

It Pays to Set the Menu: Mutual Fund Investment Options in 401(k) Plans

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Introduction

401(k) plans are employer-sponsored defined contribution (DC) retirement plans:

- 401(k) plans cover more than half of the retirement assets in the private sector.
- The value of assets reached \$3.5 trillion dollars in 2012, over half of which is invested in mutual funds.
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In this study, we focus on the incentives of the trustee.

Sponsors are required by law to appoint a trustee to the plan:

- Mutual fund family (most often): Fidelity, Vanguard, T.Rowe Price, etc.
- Bank /Financial institution (occasionally): Metlife, First Union NB, etc.
- Consulting firm (rarely): Hewitt, etc.

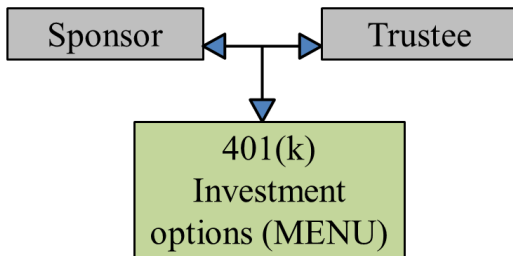
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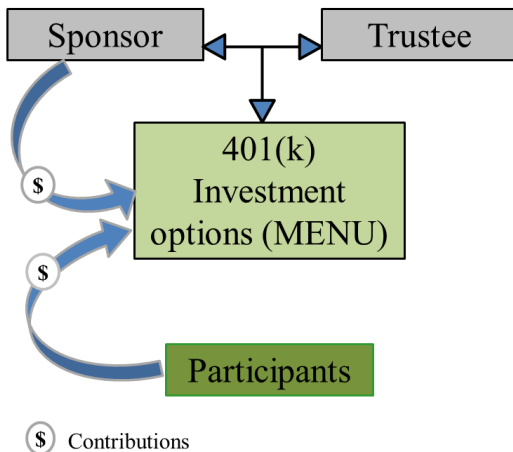
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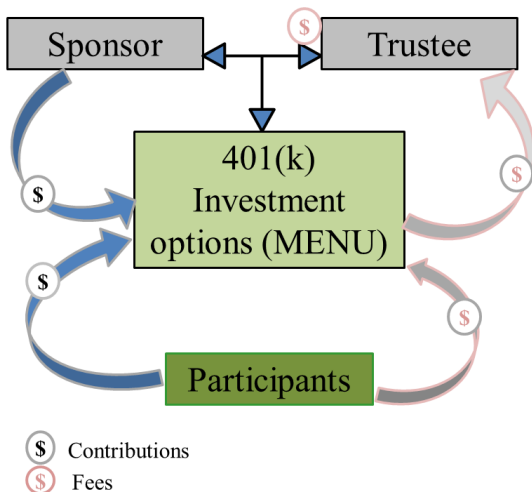
Dynamics in a 401(k) Plan



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Example: Plexus Corp. 401(k) Plan, 2003

| Option | Current Value |
|---------------------------------------|-------------------|
| MFS Conservative Allocation Fund | 1,128,499 |
| MFS Moderate Allocation Fund | 1,679,086 |
| MFS Aggressive Growth Allocation Fund | 2,633,942 |
| MFS Capital Opportunities Fund | 7,783,267 |
| MFS Fixed Fund | 6,207,087 |
| MFS Mid Cap Growth Fund | 5,621,723 |
| MFS Money Market Fund | 55,012 |
| MFS New Discovery Fund | 6,080,534 |
| MFS Value Fund | 6,099,327 |
| American Balanced Fund | 2,756,692 |
| American EuroPacific Growth Fund | 5,702,903 |
| Calvert Income Fund | 2,597,419 |
| Dreyfus Premier Technology Fund | 1,860,792 |
| Janus Aspen Worldwide Fund | 1,716,129 |
| Munder Index 500 Fund | 9,711,499 |
| Plexus Corp. Common Stock | 20,113,297 |
| Participant Loans | 2,048,345 |
| Total | 83,795,553 |

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Employer Stock: Plexus Corp.

Conflicts of Interest

The existence of affiliated funds on these menus generates conflicting incentives for trustees:

- They have to act to the benefit of participants. Their actions are governed by the Employee Retirement Income Security Act of 1974 ("ERISA").
- They have a financial interest to maximize their profits.

