Participant Reaction and The Performance of Funds Offered by 401(k) Plans

By
Edwin J. Elton
Martin J. Gruber
Chris Blake

Background On Private Retirement Market

12.9 Trillion dollars in assets in the retirement market

64% in company pension plans

25% defined contribution (401K, 305B)

39% defined benefit

Remaining balance is primarily IRAs

More than 1/3 of workers covered by 401K plans

60% of these workers have no other financial assets other than a bank account.

There are a lot of topics:

1. Are private and public pensions adequate – do people save enough?
2. Risk shifting defined benefit vs. defined contribution
3. Role of government in monitoring and insuring
4. Do participants behave rationally?
5. Do participants behave wisely (or optimally)?
6. Do companies offer participants adequate choices?
7. Do companies offer participants the “right” choices?

There has been a large amount of research on how participants behave. Examples:

1. Participants don't invest enough
2. Many participants rarely change their allocations
3. 1/N rule
4. Overinvestment in company stock

Surprisingly, there has been almost no research on the actions of plan administrators on the choices given to plan participants.

The action of a participant is a result of two decisions: the choice the participant is offered and how he or she allocates among these choices.

This is the first set of research to examine the appropriateness of the choices given to the participant: an examination of the decisions of the plan administrators rather than the participant.

Concentrate on 401K Plans:

Employer delineates a set of investment choices from among which a participant can invest contributions.

Contributions are from before-tax income.

Returns and contributions are not taxed until withdrawal.

Usually, the employer puts in funds that are tied to the participant's contributions – company stock may be part of plan.

The Adequacy of Choices Offered by 401(k) Plans

Participant Reaction and The Performance of Funds Offered by 401(k) Plans

The Impact of Mutual-Fund Family Membership On Investor Risk

Do plans offer enough or the right mix of options to participants?

Does adding index funds as suggested by the literature of financial economics or an ICDI category index of mutual funds to the mix of offerings shift the efficient frontier by an amount which is statistically significant?

A. Data

Moody's survey of pension plans:

Select 401(k) plans that offer only mutual funds with or without money market accounts, GICs, stable value funds and company stock – 680 plans

417 of these had mutual funds with at least 5 years of data.

Sufficiency of Plan Investment Choices In Spanning 8 RB Indexes

(Short Sales Not Allowed)

Number of Investment Choices in Plan	Number	Not Sufficient
6 or less	233	53%
7 to 12	164	43%
Over 12	20	15%
Total	**417**	**47%**

Plans tend to have more risk because they choose funds from 1 or 2 families.

Standard deviation not higher.

Correlation coefficients are higher.

Correlation between two funds of any type within families is higher than correlation of two similar funds across families.

Can make a difference of 52 to 70 bp per year.

Participant Reaction and The Performance of funds offered by 401(k) Plans

1. How well do administrators select mutual funds

2. How well do they do in changing options

3. Is there persistence in plan performance

4. How important are contributions, fund returns and transfers in determining changes in investment weights?

5. Do investors use contributions and transfers to restore their original weights, or do they accentuate the change in weights caused by investment returns.

6.What explains the pattern of investor contributions and transfers?

7. How do investors react to new options being offered?

8. Do investors make their contributions and transfers in a manner that improves their 401(k) performance?

9. How does the form of the matching contribution affect investor behavior?

Data source 11K filings for 401 (k) plans with the securities and exchange commission

Initial sample plans that filled 11K forms in 1994 from these plans 102 had identifiable plan offerings.

Insisted that only mutual funds, short term income funds, and company stock he held, that plan offering could be identifiable at least 4 years in a row, and that the plan was not a duplicate of another plan.

Sample.

11-K filling, 401(k) Plans 1994-2003	
401(k) Plan Sample	
Number of 401(k) Plans	43
Number of Plan Years	289
Number of Fund Families Held	40
Number of Unique Funds Held	141
Number of Funds Initially Held[a]	116
Number of Funds Added	215
Number of Funds Deleted	45

[a] The total number of funds held by the 43 sample plans in the first year each plan enters our sample

Methodology

A. Alpha

$$R_{it} - R_{rt} = \alpha_i + \sum \beta_{ij} \cdot I_{jt} + e_{it}$$

Stock Funds: S&P 500, Fama French Small-Large and high minus low, Lehman Gov/Credit, and MSCI Europe

Bond Funds: Lehman Gov/Credit, Lehman Mortgage-Backed, Credit Suisse High-Yield Index, Salomon non-dollar World Gov. Bond Index

International: S&P 500 and the three MSCI Indexes (Europe, Pacific, and Emerging Markets

Estimated model using monthly return date for three years after the 11-k report. Avoid bias

For one year alpha used alpha estimated over three years plus average monthly residuals over first year.

B. Differential Alpha

Mutual funds, in general, have negative alpha. We took the alpha for each mutual fund minus the average alpha for funds of the same general size from the same ICDI category.

To get alpha on a plan we use two alternative weightings of funds held:

1. Equal weight on each mutual fund
2. Weight by participants' holdings

Performance 3-Year Monthly α

43 Plans, with an average of 6.7 years per plan

	Equal Wts.		Participant Wts.	
	Alpha	**Diff. α**	**Alpha**	**Diff. α**
Average	-0.026	0.043	-0.043	0.037
P-Value	0.161	0.009	0.034	0.040
# Pos.	18	30	13	32

Fee difference .019

Performance 1-Year α

	Equal Wts.		Participant Wts.	
	Alpha	**Diff. α**	**Alpha**	**Diff. α**
Average	-0.080	0.035	-0.093	0.041
P-Value	0.000	0.038	0.000	0.029
# Pos.	9	29	4	33

Fee difference .019

Given the type of fund offered, administrators tend to hold better than random funds, but much of the difference is due to lower expense ratios.

