LARGE, SMALL, INTERNATIONAL: EQUITY PORTFOLIO CHOICES IN A LARGE 401(K) PLAN

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1. Introduction

Several recent papers have examined the choice of holding equity *vs.* cash and bonds, both from a normative and a positive perspective. Among the several papers studying the optimal portfolio choice for a long-lived investor we can recall Bodie, Merton, and Samuleson (1992), Brennan, Schwartz, and Lagnado (1997), Balduzzi and Lynch (1999), Barberis (2000), Campbell and Viceira (1999), Lynch and Balduzzi (2000), Viceira (2001), Campbell, Chan, and Viceira (2003). Among the papers characterizing actual household portfolio choices, we can recall Bodie and Crane (1997), Poterba and Samwick (2001), Ameriks and Zeldes (2001), and Agnew, Balduzzi, and Sundén (2003).

On the other hand, only few papers have looked at the optimal composition of the equity portfolio of a long-lived investor: Lynch (2001) studies the composition of a domestic equity portfolio allocated to size- and value-sorted portfolios; while Das and Uppal (2002), Ang and Bekaert (2002), and Balduzzi and Liu (2003) study the optimal composition of an internationally-diversified equity portfolio. And, to our knowledge, no existing paper has studied the actual composition of equity portfolios held by investors.

This paper aims at filling the gap. The results of this paper should be relevant for academics, in their effort to produce models that may explain or guide actual portfolio choices. The results of this paper should also be useful to policymakers, who may be concerned with the impact of a possible reform of the Social Security system on households' finances and on financial markets. The relevance of investigating investment decisions in 401(k) plans is immediate given their prevalence: currently, about one-third of all workers (over 25 million) are enrolled in 401(k) plans, which manage over $1 trillion in funds.

This paper investigates the determinants of holding different types of equities in the context of a 401(k) retirement plan. The decision of holding a given type of equity fund is related to investor characteristics and common effects.

Our initial data set is the same as the one used in Agnew et al. (2003): a panel of nearly seven thousand 401(k) accounts from a single plan for a period of over four years, from April 1994 through August 1998. The plan data include detailed information on participants' asset allocations. The data also include demographic and employment information such as gender, age, marital status, salary, and tenure on the job. Out of all the participants in the plan, we select those that had equity holdings and retain only the observations with positive equity holdings. Each investor has the option to hold a Large U.S. Equities fund, a Small/Medium U.S. Equities fund, and an International Equities fund.

We find that, on average, Large Equities account for the largest share of the equity portfolio, 45%, and that most observations are in the 40%-60% range. End-of-year holdings of Large Equities significantly increase over the sample period; males tend to hold somewhat less Large Equities than their female counterparts, and there is a tendency for holdings of Large Equities to decrease with salary, but to increase with age. Also, investors who entered the plan before 94 hold fewer Large Equities than later entries. Finally, a longer tenure on the job has some positive effect on Large Equities investment. In the context of a multivariate regression, Large Equity allocations respond positively to past returns on a large cap index, and negatively to returns on a small/medium cap index. The regression analysis also confirms the negative effect of salary and the positive effect of age.

Holdings of Small/Medium Equities are mainly in the 20%-40% range, and the overall average is 32%. Allocations increase over the first three years of the sample period and then decrease during the last two years. Gender and marital status do not seem to matter, while salary and early entry in the plan have a positive effect; and there is also some positive association with seniority on the job. A multivariate regression shows a positive response of Small/Medium allocations to returns on a small/medium cap and an international index; and a negative response to returns on a large cap index.

Holdings of International Equities are mainly in the 20%-40% range, with an overall average of 22%. Allocations steadily decrease over the five years of the sample. Males allocate to International Equities slightly more than their female counterparts, while married investors allocate less. Patterns by salary and time of entry in the plan are insignificant. On the other hand, there is a steady negative association between International Equities allocation and age. Similarly, there is a steady negative association between seniority on the job and International Equities investment. The multivariate analysis shows a negative reaction of International allocations to returns on an international index, and a positive reaction to returns on the domestic large cap index. Moreover, the regression confirms the negative effect of age.

We also model the decision to be diversified across different types of equities. We measure diversification by the number of equity funds held by an investor at the end of the year. Interestingly, we find that the majority of those who do hold equities, hold all three equity funds: In 74% of the participant/year observations, all three equity funds are held; and the average number of funds held overall is 2.7. When we model the number of funds held as a function of the investors' characteristics, we find an overall

negative trend in diversification, and we also find that the number of funds held tends to fall as the investor ages.

This paper is organized as follows. Section 2 describes the data set. Section 3 presents summary statistics concerning asset allocation decisions. Section 4 describes the regression results. Section 5 concludes.

2. Data

The data in this study come from the 401(k) plan for a large firm. The initial data set includes information on 6,778 participants for the time period April 1994-August 1998.[1] The plan data set originally included information for a larger sample of participants. From this data set, we eliminated participants who were no longer in the plan as of April 1994. Further, participants were eliminated due to data errors. Finally, we eliminated participants who were in the plan for less than one full year, and we consider year/participant observations as valid only if the participant was in the plan for the whole year.[2] The plan data include detailed information on participants' trading activity and asset allocations. Further details on this data set can be found in Agnew et al. (2003).

2.2 Investment Choices

The plan offers participants four investment choices: a Guarantee Income Contract (GIC) fund; a Large Equities domestic equity fund; a Small/Medium Equities fund; and an International Equities fund. Alternatively, participants can invest in one of four pre-

[1] A large benefits provider supplied the data used for this study.
[2] Participants who were in the plan only in 1994 and 1998 were eliminated if they were not in the plan from April to December and from January to August, respectively.

mixed "balanced" portfolios comprised of the previously mentioned funds. The composition of the pre-mixed funds becomes more aggressive from fund one to fund four.[3]

For the purpose of this study, we focus on the participants' equity choices. If a participant chooses to invest in a pre-mixed balanced fund, the investment is divided according to the asset breakdown for that fund. In the empirical analysis, we consider both the sample which includes pre-mixed fund allocations and the sample that excludes them.[4] The first sample follows 4,099 participants for an average of 3.4 years, for a total of 14,116 observations. The second sample follows 2,672 participants for an average of 3.1 years, for a total of 8,263 observations.[5]

In our analysis we focus on *desired* allocations, i.e. the fractions of *new contributions* invested in the different asset classes. Note that desired and actual allocations coincide immediately after a rebalancing, but then tend to drift apart because of the different returns on the different funds. We focus on desired equity allocations, rather than actual allocations, because they are more likely to reflect a participant's intentions. The allocation reported for each equity fund is calculated as a percentage of total *equity* holdings.