Surprisingly, little is known about how these conflicted incentives affect the investment choices offered to the participants and their consequences.

Research Questions

- Do mutual fund trustees' competing incentives leave a footprint on the plan's menu?
- Are participants able to see through the trustees' incentives?
- Are the trustee decisions costly or beneficial to plan participants?

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Preview of the Results

- Poorly-performing trustee funds are less likely to be removed from 401(k) plans than poorly-performing unaffiliated funds.
- Plan participants are not very sensitive to past performance and do not compensate for the trustee bias in their asset allocations.
- Trustee favoritism is costly for plan participants.

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Contribution to the Literature

Role of trustees in DC plans:

- Davis and Kim (2007); Cohen and Schmidt (2009); Duan, Hotchkiss, and Jiao (2012).

Design of DC plans:

- Benartzi and Thaler (2001); Madrian and Shea (2001); Choi, Laibson, Madrian, and Metrick (2002, 2004); Agnew, Balduzzi, and Sunden (2003); Huberman and Jiang (2006); Sialm, Starks, and Zhang (2012).

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Data Collection

We hand collect from Form 11-K filed with SEC the investment options offered in 401(k) plans.

- Plans offering company stock as an option need to file Form 11-K with the SEC.
- Sample covers the period between 1998-2009.
- We obtain a total of 26,624 filings.
- From the “Schedule of Assets” we obtain the name of the option and the current value of the investment into this option.
 - We use Form 5500 to track plans over time and for additional information at the plan level.
 - We link mutual fund options to the CRSP mutual fund database.
 - For sponsor characteristics we link plans to Compustat.

Sample Description

Sample Coverage:

| | |
|--|-----------|
| Proportion of plans filing IRS Form 5500 (1998-2009) | 30-35% |
| Number of participants | 9 million |
| Number of plans | 2,494 |
| Number of sponsors | 1,826 |
| Number of trustees | 112 |
| Proportion of mutual fund trustees | 82% |
| Proportion of assets with mutual fund trustees | 96% |

Plan Characteristics:

| | |
|------------------------------------|---------------|
| Plan size (average) | \$328 million |
| Participant account size (average) | \$42,107 |
| Employer securities | 17% |

Plan Architecture

| Year | Num of Sponsors | Num of Plans | Num of Plans with MF Trustees | Total MF Assets | Perc of MF Trustee Assets | Num of Options | Num of Trustee Options | Trustee Share Perc | Num of Mgmt Comp | Herfindahl Index |
|-------|-----------------|--------------|-------------------------------|-----------------|---------------------------|----------------|------------------------|--------------------|------------------|------------------|
| 1998 | 618 | 713 | 430 | 60.83 | 96.00 | 7.01 | 2.38 | 34.01 | 2.96 | 0.67 |
| 1999 | 760 | 895 | 617 | 75.84 | 92.12 | 7.85 | 2.85 | 34.11 | 3.48 | 0.64 |
| 2000 | 829 | 1,004 | 735 | 97.37 | 94.65 | 9.29 | 3.53 | 35.68 | 4.00 | 0.59 |
| 2001 | 920 | 1,100 | 818 | 102.87 | 95.16 | 10.43 | 4.10 | 36.91 | 4.56 | 0.57 |
| 2002 | 1,012 | 1,230 | 942 | 110.50 | 95.04 | 11.50 | 4.60 | 37.26 | 5.01 | 0.54 |
| 2003 | 1,102 | 1,325 | 1,101 | 146.83 | 95.35 | 12.00 | 4.73 | 36.00 | 5.48 | 0.51 |
| 2004 | 1,106 | 1,314 | 1,095 | 169.28 | 95.66 | 13.19 | 5.18 | 33.85 | 5.89 | 0.48 |
| 2005 | 1,093 | 1,281 | 1,070 | 183.79 | 97.03 | 13.79 | 5.40 | 32.50 | 6.18 | 0.45 |
| 2006 | 1,034 | 1,225 | 957 | 197.66 | 98.02 | 14.57 | 5.81 | 31.56 | 6.29 | 0.44 |
| 2007 | 1,002 | 1,175 | 882 | 205.10 | 97.96 | 15.93 | 5.91 | 28.37 | 6.65 | 0.42 |
| 2008 | 970 | 1,126 | 849 | 136.77 | 98.11 | 17.20 | 6.49 | 28.99 | 7.08 | 0.42 |
| 2009 | 849 | 979 | 735 | 161.68 | 97.99 | 17.82 | 6.40 | 27.13 | 7.36 | 0.40 |
| Total | 11,295 | 13,367 | 10,231 | 137.38 | 96.09 | 12.55 | 4.78 | 33.03 | 5.41 | 0.51 |

