(k) plan equity portfolios rise, while the asset-weighted average returns of the equity portfolios fall. We discuss the implications of these findings for ultimate retirement wealth.

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1. Introduction

One of the most salient implications of the continuing shift of private pensions in the U.S. away from defined benefit (DB) plans and toward defined contribution (DC) plans is that individuals have more choice about how to allocate their retirement portfolios. Self-managed, individual retirement accounts – including 401(k) plans as well as proposed personal accounts through Social Security – typically allow the individual participant at least some modicum of choice about whether to invest the funds in stocks, bonds, or other assets. These are multi-dimensional decisions, as the optimal choice requires that each individual investor consider at least three factors: expected returns, volatility, and administrative expenses. An investor's portfolio allocation decision is perhaps second in importance only to the decision of how much to save in the first place in determining how much wealth the individual will have when he or she reaches retirement age.

In the typical 401(k) plan in the U.S., participants do not have the freedom to allocate their portfolio across the complete spectrum of available assets. Rather, the 401(k) plan provider provides a limited menu of options from which to choose. There is tremendous heterogeneity in how limited or expansive the choice set is. For example, some firms provide only 3-4 investment options to participants, while others provide upwards of 50+ options. Such heterogeneity is not limited to private plans. In the Thrift Savings Plan, the defined contribution plan for federal government employees that is often touted as a model for how to structure the investment choices in a Social Security personal accounts program, there are five distinct investment options, plus a set of “life cycle funds” that are simply linear combinations

of the first five options.¹ In contrast, the Swedish public pension system provides participants with over 650 options from which to choose.

A key question in designing any individual accounts plan, whether public or private, is how many and what type of investment options to make available to plan participants. The classical economics view regarding choice is that “more choice is better” because constraints on individual choice are either not binding, in which case they are irrelevant, or binding, in which case they prevent a rational individual from achieving her maximum utility. More specific to the issue of portfolio choice, a key insight from the classic Markowitz portfolio model is that so long as an individual has access to a risk free asset and the market portfolio of risky assets, more choice is unnecessary. This result arises because various combinations of the risk free security and the market portfolio represent the “efficient frontier” of portfolios. Thus, individuals with different risk preferences will simply hold a different mix of the risk free and the risky assets, with more risk averse individuals having a higher share of their portfolio in the risk free asset, and more risk tolerant individuals holding a higher fraction in the market portfolio of risky assets.

Recently, however, an emerging literature in behavioral finance and behavioral economics has begun to question whether more choice necessarily leads to better outcomes. Munnell and Sunden (2004) provide an interesting summary of several psychological studies examining how large numbers of choices can lead some individuals to have difficulty making decisions. Even further, some researchers (e.g., Agnew & Szykman 2004) have suggested that, in the face of too many choices, individuals may suffer from “information overload” and

¹ The five distinct funds are the Government Securities Investment Fund (“G Fund”), the Fixed Income Investment Fund (“F Fund”), the Common Stock Investment Fund (“C Fund”), the Small Capitalization Stock Index Investment Fund (“S Fund”), and the International Stock Index Investment Fund (“I Fund”). The TSP also offers “L Funds,” which are lifecycle portfolios consisting of various combinations of the G, F, C, S and I funds.

actually make worse decisions. If so, then policy makers and plan administrators may wish to consider this phenomenon when making a determination of what investment options to offer to participants when designing an individual accounts system.

More generally, a growing literature in behavioral economics and behavioral finance focuses on the fact that pension plan design can have important effects on many aspects of participant behavior. For example, Madrian and Shea (2001) and Choi et al (2002) show that when individuals are automatically enrolled in a 401(k) plan, but retain the option to opt-out, participation rates rise dramatically relative to a world in which they have the option to participate but where the default option is to not participate. This is a particularly interesting finding because the actual choice set of the individual has not changed at all – participants can still choose whether to participate or not – and yet participation rates change markedly.

With regard to portfolio allocations, a standard model of rational consumers would suggest that a change in the number and mix of options should matter only insofar as it adds or removes constraints on decisions. However, Bernartzi and Thaler (2001), Liang and Weisbenner (2002), and Brown and Weisbenner (2004) have provided evidence that the number and mix of options available in a plan may influence portfolio allocations in a way that would not be predicted by a standard model of fully rational consumers. For example, consumers may follow naïve diversification strategies, such as allocating $1/n$ of their contributions to each of the n choices, suggesting that portfolio allocation may be sensitive to the mix of options.²

Work on company 401(k) match policy (e.g., Bernartzi 2001; Brown, Liang and Weisbenner 2005) suggests that individuals who are required to invest their matching

² In more recent work, Huberman and Wei (2004) provide evidence that “ $1/n$ behavior” at the plan level does not necessarily stem from $1/n$ behavior at the individual level. Rather they show that individuals tend to allocate contributions evenly across only a subset of the funds in which they participate.

contributions in their employers stock tend to invest more of their own money in employer stock, perhaps due to an implicit “endorsement” effect. Again, this suggests that plan design matters more than what a standard model of rational consumers would suggest.

The general theme of much of this recent research is that “plan design matters.” In other words, how a pension plan is designed can influence participant behavior in ways that would not be naturally predicted by standard economic models of a rational consumer. Adding to this literature, this paper focuses on how the recent, rapid increase in the average number of options provided by 401(k) plans has influenced overall portfolio allocations in those plans. Using a hand-collected panel data set of plan options offered by a large number of 401(k) plans, we proceed in three steps. First, we document how the number and mix of options offered in these plans has evolved over the last several years. Second, we examine how the change in the set of choices has influenced overall plan-level portfolio allocations. Finally, we discuss the likely implications of these changes for the retirement wealth of current plan participants.