[3] The exact composition of the funds cannot be disclosed for privacy reasons.

[4] We also explicitly modeled the decision to hold a pre-mixed fund using a probit model. We found that the probability of choosing a pre-mixed fund increased over time during the sample; that married participants are more likely to hold a pre-mixed fund; that early entry in the plan and age reduce the probability of choosing a pre-mixed fund; and that seniority on the job raises the probability of choosing a pre-mixed fund. As to the breakdown of observations by pre-mixed fund held, 51% of the participant/year observations are pre-mixed fund 4, 30% are pre-mixed fund 3, 13% are pre-mixed fund 2, and only 6% are pre-mixed fund 1. Hence, it appears that the more popular pre-mixed funds are also the more aggressive.

[5] As documented by Benartzi and Thaler (2001), there is evidence that 401(k) plan participants often follow naïve diversification (1/n) rules which allocate the same amount to the different asset choices offered within a plan, regardless of the characteristics of the asset choices. We investigated this issue in the context of the present plan, aiming at removing the observations of "1/n investors," since they are likely to be less informative. We identified as 1/n investors those who chose 1/n over 50% of the years they were in the

3. Allocations and Diversification: Summary Statistics

This section summarizes asset allocation choices. This evidence is a "nonparametric" description of the data set, which usefully complements the regression analysis of the following section.

Each table is organized in two panels. Panel (a) presents the frequency distribution of all the observations in the panel data set. The observations are then sorted by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). Means and standard deviations for these sub-samples are presented in Panel (b) of each table.

3.1 Large Equities Allocations

Table 1 shows statistics for end-of-year Large Equities allocations for the entire sample.[6] Allocations are calculated as fractions of the overall equity allocations.

Most end-of-year annual allocations are in the 40-60% range: 40.93%. The fractions of observations at 0% and 100% are small: 3.24% and 3.96%, respectively. This is an indication that investors who do hold equities tend to be diversified across the three equity categories. The overall average allocation to Large Equities is 45.24%, with a standard deviation of 17.82%.

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plan. Only 37 participants followed the 1/n rule over 50% of the time they were in the plan. This resulted in the elimination of only 165 allocation/year observations.

[6] For 1998, the end-of-year allocation is actually the one for August. Given the minimal amount of rebalancing documented in Agnew at al. (2003), end-of-year allocations are mainly the same as the average allocations during the year.

Large Equities allocations vary over time with a positive trend: the average end-of-year equity allocation monotonically increases from 40.95% in 1994 to 48.75% in 1998. It appears that participants responded to the bull market of 1994-1998 by adjusting their Large Equities allocations upwards. As we will see, this trend takes place mainly at the expense of International Equities allocations.

There are also interesting patterns in allocations as a function of participants' characteristics. First, the average Large Equities allocation is higher for women than for men, 46.38% *vs* 45.00%, although this effect is only marginally significant.[7] Given that large equities tend to exhibit least volatile returns and are generally the most transparent and liquid investment among equity classes, this is an indication that women tend to be more prudent than men with their equity allocations. Hence, this result is consistent with the finding of Agnew et al. (2003) who show that women tend to allocate less to equities than men.

At the same time it is interesting to note that this difference is much less pronounced than the difference in allocations to equities documented in Agnew et al.: 33% for women *vs* 42% for men. If women are indeed more cautious investors than men, portfolio theory dictates that they should invest less in the portfolio of risky assets, but that the composition of the risky-asset portfolio should be similar to that of the more risk-tolerant male participants. This is indeed what is happening.

[7] We test the equality of means by regressing observations on a constant and one or more dummies. The coefficient(s) on the dummies capture the difference in means with respect to a reference group, which, generally, we choose to be the one with the largest number of observations. By (marginally) significant, we denote a coefficient significantly different from zero at the (5%) 1% level in a two-sided test. Statistics in these and all other regression tests in the paper are adjusted for serial correlation *within unit*, and heteroskedasticity; see Rogers (1993) and the Appendix of Agnew et al. (2003) for details.

Second, there is a generally decreasing pattern in allocations by annual salary, although mainly insignificant.[8] If we take the salary range as an indication of financial sophistication, this suggests that more sophisticated investors are also more likely to allocate funds to Small/Medium and International Equities.

Third, participants who entered the plan before 1994 tend to allocate significantly less to Large Equities than later entries: 44.93% as opposed to 48.14%. This is an interesting result which complements those of Agnew et al. (2003). In that study, the authors found that the overall equity allocation was significantly lower for earlier entries. This effect was attributed to inertia, since participants who were in the plan before 1994 were given the default option of a 100% GIC allocation, as they entered the plan. The effect documented here could also be attributed to inertia. From the multi-variate regression analysis we know that Large Equities allocations respond positively to past returns on large equities. Since past large equity returns were positive during our sample, this effect drove Large Equity allocations up, but, given inertia, more so for investors who joined the plan after 1994 than for investors who were in the plan before 1994.

Fourth, there is a marked pattern of Large Equities allocations as a function of age: older investors tend to allocate more to Large Equities. Indeed the average Large Equities allocation by age group increases monotonically from 43.86% (Under 35 years old) to 52.22% (65+ years old).[9] A similar pattern holds for the number of years employed: the allocation to Large Equities increases monotonically from 44.14% (0-5 years) to 49.50% (16-20 years). This pattern is consistent with the notion that older

[8] The only average allocation to differ significantly from the reference group ($25,000-$74,999) is for the $75,000-$99,999 group, although this group is also the one with the second-largest number of observations.
[9] Note that we do not perform tests of equality of means for the 65+ observations, given the small number of observations.

investors opt for less risky investment choices; this pattern is also consistent with the finding of Agnew et al. (2003) that older investors tend to allocate less to equities, overall.