Mutual Funds - Summary Statistics

Mutual Funds Kept

| Trustee Fund | No. | Fund Perc. Kept | Total Perc. Kept | Plan Assets in Fund | Fund Age | Fund Size | Return Std Dev | Turn-over | Exp Ratio | Perf 1 Yr | Perf 3 Yr | Perf 5 Yr |
|--------------|--------|-----------------|------------------|---------------------|----------|-----------|----------------|-----------|-----------|-----------|-----------|-----------|
| 0 | 82,550 | 8.56 | 85.42 | 8.92 | 19.61 | 15.50 | 3.98 | 76.54 | 0.94 | 54.99 | 60.24 | 63.64 |
| 1 | 52,239 | 7.60 | 88.64 | 13.47 | 17.29 | 12.03 | 3.38 | 52.12 | 0.57 | 55.49 | 58.19 | 59.41 |

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Compute the proportion of deletions from affiliated and non-affiliated menus for funds in different performance deciles.

- Overall Sample
- Sample of funds that appear on both affiliated and unaffiliated menus

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| AIM Constellation Fund | 501,133 |
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| Alliance Bond Fund | 220,384 |
| Fidelity Advisor Equity Growth Fund | 825,860 |
| Franklin California Growth Fund | 2,059,546 |
| Franklin Convertible Securities Fund | 638,580 |
| MFS Capital Opportunities Fund | 495,507 |
| MFS Government Securities Fund A | 442,641 |
| MFS Research Fund | 311,508 |
| MFS Total Return Fund | 1,287,121 |
| Prudential Global Growth Fund A | 320,942 |
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| Common Stock East West Bancorp, Inc. | 10,363,035 |
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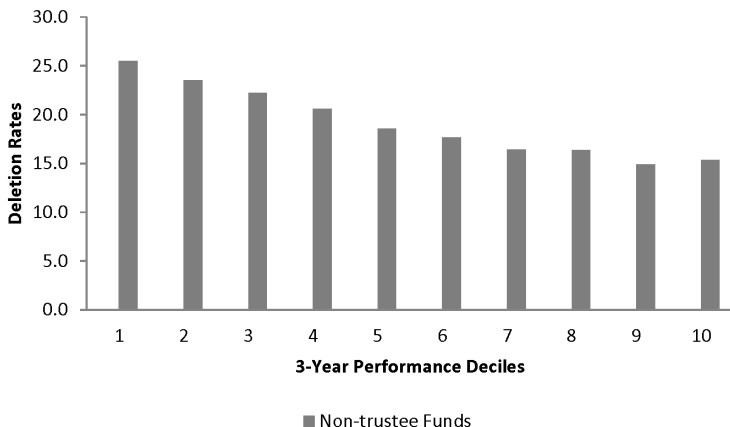
Mutual Fund Deletions

In 2003, the MFS Capital Opportunities Fund was ranked in the lowest performance decile relative to funds in the same style over the prior 3 years:

- It appeared on 29 menus: 7 times as a trustee fund and 22 times as a non-trustee fund.
- It was deleted during 2004 once as a trustee fund and 10 times as a non-trustee fund.

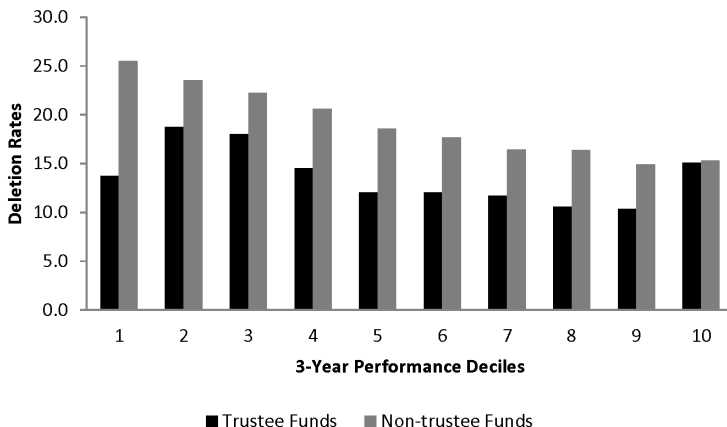
Deletion Rates by Performance Deciles

Unaffiliated Fund Sample
(3-Year Style-Adjusted Performance)