Characteristics and Performance of new funds added and deleted by Plan Administrators

Additions and Deletions

Plan Years	289
Additions	215
Deletions	45

Characteristics of Deletions

(1) usually multiple

(2) often not replaced by plan of same type

Characteristics of Additions

(1) usually new type

Fund Performance Before Being Added or Dropped			
	Differential Return	Alpha	Differential Alpha
Added Funds (193)			
1 year	0.251%	0.141%	0.115%
3 year	0.222%	0.190%	0.112%
Dropped Funds (41)			
1 year	-0.024%	-0.137%	-0.077%
3 year	-0.028%	-0.124%	-0.119%
Added minus Dropped Funds			
1-Year Difference	0.275%	0.278%	0.192%
3-Year Difference	0.250%	0.314%	0.231%

Fund Performance After Being Added or Dropped			
	Differential Return	Alpha	Differential Alpha
Added Funds (193)			
1 year	0.008%	-0.142%	-0.022%
3 year	0.144%	0.010%	0.037%
Dropped Funds (41)			
1 year	0.190%	-0.062%	0.086%
3 year	0.073%	-0.037%	0.014%
Added minus Dropped Funds			
1-Year Difference	-0.182%	-0.080%	-0.108%
3-Year Difference	0.071%	0.047%	0.023%

Performance of 401(k) Plans that Changed All Fund Offerings in a Given Year			
	Alpha	Diff. Alpha	Sharpe Ratio
Added			
1 Year	-0.222%	-0.103%	0.393
3 Year	-0.026%	0.028%	0.223
Dropped			
1 Year	-0.090%	0.043%	0.479
3 Year	-0.093%	-0.003%	0.253
1-Year Difference	-0.132%	-0.146%	-0.086
3-Year Difference	0.067%	0.031%	-0.030

Predictability of Future Performance from Past Performance

Past Performance Quartiles	Future Performance Quartiles 1 (lowest)	2	3	4 (highest)	Average Future Differential Alpha
1 (lowest)	0.338	0.265	0.235	0.162	-0.024%
2	0.203	0.297	0.216	0.284	0.040%
3	0.162	0.203	0.419	0.216	0.063%
4 (highest)	0.254	0.254	0.197	0.296	0.061%

Participant Behavior Issues

(1) How important are contributions and transfers relative to returns
(2) Do Participants use contributions or transfers to restore weights
(3) How do participants react to new choices
(4) Do Participants make contributions and transfers in a manner that improves their portfolio performance
(5) How does form of matching affect Participant Behavior

How Important are Contributions and Transfers Relative to Returns

$$\text{Dollars in } t+1 = (\text{Dollars in } t)(1+R)$$

$$\text{Change in Proportion} = \frac{\begin{matrix}\text{Dollars in } t+1 \\ \text{in one account}\end{matrix}}{\text{investment } t+1} - \frac{\begin{matrix}\text{Dollars in } t \\ \text{in one account}\end{matrix}}{\text{investment } t}$$

$$\text{Aggregate Changes} = \frac{\text{absolute value of sum of charges}}{2}$$

	Average	Median
Returns	4.51%	3.79%
Contributions and Transfers	4.62%	3.77%
Transfer	3.85	3.07
Contributions	2.11	1.63

Do Participants use Contributions and Transfers to Restore Weights

Sources of Changes in Participant Allocations

	$\Delta X^{R} > 0$	$\Delta X^{R} \leq 0$
$\Delta X^{C+T} > 0$	541	381
$\Delta X^{C+T} \leq 0$	245	476

$$\begin{bmatrix}\text{change in weights}\\ \text{contributions and transfers}\end{bmatrix} = a + b\begin{bmatrix}\text{change}\\ \text{from returns}\end{bmatrix} + e$$

Plus 36 of 41

Significant 24 of 41

Reaction to New Choices

Allocations to New Investment Choices
(excluding company stock and employer contributions)

Year	1 All New Funds	2 Existing Type	3 Replacement Fund of Same Type	4 Additional New Fund of an Existing Type	5 New Type
1	0.83	0.92	1.28	0.80	0.58
2	0.83	1.13	1.29	1.00	0.59
3	0.86	1.25	1.46	1.19	0.44
4	0.77	1.31	0.97	1.39	0.47

Do Investors Allocation to Improve Performance

Participant Portfolio Performance versus Naïve Selection Rules

Portfolio Selection Rule	Alpha	*t* Statistic	Outperforms (Total 38 Plans)
Participant Weights	-0.078		
1/*N* in Each Investment Choice	-0.022	1.54	22
1/*N* in Top Half of Past Performance	0.071	2.01	23
1/*N* in Each Category	-0.001	1.63	20

Effect of Form of Company Contributions

If form of stock

(1)still added more 43%

(2)investment in company stock 2.76 normal investment

Conclusions

Plan Administrators

(1)actions of plan administrators vitally important

(2)offer portfolios of better active funds

(3)additions and deletions not as skillful

(4)some to better than others

Participants

(1)Contributions and Transfers important in changing weights

(2)Participants by their actions accentuate weight change of return

(3)If matching is form of company stock hold 3 times as much

(4)Put less in new offerings

(5)No evidence of good selection