We have four main findings: First, consistent with the rapid growth in the number of retail mutual funds over the past 15 years, we find a similar rapid rise in the number of investment options offered by 401(k) plans. For example, from 1993 – 2002, the median number of funds offered as investment options by 401(k) plans in our sample rose from 5 to 13 (similarly, the mean rose from 5.1 to 13.9). Second, we find that equity funds, primarily actively managed equity funds, account for nearly two-thirds of the new funds being added during the latter part of this period. Third, we show that the increase in the share of funds that are actively managed equity funds has led to an increase in the share of assets invested in these actively managed funds. Fourth, we provide evidence that the average return to these

actively managed funds, particularly after accounting for their higher expense ratios, are on average inferior to those of passively managed equity funds. Indeed, we find that there is a significant positive relation between the number of investment options offered by a plan and the average expenses paid by plan participants. Similarly, there is a significant negative relation between the number of options offered and the firm-wide average return on equity funds in the plan. An implication of these findings is that the increase in the number of plan options may lead to lower average investment returns, and potentially lower retirement wealth, as individuals place a larger share of their portfolio in actively managed funds with higher expenses and lower net returns.

This paper proceeds as follows: We begin in section 2 by explaining the source of the data used in this analysis. Section 3 provides evidence about the relation between the number and mix of investment options and asset allocation at the plan level. We then discuss the implications for retirement wealth in section 4. Section 5 concludes.

2. Data

The primary source of data for this project is 401(k) plan level financial data from 1999 – 2002. This rich source of data is compiled by hand from 11-k filings with the SEC, which a company files when it provides an option to invest in company stock that is deemed an offering of securities. From these filings, we collect information about every fund option offered in the 401(k) plan, including the fund name, the beginning of year assets, and the end of year assets. For the few firms with multiple plans, we collect data for the largest plan.

Starting with all U.S. firms listed in Compustat in 1998, we identify firms that filed an 11-k at least once during our sample period. 11-k filings are available on the SEC's Edgar

website starting in 1994. However, 1999 is the first year in which the reports are consistently specific in naming the exact fund options. Having specific fund names is critical to our ability to classify mutual funds according to investment objective, as well as for identifying whether equity funds are actively or passively managed. For these and other reasons, we restrict our sample for this paper to the 1999 – 2002 period. We were able to hand-collect data for approximately 600 companies for which we could accurately identify their investment options, yielding approximately 1800 firm-year observations. Over this period, the average 401(k) plan offered approximately 12 fund choices, providing us with approximately 22,000 firm-year-fund observations.

To characterize our sample of firms, we illustrate in Table 1 the 1998 cross section of firms filing the 11-k. As shown in table 1a, about one-half of the sample was a member of the S&P 1500 during 1998.³ Thus, the typical firm in our sample is smaller, measured by both market value and employees, than the typical S&P 1500 firm, but is larger than the average of all public companies as available from Compustat. The sample represents a broad cross-section of industries. As noted in the table, 17 percent of the sample is in the technology sector, somewhat less than the overall market.

Companies that issue shares for their retirement plan, rather than purchase shares on the open market, are required to file an 11-k. While this raises the possibility that the sample could be biased toward firms that do not repurchase stock, in separate work (Brown, Liang & Weisbenner 2004) we document that repurchase activity by firms in our sample does not differ from that at other publicly-traded firms.⁴

³ The S&P 1500 consists of the 1500 stocks that comprise the S&P 500 index, the S&P 400 MidCap index, and the S&P 600 SmallCap index.

⁴ In the uncommon event that the plan does not allow employees to purchase company stock but does provide the employer match in company stock, it would generally not be deemed an offer of securities, and the plan would

We also compare our sample of plans to those at publicly-traded firms as reported on Form 5500 filed with the DOL.⁵ In the aggregate, for our sample of the largest plans at 441 companies in 1998,⁶ total plan assets were \$150 billion, representing 21 percent of the \$698 billion in plan assets at all publicly-traded companies (table 1b). Total contributions by participant and company for our sample totaled \$9.2 billion, just under 19 percent of the \$49.2 billion for publicly traded firms. Estimates from the DOL for 1998 for all US companies, public and private, are \$1.54 trillion in assets and \$135 billion in contributions.

After collecting the 22,000 plan-year-fund observations, we then merge this data with Morningstar's database on mutual fund characteristics.⁷ The Morningstar data is one of the leading sources of mutual fund data, and from this, we obtain information about each fund's investment objective (e.g., equity growth, balanced, bond fund), return history, expense ratio for retail investors, turnover, and whether the fund is actively or passively managed.

There are at least two key advantages to this data. First, because it is a large panel data set with multiple observations on the same plans, we are able to trace how changes in the mix of investment options influences portfolio behavior over time, while controlling for cross-sectional differences in firms. Second, because we are able to identify specific mutual fund offerings, we are able to merge this data with Morningstar, and thus obtain much more detailed information about the financially relevant details about the plan options, including information on returns, volatility and expenses.

not be required to file an 11-k. In our discussion with SEC staff, the onus is on the company to determine whether it needs to file an 11-k.

⁵ Publicly-traded companies in the DOL Form 5500 data set were identified by whether they had a CUSIP and matching EINs with those in Compustat.

⁶ Table 1 reports 444 firms in 1998 while subsequent analysis uses 441 firms. This is because a small number of firm year observations were not successfully merged with a complete set of firm characteristics.

⁷ We are grateful to Zoran Ivkovich for his invaluable assistance in merging this data.

3. Investment Options and Asset Allocation

3.1 Growth in the Number of Investment Options

From 1990 to 2003, the number of mutual funds available to retail investors in the United States more than doubled, from approximately 3,100 funds to approximately 8,100 funds. As illustrated in Figure 1, from 1993 – 2002, our 11-k data indicates that the median number of fund options available in 401(k) plans rose from 5 to 13 (the mean rose from 5.1 to 13.9).⁸ As Figure 1 shows, the increase in the number of fund options was steady over the period, with the median rising by 1 fund nearly every year.

Using our 11-k / Morningstar data, we are able to answer the question “what type of fund is added on the margin?” In Table 2, we report the cross-sectional results of the number of options offered by each fund type. One simple delineation is to divide fund options based on broad asset classes. Specifically, we divide all of the plan options into six major categories, including (i) employer stock, (ii) fixed income funds, which includes money market funds, guaranteed investment contracts (GICs), and corporate or government bond funds. (iii) balanced funds, (iv) international equity funds, (v) passively managed equity index funds, and (vi) actively managed equity funds.