It is interesting to compare this pattern of allocations over the life-cycle to the implications of models of optimal portfolio choice. Lynch (2001) studies the allocations of an investor who can hold a large-firm, a medium-firm, and a small-firm portfolio. In the case where the aggregate dividend yield predicts portfolio returns, there is a pattern of allocations over the life-cycle induced by hedging demands. Specifically, Lynch finds that allocations to Large Equities, as a fraction of the overall allocation to the equity portfolio, decrease as the investor ages; conversely, allocations to medium and small equities increase as the investor ages.[10] Hence, the pattern that we document runs counter to the effect of hedging demands over the life-cycle documented in Lynch's study.[11,12]

An alternative explanation for the pattern of Large Equities investment as a function of age may rely on human capital, which is absent from Lynch's (2001) analysis. The role of human capital in dynamic portfolio choices has been investigated, for example, by Jagannathan and Kocherlachota (1996), Bodie, Merton, and Samuelson (1992), and Viceira (2001). These studies show that when investors are young, they have a long stream of future non-capital income. As they age, this stream shortens, so the

[10] This pattern is driven by the fact that large-equity returns correlate more strongly (negatively) with innovations in the dividend yield than medium- and small-equity returns. In turn, the dividend yield predicts positively returns on all three equity portfolios. Hence, the positive hedging demands for equities tend to be larger for large equities than for medium and small equities.

[11] Note, though, that Lynch (2001) combines U.S. large equities, with medium and small equities, without allowing for investment in international equities.

[12] On the other hand, it is worth noting that Lynch estimates at over 35% (over 40% if short selling is allowed) the optimal allocation to large equities of an investor with a 20-year horizon in mind. These figures are not too far from the average allocation to Large Equity for the 35-44 age range: 44.70%. His results are based on a calibration that uses data from 1927 to 1996 and a relative-risk-aversion coefficient of 4.

value of their human capital falls. Since for most individuals human capital is only weakly correlated with stock returns, investors should respond shifting the risk composition of financial wealth in order to offset the decline in the value of their human capital. In addition, if individuals have some ability to change their supply of labor in response to returns, this flexibility is likely to diminish over the life cycle. For this reason, the effective human capital on which the individual can draw also declines, leading to more conservative investment behavior as retirement nears. This tendency towards more conservative investment may take the form of a lower allocation to equities and of a shift to less risky types of equities.

Table 2 presents the same analysis for the subset of observations which excludes allocations in the pre-mixed funds. The general patterns of allocations over time, and by gender, salary, time of entry, and age, are the same as for the larger sample. In particular, the positive trend in allocations is even more pronounced: the average equity allocation monotonically increases from 37.35% in 1994 to 52.96% in 1998.

3.2 Small/Medium Equities Allocations

Table 3 shows statistics for Small/Medium Equities allocations for the entire sample.

Most allocations are in the 20-40% range: 64.69%. The fraction of observations at 100% is small, 0.55%; whereas more substantial is the fraction of observations at 0%, 7.57%. The overall average allocation to Small/Medium Equities is 32.16%, with a standard deviation of 14.40%.

Small/Medium Equities allocations vary over time with a non-monotonic pattern: the average end-of-year equity allocation monotonically increases from 28.91% in 1994 to 34.91% in 1996, to drop to 30.91% in 1998.

While there are no significant differences in allocations between men and women, and between married and single participants, allocations as a function of salary range tend to follow a positive pattern, at least for the two largest groups of observations. This result complements the negative pattern documented for Large Equities allocations.

The difference in allocations between early and late entries in the plan is significant: higher for early entries at 32.36% and lower for late entries, at 30.20%. This effect complements the one documented for Large Equities. Finally, there is some tendency for Small/Medium Equities allocations to increase with the time employed, following a pattern similar to Large Equities Allocations.

Table 4 presents the same analysis for the subset of observations which excludes allocations in the pre-mixed funds. As in the case of Large Equities investment, the general patterns of allocations over time, by salary, time of entry, and time employed are the same as for the larger sample.

3.3 International Equities Allocations

Table 5 shows statistics for desired International Equities allocations for the entire sample.

Most allocations are in the 20-40% range: 61.33%. The fraction of observations at 100% is negligible, 0.12%; while the fraction of observations at 0% is substantial,

21.44%. The overall average allocation to International Equities is 22.61%, with a standard deviation of 17.06%.

International Equities allocations vary over time with a marked negative trend: the average end-of-year allocation decreases from 30.14% in 1994 to 19.74% in 1997, to then rebound slightly to 20.34% in 1998. This trend complements the positive trends for Large and Medium/Small Equity allocations.

International Equities allocations are slightly higher for men than for women, 22.87% *vs* 21.35%, although the difference is only marginally significant. This is again consistent with more prudent investment on the part of women.

Single participants allocate to International Equities slightly more than married participants, although the effect is only marginally significant.

Patterns by Annual Salary and Time of Entry are not significant, while there is a marked pattern as a function of age: older investors tend to allocate less to International Equities. Indeed, the average International Equities allocation by age group decreases monotonically from 24.28% (Under 35 years old) to 15.56% (65+ years old). A similar pattern holds for the number of years employed: the allocation to International Equities decreases monotonically from 24.59% (0-5 years) to 17.87% (16-20 years).

Table 6 presents the same analysis for the subset of observations which excludes allocations in the pre-mixed funds. As in the cases of Large Equities and Small/Medium Equities, the general patterns of allocations by year, gender, marital status, age, and seniority on the job are the same for this smaller sample. As in the case of Large Equities, the downward trend in allocations is even more marked: from 33.61% in 1994 to 14.94% in 1997, with a slight rebound to 15.82% in 1998.

3.4 Number of Funds

Table 7 shows summary statistics for the number of equity funds held for the entire sample. As with allocations, the number of funds is measured at the end of each year.

Interestingly, the majority of observations for investors who do hold equity funds indicate that all three funds are held: 73.76%. Only few investors choose to hold only one fund, 5.97%. These figures are to be contrasted with the results of Agnew et al. (2003), where it is shown that the percentage of participant/year observations with either an all-equity or a zero-equity allocation is over 69%.[13] Hence, while investors in this plan tend to be extreme in their allocations between the risky and the risk-free portfolios, they tend to be diversified in the composition of the risky portfolio.

There is a downward trend in diversification over time. Given the evidence from the previous tables, we can attribute this effect to the exit from International Equities. The average number of funds held drops from 2.79 in 1994 to 2.61 in 1998.

Of the patterns by demographic characteristics, the only one significant is by age: the average number of funds decreases monotonically with age, from 2.72 (Under 35) to 2.54 (66-64). Given the evidence of the previous tables, we can conclude that as investors age, they tend to eliminate allocations to International Equities, to increase their allocations to Large Equities.