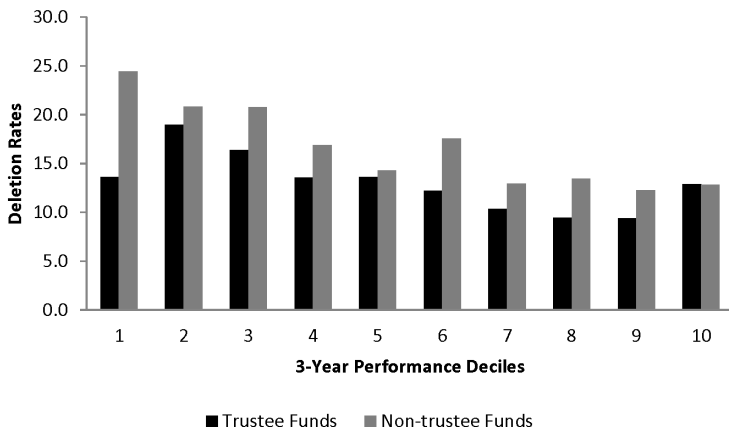
Deletion Rates by Performance Deciles

Overall Sample
(3-Year Style-Adjusted Performance)



Deletion Rates by Performance Deciles

Sample of Funds on Both Affiliated and Unaffiliated Menus
(3-Year Performance)



Linear Probability Model of Fund Deletions

We estimate the following model:

$$\begin{aligned}
 DEL_{p,f,t} &= \beta_0 + \beta_1 \times TF_{p,f,t} + \beta_2 \times LowPerf_{p,f,t} + \beta_3 \times HighPerf_{p,f,t} \\
 &+ \beta_4 \times TF_{p,f,t} \times LowPerf_{p,f,t} + \beta_5 \times TF_{p,f,t} \times HighPerf_{p,f,t} \\
 &+ Z'_{p,f,t} \gamma + \epsilon_{p,f,t}
 \end{aligned}$$

- Performance percentiles $Perf_{p,f,t}$ are calculated based on style-adjusted returns of all mutual funds in the CRSP database over the prior 1, 3, and 5 years.
- To adjust for non-linearities we use a piecewise linear performance specification:

$$\begin{aligned}
 LowPerf_{p,f,t} &= \min(Perf_{p,f,t} - 0.5, 0), \\
 HighPerf_{p,f,t} &= \max(Perf_{p,f,t} - 0.5, 0)
 \end{aligned}$$

- Fund type fixed effects (domestic equity, etc.), time fixed effects, and two-way clustered standard errors at fund and plan level.

Linear Probability Model of Fund Deletions

We estimate the following model:

$$\begin{aligned}
 DEL_{p,f,t} &= \beta_0 + \beta_1 \times TF_{p,f,t} + \beta_2 \times LowPerf_{p,f,t} + \beta_3 \times HighPerf_{p,f,t} \\
 &+ \beta_4 \times TF_{p,f,t} \times LowPerf_{p,f,t} + \beta_5 \times TF_{p,f,t} \times HighPerf_{p,f,t} \\
 &+ Z'_{p,f,t} \gamma + \epsilon_{p,f,t}
 \end{aligned}$$

- Performance percentiles $Perf_{p,f,t}$ are calculated based on style-adjusted returns of all mutual funds in the CRSP database over the prior 1, 3, and 5 years.
- To adjust for non-linearities we use a piecewise linear performance specification:

$$\begin{aligned}
 LowPerf_{p,f,t} &= \min(Perf_{p,f,t} - 0.5, 0), \\
 HighPerf_{p,f,t} &= \max(Perf_{p,f,t} - 0.5, 0)
 \end{aligned}$$

- Fund type fixed effects (domestic equity, etc.), time fixed effects, and two-way clustered standard errors at fund and plan level.