One can see that in firms that offer more options, the majority of the additional funds are actively managed equity funds. For example, comparing firms with 8 fund options to firms with 18 fund options, on average 6 of these 10 additional options are actively managed domestic equity funds. In contrast, only 0.3 are passively managed index funds. The remaining additional options consist, on average, of 1.5 more fixed income options, 0.9 more balanced fund, and 1.4 more international funds.

⁸ As further indication of the representativeness of our data, from 1998 – 2002 the Profit Sharing / 401(k) Council of American reports that the average number of investment options offered rose from 10 to 15. In our sample over this same time period, our average rose from 9.6 to 13.9.

Of course, comparing the number of options across firms at a given point in time does not necessarily imply that actively managed equity funds represent the majority of funds that are being newly added on the margin. To address this, we are able to make use of the time series aspect of our data, and examine the composition of new funds that were added over our sample period. Figure 2 shows the composition of the new funds that were added from between 1999 and 2002. Nearly two-thirds (62%) of all new fund options were actively managed equity funds, compared with only 5 percent of new funds being equity index funds. Another 17 percent of new funds are fixed income, with balanced funds and international funds representing 9 percent and 7 percent of new funds respectively.

3.2 Investment Options and Asset Allocation

In figure 3, we report, for the entire pooled cross section of firms in our sample, the fraction of plan options and the fraction of plan assets that fall into each of the six major asset classes. Focusing first on the bars representing the fraction of plan options, a major feature of the data is that actively managed equity funds represent over just over 40 percent of all fund options. Note that, while large, this share is actually lower than the share of *new* funds being added that are in actively managed funds. Because the marginal funds are more heavily concentrated in actively managed funds, this supports the notion that the share of funds that are actively managed is rising over time. Employees also have additional equity options, including employer stock, passively managed equity funds, and international funds, which each contribute another 8 – 11 percent of fund options. Balanced funds, which consist of a mix of equity and fixed income options, represent 8 percent of fund options. The remaining 22 percent of fund options consist of various fixed income investment options. The very low

fraction of options and assets that are in passively managed index funds is particularly noteworthy. At only 8 percent of existing options, and only 5 percent of new options, index equity funds are declining as a share of total fund choices.

The second major, and perhaps most striking, feature of the data is how closely the allocation of plan assets mirrors the mix of options. Indeed, the simple correlation between the average share of options and the average share of assets across these six asset classes is 0.85. In previous work, Brown and Weisbenner (2004) provided evidence, using a sample of 401(k) plans based on earlier 11-k data during the 1990s, of a strong correlation between the fraction of plan options in an investment class and the fraction of contributions that are allocated to that class.⁹ In this 1999 – 2002 data, this pattern clearly continues, even after breaking the funds into finer asset classes. The only major deviation from this pattern is that employer stock represents 22.2 percent of plan assets, while representing only 9.4 percent of plan options. This reflects the fact that many employers restrict the employer's matching contribution to company stock, as well as the fact that employees tend to allocate more of their own contributions to company stock when the firm restricts the match in this way (Brown, Liang and Weisbenner 2005).

While it is tempting to draw conclusions that the relation between asset allocation and the mix of investment options is evidence that individual investment decisions are being irrationally influenced by fund mix, it is important to consider two alternative hypotheses about the relation between the fraction of fund options invested in index funds and the fraction of assets allocated to them.

⁹ In the previous study, which was based on an earlier data sample, we were limited in our ability to classify investment options by fund type because we did not have specific fund names. For example, we were previously unable to distinguish between actively and passively managed funds. The advantage of using the 1999-2002 data in this paper is that much finer distinctions are possible.

The first alternative hypothesis is that individuals have a rational preference for funds that specialize in investments other than large-cap funds like the S&P 500, which is the most common form of equity index fund. For example, perhaps it is the case that, when offered a choice between an active and a passive fund with similar investment objectives (e.g., large cap growth funds), they choose the passive one. But if the investor wants to place part of their portfolio in small cap funds, or emerging market funds, that as these funds are added to the plan, they are only offered in an actively managed form. If so, then the move away from index funds may simply be telling us something about allocations across investment objectives rather than telling us anything about the choice between active and passive fund management.

A second alternative hypothesis is that, because we are restricted to looking at asset balances rather than contributions, we are simply picking up the effects of “inertia.” In other words, if it were the case that the average index fund were added to the mix later than the average active fund, allocations to index funds might be low simply because investors are still playing catch up. That is, even if contributions are now flowing more readily into index funds, they might still represent a small share of plan assets.

In figure 4, we provide some evidence that our general finding – namely that the share of assets held in index funds is influenced by the share of total fund options represented by index funds – is robust to both of these concerns. We first restrict ourselves to those firms that offer at least one index fund and at least one actively managed fund. We first report the share of options and the share of assets in this full sample. We then limit the sample to large cap / value-growth funds. The logic of this restriction is that the most common index fund, the S&P 500 index fund, has this investment objective. By restricting our attention to funds

with this objective, and finding a strong correlation between share of options and share of assets, we can rule out the concern that the results are driven by a desire for alternative asset classes. The final set of bars limits the analysis to new funds only, the logic being that the end of year balances of new funds consist primarily of contributions. As such, this set of bars represents a good proxy for the flow of contributions going into index funds.

These results suggest that index funds represent a small share of options offered by 401(k) plans, and that as more and more actively managed equity funds are added to the mix, the share of investment options represented by index funds shrinks even further. At least partly as a result of this dilution of importance, index funds also represent a small share of the plan assets. Given that index funds tend to have lower expenses than actively managed funds, this suggests that there may be important implications for retirement wealth, an issue we return to in section 4.