Table 8 presents the analysis for the subset of observations which excludes allocations in the pre-mixed funds. When pre-mixed allocations are excluded, we see holdings of all three funds in a lower fraction of the observations, 55.09%, whereas we

see holdings of only one fund in a larger percentage of observations, 10.19%. Hence, at least part of the diversification across equity funds by plan participants is really driven by the choice of a pre-mixed fund. As with the larger sample, there is an overall downward trend in the number of funds held, from 2.60 to 2.37. All other patterns, though, are insignificant, including the one by age.

4. Regression Analysis

The regression analysis relates asset allocation choices to common effects and participants' characteristics.

The constant and time-varying common effects are captured by a constant, a linear time trend, and the previous five-year returns on three equity indices.[14] The three returns are

- "Large Cap 5-Yr Return:" the five-year buy-and-hold return on the S&P500 index;
- "Small/Med Cap 5-Yr Return:" the five-year buy-and-hold return on an equally-weighted portfolio of the S&P400 and the Russell 2000 indices;
- "Int'l 5-Yr Return:" the five-year buy-and-hold return on the Morgan Stanley EAFE index.

We then consider demographic and earnings characteristics. The following participant's characteristics are constant over time:

[13] The all-equity observations are 21.73% of the sample; the zero-equity observations are 47.61% of the sample. Hence, in roughly 42% of the observations for equity holders, the allocation is all in equities.
[14] We also tried one-year and two-year horizons, but the five-year horizon gives the best results in the regression analysis.

- "Male:" indicator variable equal to one if the participant is male, zero otherwise;
- "Married:" indicator variable equal to one if the participant is married, zero otherwise, as of August 1998;
- "Married*Male:" indicator variable equal to one if the participant is married *and* male, zero otherwise;
- "Salary:" 1997 annual salary, as of October 1997 (unit: ten thousand dollars);
- "Pre-94:" indicator variable equal to one if the participant was in the plan before April 1994, zero otherwise.

A second set of participants' characteristics varies over time:

- "Age:" age of the participant as of year of observation (unit: years);
- "Time Employed:" time the participant has been with the company as of year of the observation (unit: years).

The explanatory variables above essentially correspond to the criteria used to sort observations in the panel data set in the previous section.

We relate end-of-year allocations to the explanatory variables listed above. Since equity allocations are restricted to be between zero and one, we use a *censored regression* model. Let s_{it} denote the percentage allocation to a certain type of equities. We assume

$$\begin{aligned} s_{it} &= x_t\beta + y_i\gamma + z_{it}\delta + \varepsilon_{it}, \text{ if } 0 < s_{it} < 1; \\ s_{it} &= 0, \text{ if } \quad x_t\beta + y_i\gamma + z_{it}\delta + \varepsilon_{it} \le 0; \\ s_{it} &= 1, \text{ if } \quad x_t\beta + y_i\gamma + z_{it}\delta + \varepsilon_{it} \ge 1 \ . \end{aligned} \tag{1}$$

x_t is the row vector of realizations of the explanatory variables which are common to all participants (constant, time trend, and past index returns); y_i is the row vector of *constant* participants' characteristics (gender, marital status, salary, time of entry); z_{it} is the row vector of realizations of *time-varying* participants' characteristics (age and seniority); b, g, and d are conforming column vectors of coefficients; e_{it} is a normally-distributed error term.

For the choice of the number of funds to hold, we use a multinomial ordered probit. In this case, the common effects in the vector x_t are captured by four year dummies. We assume the following latent linear model

$$w_{it} = x_t b + y_i g + z_{it} d + e_{it}, \tag{2}$$

where the realization of w_{it} relative to a threshold m_j determines the number of equity funds held n_{it}. Namely, we have

$$\begin{aligned} &n_{it} = 1, \text{ if } w_{it} < m_1; \\ &n_{it} = 2, \text{ if } m_1 \le w_{it} < m_2; \\ &n_{it} = 3, \text{ if } w_{it} \ge m_2. \end{aligned} \tag{3}$$

4.1 Large Equities Allocations

Results of the regression for Large Equities allocations and the entire sample are presented in Table 9.

Past returns on the large cap index have a strong and positive effect on allocations; while past returns on the small/medium cap index have a negative effect. A

one percent increase in past large (small/medium) cap returns increases (decreases) the Large Equity allocation by 27 (15) basis points These effects are consistent with the notion that investors revise their expectations of future returns based on past returns, and substitute assets with low expected future returns with assets with high expected future returns.[15]

Interestingly, in this analysis where we simultaneously control for all demographics, the effect of being Male, while negative, is no longer significant.

Salary, on the other hand, has a significant effect, reducing the Large Equities allocation by 0.27% for each $10,000 of extra income. Hence, the negative effect of Salary, less clear in Tables 1 and 2, turns out to be significant in this context, confirming the notion that more sophisticated investors (as higher earners are likely to be) are more willing to diversify their portfolio holdings into asset classes other than large U.S. equities.

Having entered the plan before April 1994 reduces the Large Equities allocation by 3.10%. This is consistent with the statistics of Tables 1 and 2.

Age has a positive effect on the share held in Large Equities: each extra year translates into a higher allocation to Large Equities by 28 basis points. This is also consistent with the results of Tables 1 and 2.

Finally, once we control for Age, Seniority on the job does not have a significant effect.

[15] This type of revision is in the spirit of the models by Barberis (2000) and Balduzzi and Liu (2003), where a Bayesian multi-period investor periodically revises mean return estimates based on past return realizations.

Table 10 presents results of the same censored regression, for the sample which excludes pre-mixed funds. Overall, results are similar, with past returns having larger coefficients in absolute value.

4.2 Small/Medium Equities Allocations

Results of the regression for Small/Medium Equities allocations and the entire sample are presented in Table 11.

Large cap returns affect negatively allocations; past small/medium-cap and international returns have positive effects. A one percent increase in past large cap returns decreases the Small/Medium Equity allocation by 51 basis points; a one percent increase in small/medium cap and international returns increases the Small/Medium Equity allocation by 20 basis points.

Married participants invest slightly more in Small/Medium Equities than their single counterparts, 2.31% less, although the effect is only marginally significant.

Salary increases the Small/Medium Equities allocation by 0.13% for each $10,000 of extra income. Hence, the positive effect of Salary, less clear in Tables 3 and 4, turns out to be significant.