Linear Probability Model of Fund Deletions

We estimate the following model:

$$\begin{aligned}
 DEL_{p,f,t} &= \beta_0 + \beta_1 \times TF_{p,f,t} + \beta_2 \times LowPerf_{p,f,t} + \beta_3 \times HighPerf_{p,f,t} \\
 &+ \beta_4 \times TF_{p,f,t} \times LowPerf_{p,f,t} + \beta_5 \times TF_{p,f,t} \times HighPerf_{p,f,t} \\
 &+ Z'_{p,f,t} \gamma + \epsilon_{p,f,t}
 \end{aligned}$$

- Performance percentiles $Perf_{p,f,t}$ are calculated based on style-adjusted returns of all mutual funds in the CRSP database over the prior 1, 3, and 5 years.
- To adjust for non-linearities we use a piecewise linear performance specification:

$$\begin{aligned}
 LowPerf_{p,f,t} &= \min(Perf_{p,f,t} - 0.5, 0), \\
 HighPerf_{p,f,t} &= \max(Perf_{p,f,t} - 0.5, 0)
 \end{aligned}$$

- Fund type fixed effects (domestic equity, etc.), time fixed effects, and two-way clustered standard errors at fund and plan level.

Linear Probability Model of Fund Deletions

We estimate the following model:

$$\begin{aligned}
 DEL_{p,f,t} &= \beta_0 + \beta_1 \times TF_{p,f,t} + \beta_2 \times LowPerf_{p,f,t} + \beta_3 \times HighPerf_{p,f,t} \\
 &+ \beta_4 \times TF_{p,f,t} \times LowPerf_{p,f,t} + \beta_5 \times TF_{p,f,t} \times HighPerf_{p,f,t} \\
 &+ Z'_{p,f,t} \gamma + \epsilon_{p,f,t}
 \end{aligned}$$

- Performance percentiles $Perf_{p,f,t}$ are calculated based on style-adjusted returns of all mutual funds in the CRSP database over the prior 1, 3, and 5 years.
- To adjust for non-linearities we use a piecewise linear performance specification:

$$\begin{aligned}
 LowPerf_{p,f,t} &= \min(Perf_{p,f,t} - 0.5, 0), \\
 HighPerf_{p,f,t} &= \max(Perf_{p,f,t} - 0.5, 0)
 \end{aligned}$$

- Fund type fixed effects (domestic equity, etc.), time fixed effects, and two-way clustered standard errors at fund and plan level.

Linear Probability Model of Fund Deletions

| | 1 Year | 3 Years | 5 Years |
|-----------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.108*** (0.016) | -0.150*** (0.019) | -0.107*** (0.023) |
| LowPerf | -0.183*** (0.030) | -0.319*** (0.034) | -0.197*** (0.037) |
| HighPerf | -0.017 (0.024) | -0.051** (0.023) | -0.142*** (0.024) |
| LowPerf*Trustee Fund | 0.171*** (0.037) | 0.249*** (0.045) | 0.099* (0.055) |
| HighPerf*Trustee Fund | -0.036 (0.032) | -0.006 (0.030) | 0.099*** (0.034) |
| Maximum Corr | 0.011*** (0.001) | 0.010*** (0.001) | 0.010*** (0.001) |
| Log(Option Size) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) |
| No. of Options | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 8.132*** (1.117) | 7.626*** (1.106) | 8.073*** (1.143) |
| Turnover | 0.017*** (0.004) | 0.017*** (0.004) | 0.018*** (0.004) |
| Log(Fund Size) | -0.021*** (0.002) | -0.019*** (0.002) | -0.018*** (0.002) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | -0.000 (0.000) |
| Std. Dev. | -0.478** (0.198) | -0.179 (0.195) | -0.078 (0.194) |
| Observations | 106,848 | 106,848 | 106,848 |
| R-squared | 0.072 | 0.079 | 0.075 |