3.3 Quantifying the Relation between Number of Options and Asset Balances

In previous work (Brown & Weisbenner 2004), we have documented a strong correlation between the fraction of fund options in a broad asset class (equity vs. fixed income vs. company stock) and the fraction of contributions allocated to that asset class. Here, we show similar results, but with three differences. First, our current sample uses firms from a later sample, namely 1999 – 2002. Second, the greater detail on specific fund names in this data sample allows us to divide funds into finer categories (e.g., active vs. passive funds, domestic vs. international, etc). Third, we are restricted to focusing on asset allocations (rather than the allocation of new contributions) because after 1998, firms were no longer required to disclose as much information about contributions.

In Table 3 we report coefficients from a regression of the share of assets invested in each fund type against the share of fund options of that type that are available in the plan. If the coefficient is equal to 1, it suggests that, on average, plan participants are allocating assets according to a “1/n” rule. In other words, a coefficient of 1 suggest that participants are allocating assets to each category in exact proportion to the share of options represented by that category. A coefficient of 0 indicates that there is no relation between the share of investment options and the share of assets allocated to that fund type.

We see the coefficients on the share of options for a pooled cross-section. These regressions are based on a sample of 1779 firm-year observations, with standard errors clustered on the firm identifier to account for the fact that cross-year observations on the same firm are not independent. Each coefficient is from a separate regression: for example, the first row, first column reports the result from a regression of the “share of assets invested in company stock” against the “share of total options that is company stock.” The coefficient of 1.27 suggests that the fewer total options there are, and thus the larger the share of options represented by employer stock, the larger the share of plan assets invested in employer stock. While the other coefficient estimates range from a low of 0.28 for fixed income investments to a high of 1.05 for indexed equity, every result is statistically significant. These results clearly indicate a correlation between the share of fund options and the share of assets allocated to each fund type.

We know from earlier results that the majority of funds being added to a plan are actively managed funds. This means, on average, that as new funds are added, the share of total fund options represented by other fund types, declines. This is particularly true of passively managed, index equity funds. When combined with these regression results, it

suggests, for example, that as firms add new options, plan participants allocate a smaller share of their resources to index funds (as well as some other groups, such as balanced funds.)

The implication that individuals allocate a smaller share of their portfolio to low cost index funds as more funds are added to a plan has potentially important implications for retirement wealth. We turn to this subject now.

4. Implications for Retirement Wealth

The results so far have indicated that the rapid rise in the number of fund options provided to participants in 401(k) plans in recent years has led to a larger share of fund options being actively managed equity funds. Further, we have provided evidence that as the fraction of fund options in an asset class increases, asset allocations tend to shift toward actively managed funds and away from index funds and other investments. As a result, the combined effect is that aggregate 401(k) plan assets are increasingly being invested in actively managed index funds, with a smaller share of assets flowing into passively managed funds.

Why should we care whether 401(k) plan participants are investing more in actively managed equity funds? Since Jensen (1968), a large number of studies have shown very little evidence that mutual fund managers outperform passive benchmarks. As stated by Berk and Green (2002), “the fact that investments with active managers do not outperform passive benchmarks is a consequence of the competitiveness in the market for capital investment. If investors compete with each other for superior returns, they end up ensuring that none exist.”

In figure 5, we report the average past 5 year return for the actively managed and passively managed equity funds in our 401(k) data, on both a gross (pre-expense) and net

(post-expense) basis. While the pre-expense returns only differ by 30 basis points, the net return differential is much greater. This is because the actively managed funds have an average expense ratio of 93 basis points, compared with only 32 basis points for index funds. These expense ratios are calculated from Morningstar, and are the expenses associated with these fund when sold at the retail level (e.g., direct to the investor). Large 401(k) plans are often able to negotiate much smaller management fees from the mutual fund providers, and as such, the level of the fees that we use in this analysis are likely overstated. However, as reported in Brown, Liang and Weisbenner (2005), a confidential Federal Reserve Board survey of 401(k) plan expense ratios by fund type indicates that the average *difference* in expense ratios between actively and passively managed mutual funds is on the order of 50 – 60 basis points, in line with the Morningstar estimates.

To draw a more direct link between the number of options offered by a 401(k) plan and the average returns and expenses in the plan, we turn to a regression framework. Specifically, we compute the firm-wide average expense ratio on *equity* investments (weighted by the dollar value of the assets invested in each option), and regress this on one divided by the *number* of equity options offered.

The results, reported in table 4, indicate a relation between the number of fund options and asset-weighted average expense ratios on equity investments. Specifically, the coefficient in column 1 shows that an increase from 1 equity fund to 5 equity funds (which means the $1/n$ variable declines from 1 to 0.2) is associated with a 22 basis point increase in the average annual expenses for the plan.¹⁰ As illustrated in column 2, we get similar results when we estimate a median regression instead.

¹⁰ The coefficient estimate is -.00274. An increase in the number of equity funds from 1 to 5 means that the right hand side variable declines from 1.0 to 0.2, or a decline of 0.8. Thus, the effect is that expenses move in the

In columns 3 and 4 we report results for a slightly different specification. Rather than using as our dependent variable the asset weighted expenses on all equity funds, we instead look only at the asset weighted expenses on all *actively managed* equity funds. This enables us to ask whether the additional equity funds that are added have similar expenses to the initial funds. Column 3 indicates that, in fact, the addition of more actively managed funds increases the average expense ratio even within the universe of actively managed funds. The coefficient of -0.001685 means that a move from 1 to 5 active funds (a decline in $1/n$ from 1 to 0.2) is associated with a 13 basis points ($116.85 \text{ basis points} * -0.8$) increase in asset weighted average fund expenses. Again, very similar results hold when we run a median regression (column 4). These results suggest that not only are firms adding actively managed funds that are more expensive than passively managed funds, but on average they are adding actively managed funds that are more expensive than the actively managed fund that they already had.