Having entered the plan before April 1994 increases the Small/Medium Equities allocation by 2.24%. This is consistent with the statistics of Tables 3 and 4.

Age has a negative effect on the share held in Small/Medium Equities: each extra year translates into a lower allocation to Small/Medium Equities by 8 basis points (the effect is marginally significant). This effect is consistent with more prudent investing on the part of older participants; this effect was unclear from the results of Tables 3 and 4.

Table 12 presents results for the sample which excludes pre-mixed funds. Again, the exclusion of the pre-mixed allocations increases the absolute size of the coefficients on past returns. In addition, we now find that the effects of the Salary, Pre-1994, and Age variables are all insignificant.

4.3 International Equities Allocations

Results for International Equities allocations and the entire sample are presented in Table 13.

Somewhat surprisingly, the effect of Large Cap returns is positive, while the effect of International returns is negative. Yet, the result on Large Cap returns is consistent with the fact that Large Cap returns reduce the Small/Medium Equities allocation more than they increase the Large Equities allocation. Hence, this leaves "room" for an increase in the International Equities allocation. Similarly, International returns affect positively the Small/Medium Equities allocation, while they have little effect on the Large Equities allocation, leading to a negative effect on the International Equities allocation.

Age has a negative effect and significant effect on the share held in International Equities: each extra year translates into a lower allocation to Small/Medium Equities by 28 basis points. This effect is consistent with the results of Tables 5 and 6 and it is again consistent with more conservative investments on the part of older participants.

Time Employed, once we control for Age, is not significant.

Table 14 presents results for the sample which excludes pre-mixed funds. Again, the coefficients on past returns are larger in absolute value, and the coefficient on

Small/Medium returns is now negative and significant. The effect of Salary is also stronger (0.38% for each $10,000 of extra income) and significant. The effect of Age is stronger as well, with a reduction in allocations of 44 basis points for each additional year.

4.4 Number of Funds

Results for Number of Funds and the entire sample are presented in Table 15.

The year dummies, all significant, confirm the downward trend in the Number of Funds. The male dummy is marginally significant and negative, indicating that male participants tend to hold fewer funds than their female counterparts. Age enters with a negative and significant coefficient, confirming the pattern of Tables 7 and 8.

Table 16, which excludes the pre-mixed allocations, exhibits similar patterns. In this case Male is no longer significant, while Salary and Time Employed have positive and significant coefficients; Age is still negative and significant.

5. Conclusions

This paper examines a new data set documenting the equity allocation choices of a large number of participants in a 401(k) plan.

We find that the average equity portfolio is reasonably allocated: 45% in Large Equities, 32% in Small/Medium Equities, and 22% in International Equities. For most of the investors/year observations, 74% of the observations, investors hold all three equity funds. Hence, for the most part investors take advantage of the diversification options available in the plan.

There are marked effects of past returns on allocations: Allocations to Large Equities respond positively to Large Cap returns and negatively to Small/Medium Cap returns. Allocations to Small/Medium Equities respond negatively to Large Cap returns and positively to Small/Medium Cap and International returns. Finally, allocations to International Equities respond positively to Large Cap returns and negatively to International returns.

Among the patterns by participant characteristics, the most robust are the ones by age: older participants tend to hold more Large Equities and less International Equities.

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Table 1. Large Equities Allocations, Entire Sample

End-of-year Large Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	3.24
$0 < x < 20$	0.82
$20 \le x < 40$	35.15
$40 \le x < 60$	40.93
$60 \le x < 80$	14.95
$80 \le x < 100$	0.94
$x = 100$	3.96

Panel b: Statistics by Group

	Obs	Mean		Std.
All	14,116	45.24		17.82
Sort by Year:				
1994	1,956	40.95		17.22
1995	2,246	43.02	**	16.51
1996	2,895	43.27	**	15.37
1997	3,359	47.08	**	17.98
1998	3,660	48.75	**	19.62
Gender:				
Male	11,676	45.00		17.99
Female	2,440	46.38	*	16.99
Marital Status:				
Married	11,570	45.33		17.59
Unmarried	2,546	44.80		18.85
Annual Salary:				
Under $25,000	61	50.75		15.59
$25,000-$49,999	671	45.61		17.83
$50,000-$74,999	9,053	45.65		18.07
$75,000-$99,999	3,259	43.97	**	16.67
$100,000+	1,072	45.07		19.00
Time of Entry:				
Pre-1994	12,775	44.93		17.61
Post-1994	1,341	48.14	**	19.54
Age:				
Under 35 years old	4,624	43.86		17.40
35-44 years old	6,163	44.70		17.66
45-54 years old	2,891	47.77	**	18.31
55-64 years old	436	50.65	**	18.73
65+ years old	2	52.22		11.00
Time Employed:				
0-5 years	3,161	44.14		18.34
6-10 years	4,474	45.17		18.06
11-15 years	5,361	45.06		17.01
16-20 years	1,120	49.50	**	18.61

Table 2. Large Equities Allocations, No Pre-Mixed Allocations

End-of-year Large Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	5.53
$0 < x < 20$	1.40
$20 \le x < 40$	23.59
$40 \le x < 60$	48.78
$60 \le x < 80$	12.32
$80 \le x < 100$	1.61
$x = 100$	6.77

Panel b: Statistics by Group

	Obs	Mean		Std.
All	8,263	46.72		21.75
Sort by Year:				
1994	1,001	37.35		21.35
1995	1,222	42.07	**	20.42
1996	1,710	43.18	**	18.34
1997	2,078	50.10	**	21.18
1998	2,252	52.96	**	23.00
Gender:				
Male	6,865	46.30		21.96
Female	1,398	48.77	*	20.57
Marital Status:				
Married	6,783	46.85		21.41
Unmarried	1,480	46.11		23.26
Annual Salary:				
Under $25,000	36	52.25		18.81
$25,000-$49,999	357	47.78		22.60
$50,000-$74,999	5,127	47.40		22.36
$75,000-$99,999	2,003	44.86	**	19.81
$100,000+	740	46.22		21.93
Time of Entry:				
Pre-1994	7,467	46.42		21.50
Post-1994	796	49.47	*	23.79
Age:				
Under 35 years old	2,590	44.55		21.68
35-44 years old	3,491	46.10		21.90
45-54 years old	1,862	50.10	**	21.23
55-64 years old	319	51.21	**	20.86
65+ years old	1	44.44		0.00
Time Employed:				
0-5 years	1,775	43.51	**	22.83
6-10 years	2,541	47.60		22.36
11-15 years	3,156	46.47		20.54
16-20 years	791	52.08	**	20.76