In table 5, we turn our attention to rates of return instead of expenses. Because our mutual fund data only runs through 2002, and because we are interested in examining *subsequent* fund performance, we must restrict our sample to the 1999 – 2001 period. As a result, the number of observations in our regression falls to 1339. We regress the subsequent one-year return, i.e., the return in year $t+1$, on the number of fund options offered in year t . As before, we begin by asset-weighting the rates of return for the funds that each firm offers. The first regression coefficient of 10.95 in column 1 has the interpretation that as the number of equity options increases from 4 to 5 (so that one over n falls from 0.25 to 0.20), the firm-wide average equity return falls by $0.5 * 10.95 = 0.55$ percentage points. We again find similar results using a median regression approach in column 2.

opposite direction (i.e., increase) by $0.8 * .00275 = .0022$.

The magnitude of these return differentials is quite large, and likely reflects at least three factors. First, as already noted, management expense fees are higher for actively managed funds, so adding more of them (especially adding even more expensive ones) will depress returns. Second, the expense ratios that are widely used actually understate the true expense differential, because they do not include trading costs. Because actively managed funds, by definition, have much higher turnover rates than index funds, they incur higher trading costs, further dragging down returns. Finally, at least during this particular time period, actively managed funds, on average, simply under-performed relative to the market indices. It is of course also worth noting that the large negative constant term in the regressions, indicating a negative 16% return, simply reflects the poor performance of the stock market over our sample period of 1999 – 2001.

In order to ensure that our results are not unique to the bear market between 1999 and 2001, we also use firm-wide asset weighted equity returns over the past five years. Note that this specification is not entirely satisfying, as there it does induce some endogeneity due to the fact that a fund that performed well in the past will have a higher weight in the weighted average return. Nonetheless, the results are still quite similar, with a coefficient of 13 in the standard regression (vs. 11 in column 1). Note that the primary difference is the fact that overall equity market performance was quite strong in the preceding five year period, as indicated by the constant term of the regression now being a positive 9.95 percentage points, versus –16.1 percentage points in the later period. The key, however, is that the marginal effect of adding additional options on weighted average returns is quite similar in both periods.

How important are these effects? To illustrate, consider a worker investing 3% of their annual income in 401(k) equity options from age 27 through age 62, using the age-earnings profiles from Munnell & Sunden (2004). Suppose that both actively managed and passively managed index funds earned an average annual rate of return of 7 percent per year over this period before expenses, and that, in line with the Federal Reserve Board survey, index funds have annual expenses of 10 basis points, while actively managed funds have annual expenses of 60 basis points. At age 62, the equity portion of this individual's portfolio would be worth \$170,000 if the individual invested in index funds, and only \$152,000 if the individual invested in actively managed funds. Thus, assuming equal gross returns, a 50 basis point expense differential translates into a 12 percent difference in the size of one's equity portfolio at retirement. Obviously, if one also considers the much larger return differential derived from the rate of return regressions, the differential wealth outcome is substantially larger.

5. Discussion and Summary

A key policy question in designing personal retirement accounts as part of a reformed U.S. Social Security system is how many and what types of investment options should be made available to individual participants. The results of this paper suggest that this design decision has the potential to influence portfolio choice, and thus asset returns, risk exposure and administrative costs.

A wide range of models and proposals exist for designing such a system. For example, the personal accounts proposal unveiled by President Bush in February 2005 envisions a limited number of fund options, modeled after the Thrifts Savings Plan, with a

heavy emphasis on “life-cycle” funds. The 2001 President’s Commission to Strengthen Social Security recommended a “two tier structure”: in Tier I, workers would choose from funds modeled on an augmented version of the choices available in the current Thrift Savings Plan. Once employees accumulate a sufficiently large balance (e.g., \$5000), however, they would be allowed to choose from a wider range of “Tier II” qualified private sector funds. An extreme level of choice is provided in the Swedish public pension system, in which participants currently have access to over 650 different fund options (Sunden 2004). The large (and thus potentially confusing) range of choices available in the Swedish system is perhaps one reason that, during the 2004 fund election period, only 10 percent of participants made an active choice from among the fund options, while 90 percent accepted the default allocation.

Our research provides further evidence that asset allocation decisions are influenced by the number and mix of options available. In 401(k) plans over the past decade, there has been a steady increase in the average number of options provided. The majority of these options have been actively managed equity funds. One implication of this is that other fund options, such as index equity funds, represent a smaller and smaller fraction of total fund options. We have provided evidence that asset allocations are correlated with the fraction of plan options in each investment category, implying that as index funds become a smaller share of overall investment options, participants allocate a smaller fraction of their portfolio to these funds. Given the lack of evidence supporting superior returns from actively managed funds, and the simple empirical fact that actively managed funds charge higher fees, it is likely that an increase in the number of actively managed equity funds will result, on average, in poorer net returns to 401(k) equity portfolios.

Of course, to the extent that providing more fund choices also reduces allocations to company stock, this would be an improvement in the risk / return profile for many participants. Similarly, if adding additional equity options reduces allocations to money market funds or other low-yielding investments, average returns (and risk exposure) could increase. However, it is important to note that these beneficial effects of increasing the number of options would likely apply with equal force if the new fund options being added were low cost options.

These factors indicate that there are potentially important trade-offs that policymakers must consider when considering whether to provide a larger number of investment options. For that fraction of the population that has the financial savvy to optimally allocate their portfolio across a wide range of options, providing more choice will reduce constraints on the investment decision and make these consumers better off (or at least not worse off). However, for that segment of the population that is not financially sophisticated, providing more choice does not necessarily lead to better outcomes. Given the lack of evidence supporting higher returns from active fund management, low cost passively managed fund options would seem a natural choice for designing public individual accounts programs.

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Table 1a: Characteristics of 1998 Sample, S&P 1500, and Public Firms

	1998 Sample	S&P 1500	Public Firms
Market Value (\$ millions)			
Mean	4,695	7,283	2,438
Median	716	1,329	192
[10 th % – 90 th %]	[70 – 9,010]	[238 – 14,211]	[26 – 3,260]
Employees (000s)			
Mean	11.7	19.9	5.4
Median	4.0	6.6	0.5
[10 th % – 90 th %]	[0.5 – 27.5]	[0.9 – 45]	[0.02 – 10.2]
Member of S&P 1500 (%)	51	100	20
Technology Sector (%)	17	19	24

Data are from Compustat. Public firms include 7,501 U.S. firms.