Table 3. Small/Medium Equities Allocations, Entire Sample

End-of-year Small/Medium Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	7.57
$0 < x < 20$	1.68
$20 \le x < 40$	64.69
$40 \le x < 60$	23.94
$60 \le x < 80$	1.40
$80 \le x < 100$	0.18
$x = 100$	0.55

Panel b: Statistics by Group

	Obs	Mean		Std.
All	14,116	32.16		14.40
Sort by Year:				
1994	1,956	28.91		12.37
1995	2,246	31.95	**	13.54
1996	2,895	34.91	**	14.09
1997	3,359	33.18	**	14.64
1998	3,660	30.91	**	15.38
Gender:				
Male	11,676	32.13		14.39
Female	2,440	32.26		14.38
Marital Status:				
Married	11,570	32.32		14.27
Unmarried	2,546	31.41		14.91
Annual Salary:				
Under $25,000	61	31.54		12.11
$25,000-$49,999	671	32.07		15.39
$50,000-$74,999	9,053	31.63		14.60
$75,000-$99,999	3,259	33.67	**	13.27
$100,000+	1,072	32.12		15.05
Time of Entry:				
Pre-1994	12,775	32.36		14.25
Post-1994	1,341	30.20	**	15.51
Age:				
Under 35 years old	4,624	31.85		14.03
35-44 years old	6,163	32.31		14.32
45-54 years old	2,891	32.42		14.91
55-64 years old	436	31.35		15.59
65+ years old	2	32.22		17.28
Time Employed:				
0-5 years	3,161	31.28	**	14.64
6-10 years	4,474	31.74	**	14.27
11-15 years	5,361	32.92		14.13
16-20 years	1,120	32.63		15.19

Table 4. Small/Medium Equities Allocations, No Pre-Mixed Allocations

End-of-year Small/Medium Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	12.94
$0 < x < 20$	2.87
$20 \le x < 40$	39.68
$40 \le x < 60$	40.89
$60 \le x < 80$	2.38
$80 \le x < 100$	0.30
$x = 100$	0.93

Panel b: Statistics by Group

	Obs	Mean		Std.
All	8,263	33.89		17.94
Sort by Year:				
1994	1,001	29.04		16.21
1995	1,222	34.33	**	17.14
1996	1,710	38.62	**	16.68
1997	2,078	34.96	**	17.84
1998	2,252	31.22	**	19.09
Gender:				
Male	6,865	33.83		17.91
Female	1,398	34.18		18.08
Marital Status:				
Married	6,783	34.18		17.73
Unmarried	1,480	32.53	*	18.81
Annual Salary:				
Under $25,000	36	35.25		14.03
$25,000-$49,999	357	34.16		20.16
$50,000-$74,999	5,127	33.20		18.54
$75,000-$99,999	2,003	35.89	**	15.87
$100,000+	740	33.02		17.63
Time of Entry:				
Pre-1994	7,467	34.11		17.78
Post-1994	796	31.79	*	19.30
Age:				
Under 35 years old	2,590	33.46		17.86
35-44 years old	3,491	34.18		18.12
45-54 years old	1,862	34.03		17.81
55-64 years old	319	33.23		17.43
65+ years old	1	44.44		0.0
Time Employed:				
0-5 years	1,775	33.37	*	18.52
6-10 years	2,541	32.74	**	18.24
11-15 years	3,156	35.10		17.40
16-20 years	791	33.89		17.53

Table 5. International Equities Allocations, Entire Sample

End-of-year International Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	21.44
$0 < x < 20$	8.64
$20 \le x < 40$	61.33
$40 \le x < 60$	5.91
$60 \le x < 80$	1.10
$80 \le x < 100$	0.12
$x = 100$	1.46

Panel b: Statistics by Group

	Obs	Mean		Std.
All	14,116	22.61		17.06
Sort by Year:				
1994	1,956	30.14		18.26
1995	2,246	25.03	**	18.27
1996	2,895	21.82	**	17.22
1997	3,359	19.74	**	15.51
1998	3,660	20.34	**	15.41
Gender:				
Male	11,676	22.87		17.34
Female	2,440	21.35	*	15.62
Marital Status:				
Married	11,570	22.35		16.62
Unmarried	2,546	23.79	*	18.89
Annual Salary:				
Under $25,000	61	17.70		14.28
$25,000-$49,999	671	22.32		15.64
$50,000-$74,999	9,053	22.73		16.82
$75,000-$99,999	3,259	22.36		17.29
$100,000+	1,072	22.82		19.20
Time of Entry:				
Pre-1994	12,775	22.71		17.07
Post-1994	1,341	21.66		16.95
Age:				
Under 35 years old	4,624	24.28	*	16.89
35-44 years old	6,163	22.99		16.96
45-54 years old	2,891	19.81	**	16.83
55-64 years old	436	18.00	**	18.71
65+ years old	2	15.56	*	6.28
Time Employed:				
0-5 years	3,161	24.59	**	17.77
6-10 years	4,474	23.09	*	16.76
11-15 years	5,361	22.02		16.98
16-20 years	1,120	17.87	**	15.46

Table 6. International Equities Allocations, No Pre-Mixed Allocations

End-of-year International Equities allocations are in percentage points. In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 0$	36.63
$0 < x < 20$	14.76
$20 \le x < 40$	33.93
$40 \le x < 60$	10.09
$60 \le x < 80$	1.88
$80 \le x < 100$	0.21
$x = 100$	2.49

Panel b: Statistics by Group

	Obs	Mean		Std.
All	8,263	19.40		21.51
Sort by Year:				
1994	1,001	33.61		24.73
1995	1,222	23.60	**	24.42
1996	1,710	18.20	**	21.46
1997	2,078	14.94	**	17.92
1998	2,252	15.82	**	18.03
Gender:				
Male	6,865	19.88		21.90
Female	1,398	17.05	**	19.29
Marital Status:				
Married	6,783	18.97		20.83
Unmarried	1,480	21.35	*	24.28
Annual Salary:				
Under $25,000	36	12.50		16.47
$25,000-$49,999	357	18.06		20.25
$50,000-$74,999	5,127	19.40		21.53
$75,000-$99,999	2,003	19.25		21.27
$100,000+	740	20.76		22.70
Time of Entry:				
Pre-1994	7,467	19.47		21.54
Post-1994	796	18.74		21.24
Age:				
Under 35 years old	2,590	21.98	*	22.06
35-44 years old	3,491	19.72		21.76
45-54 years old	1,862	15.87	**	19.69
55-64 years old	319	15.56	*	21.19
65+ years old	1	11.11		0.0
Time Employed:				
0-5 years	1,775	23.12	**	23.36
6-10 years	2,541	19.66		21.41
11-15 years	3,156	18.44		21.18
16-20 years	791	14.03	**	16.81

Table 7. Number of Funds, Entire Sample

In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 1$	5.97
$x = 2$	20.26
$x = 3$	73.76

Panel b: Statistics by Group

	Obs	Mean		Std.
All	14,116	2.68		0.58
Sort by Year:				
1994	1,956	2.79		0.52
1995	2,246	2.73	**	0.54
1996	2,895	2.69	**	0.54
1997	3,359	2.64	**	0.60
1998	3,660	2.61	**	0.64
Gender:				
Male	11,676	2.67		0.58
Female	2,440	2.70		0.56
Marital Status:				
Married	11,570	2.66		0.61
Unmarried	2,546	2.68		0.57
Annual Salary:				
Under $25,000	61	2.62		0.55
$25,000-$49,999	671	2.68		0.58
$50,000-$74,999	9,053	2.68		0.59
$75,000-$99,999	3,259	2.69		0.55
$100,000+	1,072	2.62		0.61
Time of Entry:				
Pre-1994	12,775	2.68		0.58
Post-1994	1,341	2.65		0.62
Age:				
Under 35 years old	4,624	2.72	*	0.56
35-44 years old	6,163	2.68		0.58
45-54 years old	2,891	2.61	**	0.61
55-64 years old	436	2.54	**	0.64
65+ years old	2	3.00		0.00
Time Employed:				
0-5 years	3,161	2.70		0.57
6-10 years	4,474	2.68		0.59
11-15 years	5,361	2.68		0.57
16-20 years	1,120	2.60	**	0.63

Table 8. Number of Funds, No Pre-Mixed Allocations

In Panel a, we consider the frequency distribution of the observations in the panel. In Panel b, we sort observations by year, gender, marital status (as of August 1998), 1997 annual salary (as of October 1997), time of entry in the plan (before or after April 1994), age (as of year of the observation), and time employed (as of year of the observation). For each sorting, we test the null hypotheses that the mean of each sub-category equals the mean of the reference sub-category (bold). One (two) asterisk(s) denote rejection in a two-tailed test at the 5% (1%) significance level. Test statistics are adjusted for serial correlation and heteroskedasticity.

Panel a: Distribution

Range	Percent
$x = 1$	10.19
$x = 2$	34.72
$x = 3$	55.09

Panel b: Statistics by Group

	Obs	Mean		Std.
All	8,263	2.45		0.67
Sort by Year:				
1994	1,001	2.60		0.67
1995	1,222	2.50	**	0.65
1996	1,710	2.48	**	0.61
1997	2,078	2.41	**	0.67
1998	2,252	2.37	**	0.72
Gender:				
Male	6,865	2.44		0.67
Female	1,398	2.48		0.66
Unknown	0	0.00		0.00
Marital Status:				
Married	6,783	2.46		0.66
Unmarried	1,480	2.41		0.70
Annual Salary:				
Under $25,000	36	2.36		0.59
$25,000-$49,999	357	2.40		0.69
$50,000-$74,999	5,127	2.43		0.69
$75,000-$99,999	2,003	2.50	*	0.63
$100,000+	740	2.46		0.67
Time of Entry:				
Pre-1994	7,467	2.45		0.67
Post-1994	796	2.41		0.72
Age:				
Under 35 years old	2,590	2.50	*	0.67
35-44 years old	3,491	2.44		0.67
45-54 years old	1,862	2.40		0.68
55-64 years old	319	2.37		0.67
65+ years old	1	3.00		0.0
Time Employed:				
0-5 years	1,775	2.47		0.68
6-10 years	2,541	2.44		0.68
11-15 years	3,156	2.45		0.66
16-20 years	791	2.43		0.68

Table 9. Censored Regression: Large Equities Allocations, Entire Sample

The dependent variable is the Large Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	Large Equities Allocations
Constant	0.3363
	(10.42)
Time	-0.0151
	(-2.69)
Large Cap 5-Yr Return	0.2676
	(7.74)
Small/Med Cap 5-Yr Return	-0.1493
	(-3.69)
Int'l 5-Yr Return	0.0080
	(0.15)
Male	-0.0174
	(-1.33)
Married	-0.0021
	(-0.17)
Married*Male	0.0163
	(1.07)
Salary	-0.0027
	(-4.08)
Pre-1994	-0.0310
	(-3.04)
Age	0.0028
	(6.55)
Time Employed	-0.0005
	(-0.57)
χ^2 (11)	406.83
Obs.	14,116
Left-censored	457
Uncensored	13,100
Right-censored	559
T-bar	3.4
N	4,099

Table 10. Censored Regression: Large Equities Allocations, No Pre-Mixed Allocations

The dependent variable is the Large Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	Large Equities Allocations
Constant	0.2465
	(4.47)
Time	-0.0114
	(-1.17)
Large Cap 5-Yr Return	0.4089
	(6.90)
Small/Med Cap 5-Yr Return	-0.2294
	(-3.28)
Int'l 5-Yr Return	0.0324
	(0.36)
Male	-0.0318
	(-1.42)
Married	-0.0038
	(-0.18)
Married*Male	0.0276
	(1.09)
Salary	-0.0031
	(-3.76)
Pre-1994	-0.0192
	(-1.15)
Age	0.0034
	(4.93)
Time Employed	-0.0004
	(-0.29)
χ^2 (11)	506.13
Obs.	8,263
Left-censored	457
Uncensored	7,247
Right-censored	559
T-bar	3.1
N	2,672