Table 1b: Aggregate 401-k Plan Assets and Contributions for 1998 Sample, Public Firms, and All Firms

	1998 Sample: 441 firms	Public Firms	All Firms
Total 401-k Assets (\$ billions)	150	698	1,541
Employee and Employer Contributions (\$ billions)	9.2	49.2	134.7

Data on 401-k assets for public firms are from 1998 5500 filings with the Department of Labor. Data for all firms (public and private) are estimated by the Department of Labor. Company stock for public firms and all firms excludes stock indirectly held in trusts and pooled accounts. Employer contributions constitute 29 percent of total contributions for the 1998 sample and 31 percent for all public firms.

Table 2: Mix of Funds by Number of Fund Options

Number of Options	Employer Stock	Fixed Income Funds	Balanced Funds	International Funds	Passively Managed (Index) Equity Funds	Actively Managed Equity Funds
8	1.0	2.0	0.7	1.0	0.7	2.6
10	1.0	2.3	0.8	1.1	0.8	3.9
12	1.0	2.6	0.9	1.5	0.9	5.0
14	1.0	2.8	1.4	1.5	1.0	6.3
16	1.0	2.9	1.7	1.8	1.0	7.7
18	1.0	3.5	1.6	2.4	1.0	8.6

Calculation based on pooled cross section of 11-k information for firms from 1999 – 2002.

Table 3: Coefficient from Regression of Share of Assets on Share of Contributions

Regression	Co. Stock	Fixed Income	Balanced	International	Index Equity	Actively-Managed Equity
Share of Fund Options of Each Type	1.27*** (0.23)	0.28*** (0.05)	0.51*** (0.04)	0.49*** (0.04)	1.05*** (0.07)	0.61*** (0.04)

Each coefficient is from a separate regression of the share of assets of each type against the share of fund options that are of each type. Each regression was based on a sample of 1779 firm-year observations. Standard errors are reported in parentheses. Standard errors are clustered on the firm identifier.

Table 4: Regression of Weighted Average Equity Fund Expenses on Number of Equity Options

	Weighted Average Expenses of Entire Equity Portfolio		Weighted Average Expenses of Actively Managed Portfolio	
	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)
Constant	0.00870*** (0.00018)	0.00867*** (0.00013)	0.00947*** (0.00014)	0.00929*** (0.00011)
1 / Number of Equity Funds	-0.00221*** (0.000765)	-0.00227*** (0.00051)	-0.00169*** (0.00046)	-0.00117*** (0.00034)

*** indicates that the result is statistically significant at the 1% level.

The dependent variable in columns 1 and 2 is the average expense ratio for each of the equity investment options available in each 401(k) plan, weighted by the share of total plan equity holdings in that fund. In columns 3 and 4, only the actively managed funds are included in the expense calculation.

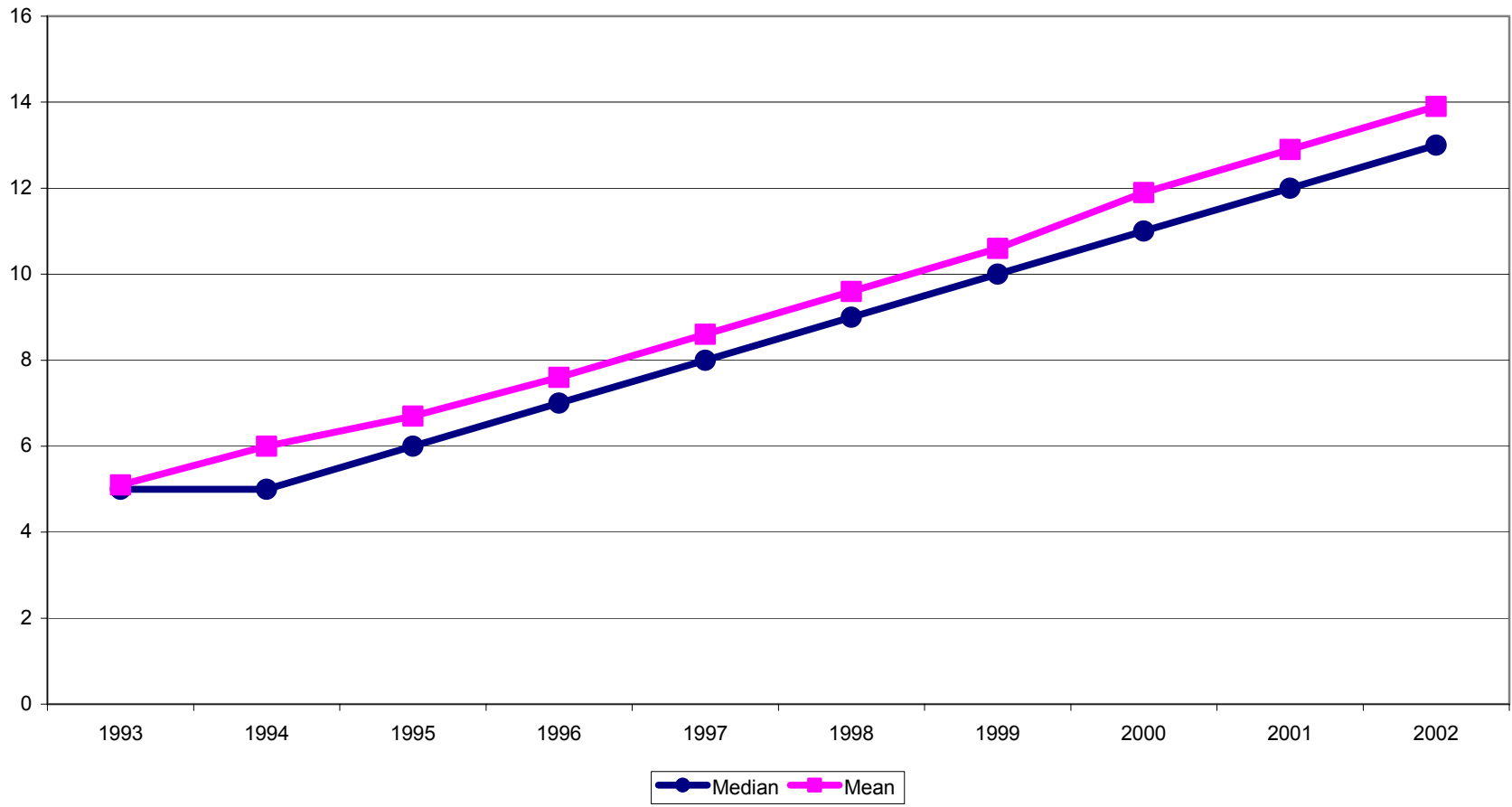
Table 5: Regression of Weighted Average Equity Fund Returns on Number of Equity Options