Table 11. Censored Regression: Small/Medium Equities Allocations, Entire Sample

The dependent variable is the Small/Medium Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	Small/Medium Equities Allocations
Constant	0.3219
	(11.41)
Time	0.0554
	(10.56)
Large Cap 5-Yr Return	-0.5148
	(-15.45)
Small/Med Cap 5-Yr Return	0.2024
	(5.36)
Int'l 5-Yr Return	0.1954
	(3.98)
Male	0.0069
	(0.69)
Married	0.0231
	(2.39)
Married*Male	-0.0181
	(-1.52)
Salary	0.0013
	(2.59)
Pre-1994	0.0224
	(2.76)
Age	-0.0008
	(-2.33)
Time Employed	0.0012
	(1.70)
χ^2 (11)	490.41
Obs.	14,116
Left-censored	1,069
Uncensored	12,970
Right-censored	77
T-bar	3.4
N	4,099

Table 12. Censored Regression: Small/Medium Equities Allocations, No Pre-Mixed Allocations

The dependent variable is the Small/Medium Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	Small/Medium Equities Allocations
Constant	0.2950
	(5.89)
Time	0.1024
	(11.15)
Large Cap 5-Yr Return	-0.8801
	(-15.48)
Small/Med Cap 5-Yr Return	0.4525
	(6.76)
Int'l 5-Yr Return	0.2040
	(2.35)
Male	0.0056
	(0.31)
Married	0.0364
	(2.13)
Married*Male	-0.0219
	(-1.05)
Salary	0.0010
	(1.54)
Pre-1994	0.0209
	(1.51)
Age	-0.0011
	(-1.82)
Time Employed	0.0018
	(1.48)
χ^2 (11)	448.01
Obs.	8,263
Left-censored	1,069
Uncensored	7,117
Right-censored	77
T-bar	3.1
N	2,672

Table 13. Censored Regression: International Equities Allocations, Entire Sample

The dependent variable is the International Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	International Equities Allocations
Constant	0.3450
	(8.86)
Time	-0.0469
	(-7.31)
Large Cap 5-Yr Return	0.2971
	(7.31)
Small/Med Cap 5-Yr Return	-0.0477
	(-1.03)
Int'l 5-Yr Return	-0.2624
	(-4.39)
Male	0.0026
	(0.15)
Married	-0.0251
	(-1.58)
Married*Male	0.0082
	(0.43)
Salary	0.0017
	(1.83)
Pre-1994	0.0080
	(0.71)
Age	-0.0028
	(-5.37)
Time Employed	-0.0004
	(-0.35)
χ^2 (11)	611.34
Obs.	14,116
Left-censored	3,027
Uncensored	10,883
Right-censored	206
T-bar	3.4
N	4,099

Table 14. Censored Regression: International Equities Allocations, No Pre-Mixed Allocations

The dependent variable is the International Equities allocation. "Time" is a linear time trend variable that equals 1 if the year is 1994, 2 if the year is 1995, 3 if the year is 1997, and 4 if the year is 1998. "Large Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on the S&P500 index. "Small/Med Cap 5-Yr Return" is the previous 5-year, buy-and-hold return on an equally-weighted portfolio of the S&P400 and Russell 2000 indices. "Int'l 5-Yr Return" is the previous 5-year, buy-and-hold return on the Morgan Stanley EAFE index. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity.

Dependent variable:	International Equities Allocations
Constant	0.4655
	(5.80)
Time	-0.1154
	(-8.71)
Large Cap 5-Yr Return	0.6290
	(7.61)
Small/Med Cap 5-Yr Return	-0.2433
	(-2.53)
Int'l 5-Yr Return	-0.3786
	(-3.05)
Male	0.0138
	(0.39)
Married	-0.0404
	(-1.20)
Married*Male	0.0015
	(0.04)
Salary	0.0038
	(2.72)
Pre-1994	-0.0103
	(-0.45)
Age	-0.0044
	(-4.20)
Time Employed	-0.0002
	(-0.10)
χ^2 (11)	569.86
Obs.	8,263
Left-censored	3,027
Uncensored	5,030
Right-censored	206
T-bar	3.1
N	2,672

Table 15. Ordered Probit: Number of Funds, Entire Sample

The dependent variable is the Number of Funds held by the investor, 1 to 3. "1995," "1996," "1997," and "1998" are year dummy variables. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity. The pseudo R-squared is the log-likelihood value on a scale from zero to one, where zero corresponds to the constant-only model and one corresponds to perfect prediction (a log-likelihood of zero).

Dependent variable:	Number of Funds
1995	-0.2043
	(-6.87)
1996	-0.3124
	(-8.98)
1997	-0.4235
	(-10.77)
1998	-0.4613
	(-11.17)
Male	-0.2264
	(-2.31)
Married	-0.0280
	(-0.29)
Married*Male	0.1463
	(1.29)
Salary	0.0070
	(1.35)
Pre-1994	0.0097
	(0.14)
Age	-0.0190
	(-6.31)
Time Employed	0.0122
	(1.95)
χ^2 (11)	211.74
Pseudo-R^2	0.0157
Obs.	14,116
T-bar	3.4
N	4,099

Table 16. Ordered Probit: Number of Funds, No Pre-Mixed Allocations

The dependent variable is the Number of Funds held by the investor, 1 to 3. "1995," "1996," "1997," and "1998" are year dummy variables. "Male" is a dummy variable equal to one if the participant is male, zero otherwise. "Married" is a dummy variable equal to one if the participant is married, zero otherwise. "Married*Male:" is a dummy variable equal to one if the participant is married *and* male, zero otherwise. "Salary" is the annual 1997 salary (unit: ten thousand dollars). "Age" is the age of the participant as of the year of the observation (unit: years). "Time Employed" is the time participant has been employed as of the year of the observation (unit: years). Z-ratios, reported in parentheses, are adjusted for serial correlation and heteroskedasticity. The pseudo R-squared is the log-likelihood value on a scale from zero to one, where zero corresponds to the constant-only model and one corresponds to perfect prediction (a log-likelihood of zero).

Dependent variable:	Number of Funds
1995	-0.2069
	(-5.63)
1996	-0.2622
	(-6.18)
1997	-0.3728
	(-7.72)
1998	-0.4367
	(-8.61)
Male	-0.1678
	(-1.42)
Married	-0.0600
	(0.51)
Married*Male	0.0454
	(0.33)
Salary	0.0221
	(2.84)
Pre-1994	-0.0318
	(-0.39)
Age	-0.0183
	(-5.29)
Time Employed	0.0175
	(2.42)
χ^2 (11)	133.08
Pseudo-R^2	0.0140
Obs.	8,263
T-bar	3.1
N	2,672

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