	Weighted Average Returns in Year t+1 Portfolio		Weighted Average Returns over Past 5 Years	
	Mean	Median	Mean	Median
	(1)	(2)	(3)	(4)
Constant	-16.10*** (0.549)	-16.86*** (0.821)	9.95*** (0.445)	8.703*** (0.461)
1 / Number of Equity Funds	10.95*** (2.407)	9.96*** (3.050)	13.07*** (2.061)	17.097*** (1.800)

*** indicates that the result is statistically significant at the 1% level.

The dependent variable is the average rate of return for each of the investment options available in each 401(k) plan, weighted by the share of total plan equity holdings in that fund. In columns 1 and 2, the rate of return is for year t+1, i.e., the year following the observation. In columns 3 and 4, the rate of return is the average measured over the prior 5 years.

**Figure 1:
Mean and Median Number of Funds Offered in 401(k) Plans**



**Figure 2:
Share of New Options**

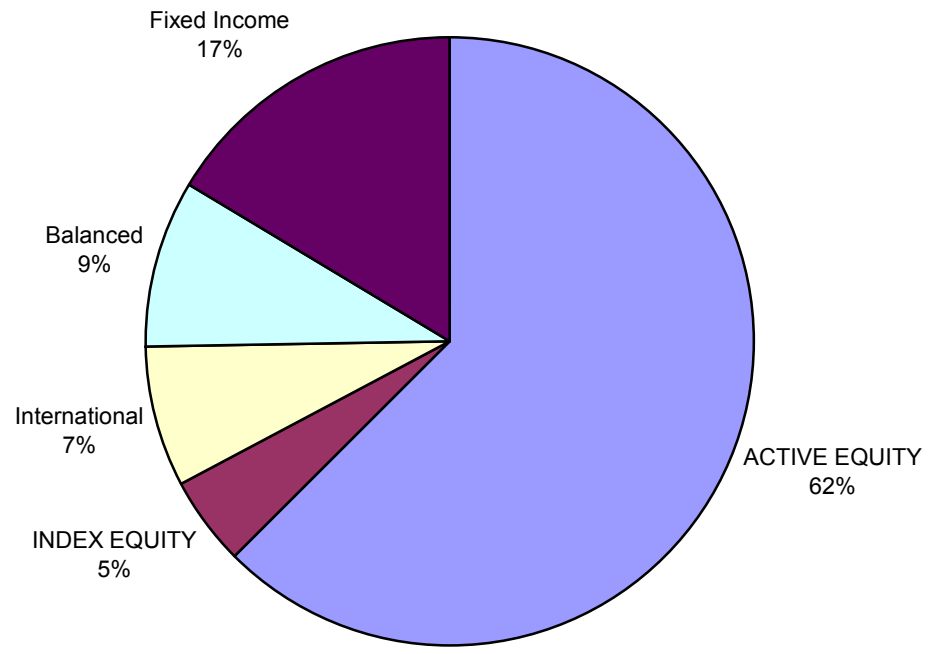


Figure 3
Share of Options & Assets Across Fund Types

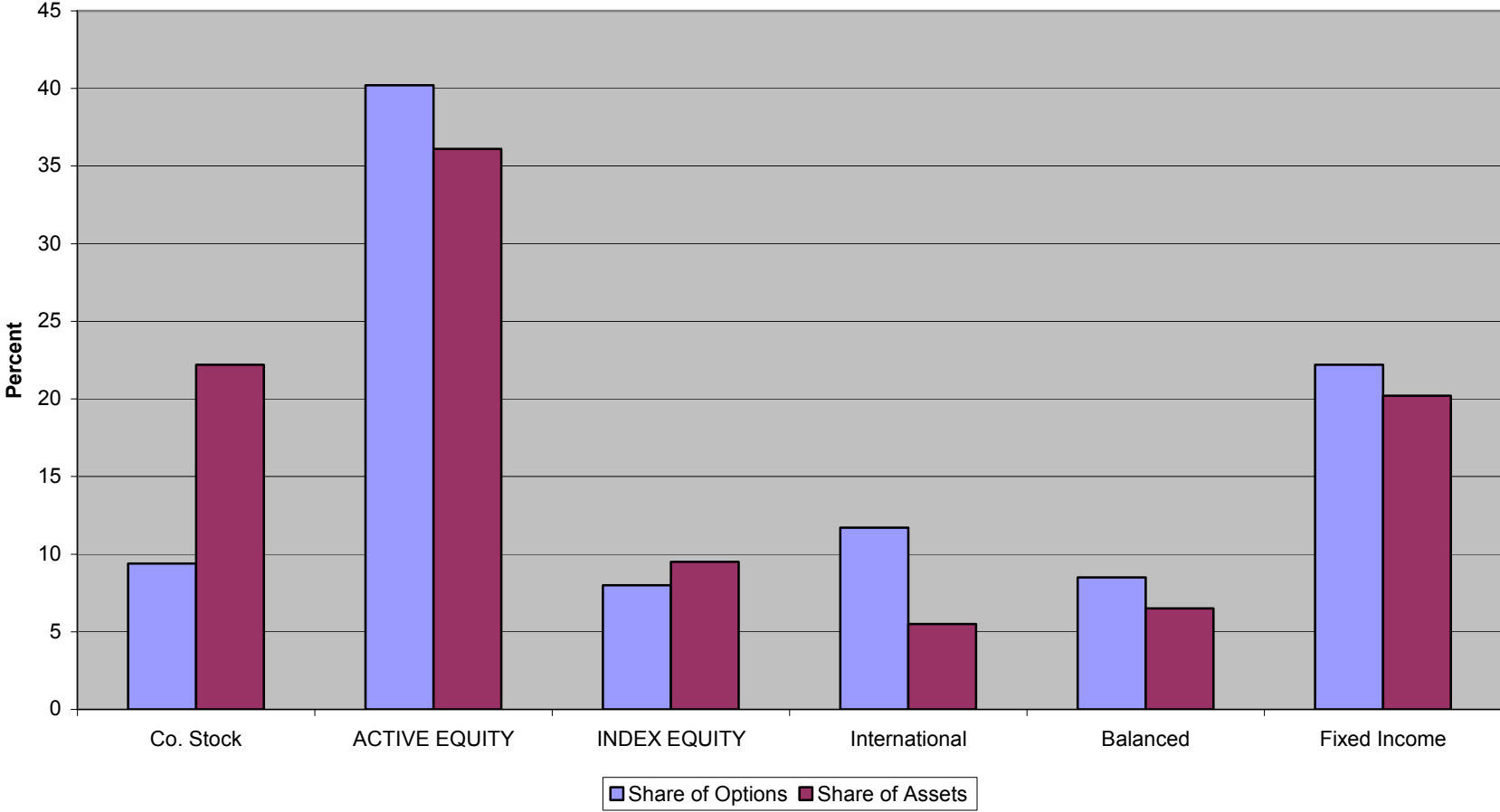
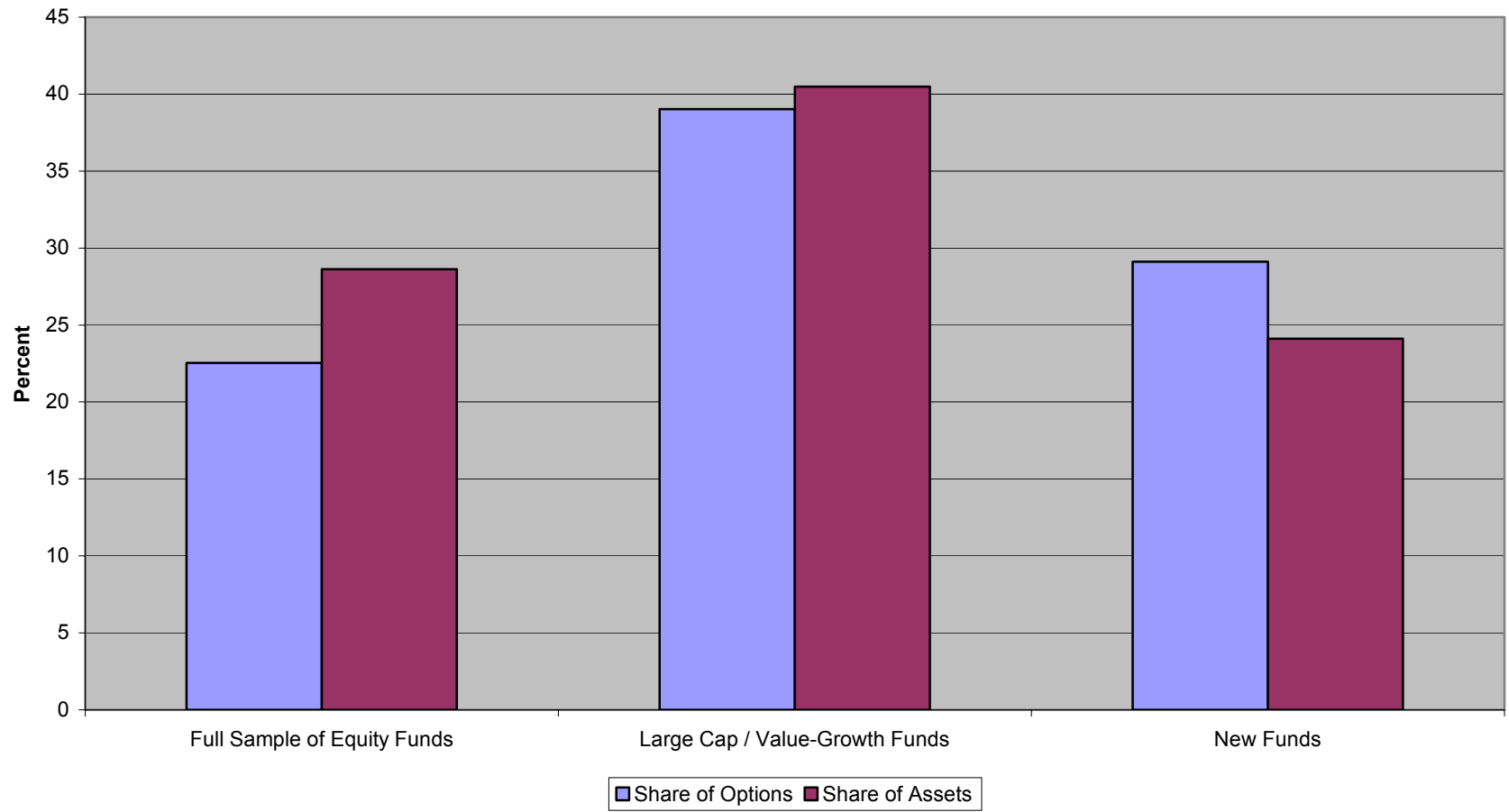


Figure 4:
Robustness Checks: Share of Equity Options & Assets in Index Funds



**Figure 5:
Performance of Equity Funds in 401(k) Plans**