Linear Probability Model of Fund Deletions

| | 1 Year | 3 Years | 5 Years |
|-----------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.108*** (0.016) | -0.150*** (0.019) | -0.107*** (0.023) |
| LowPerf | -0.183*** (0.030) | -0.319*** (0.034) | -0.197*** (0.037) |
| HighPerf | -0.017 (0.024) | -0.051** (0.023) | -0.142*** (0.024) |
| LowPerf*Trustee Fund | 0.171*** (0.037) | 0.249*** (0.045) | 0.099* (0.055) |
| HighPerf*Trustee Fund | -0.036 (0.032) | -0.006 (0.030) | 0.099*** (0.034) |
| Maximum Corr | 0.011*** (0.001) | 0.010*** (0.001) | 0.010*** (0.001) |
| Log(Option Size) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) |
| No. of Options | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 8.132*** (1.117) | 7.626*** (1.106) | 8.073*** (1.143) |
| Turnover | 0.017*** (0.004) | 0.017*** (0.004) | 0.018*** (0.004) |
| Log(Fund Size) | -0.021*** (0.002) | -0.019*** (0.002) | -0.018*** (0.002) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | -0.000 (0.000) |
| Std. Dev. | -0.478** (0.198) | -0.179 (0.195) | -0.078 (0.194) |
| Observations | 106,848 | 106,848 | 106,848 |
| R-squared | 0.072 | 0.079 | 0.075 |

Linear Probability Model of Fund Deletions

| | 1 Year | 3 Years | 5 Years |
|-----------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.108*** (0.016) | -0.150*** (0.019) | -0.107*** (0.023) |
| LowPerf | -0.183*** (0.030) | -0.319*** (0.034) | -0.197*** (0.037) |
| HighPerf | -0.017 (0.024) | -0.051** (0.023) | -0.142*** (0.024) |
| LowPerf*Trustee Fund | 0.171*** (0.037) | 0.249*** (0.045) | 0.099* (0.055) |
| HighPerf*Trustee Fund | -0.036 (0.032) | -0.006 (0.030) | 0.099*** (0.034) |
| Maximum Corr | 0.011*** (0.001) | 0.010*** (0.001) | 0.010*** (0.001) |
| Log(Option Size) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) |
| No. of Options | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 8.132*** (1.117) | 7.626*** (1.106) | 8.073*** (1.143) |
| Turnover | 0.017*** (0.004) | 0.017*** (0.004) | 0.018*** (0.004) |
| Log(Fund Size) | -0.021*** (0.002) | -0.019*** (0.002) | -0.018*** (0.002) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | -0.000 (0.000) |
| Std. Dev. | -0.478** (0.198) | -0.179 (0.195) | -0.078 (0.194) |
| Observations | 106,848 | 106,848 | 106,848 |
| R-squared | 0.072 | 0.079 | 0.075 |

Linear Probability Model of Fund Deletions

| | 1 Year | 3 Years | 5 Years |
|-----------------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.083*** (0.021) | -0.118*** (0.027) | -0.046 (0.032) |
| LowPerf | -0.158*** (0.038) | -0.343*** (0.044) | -0.208*** (0.049) |
| HighPerf | -0.029 (0.033) | -0.021 (0.031) | -0.121*** (0.030) |
| LowPerf*Trustee Fund | 0.133*** (0.048) | 0.190*** (0.059) | -0.008 (0.072) |
| HighPerf*Trustee Fund | -0.020 (0.043) | 0.013 (0.040) | 0.113*** (0.041) |
| Neg NonDC Flow | 0.056*** (0.008) | 0.041*** (0.008) | 0.048*** (0.009) |
| Neg NonDC Flow*Trustee Fund | -0.034*** (0.010) | -0.028*** (0.010) | -0.038*** (0.010) |
| (...) | | | |
| Observations | 65,855 | 65,855 | 65,855 |
| R-squared | 0.075 | 0.082 | 0.078 |

Subsample Analysis

| | Exclude Top 3 MF Trustees | Only Top 3 MF Trustees |
|-----------------------|---------------------------------|------------------------------|
| Trustee Fund | -0.143*** (0.024) | -0.183*** (0.038) |
| LowPerf | -0.308*** (0.033) | -0.385*** (0.069) |
| HighPerf | -0.043* (0.023) | -0.113** (0.046) |
| LowPerf*Trustee Fund | 0.212*** (0.060) | 0.310*** (0.084) |
| HighPerf*Trustee Fund | -0.037 (0.040) | 0.058 (0.052) |
| Maximum Corr | 0.010*** (0.001) | 0.012*** (0.002) |
| Log(Option Size) | -0.010*** (0.002) | -0.007** (0.003) |
| No. of Options | -0.002*** (0.001) | -0.004*** (0.001) |
| Exp. Ratio | 6.174*** (1.177) | 15.129*** (2.272) |
| Turnover | 0.014*** (0.004) | 0.028*** (0.009) |
| Log(Fund Size) | -0.019*** (0.002) | -0.024*** (0.004) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.014 (0.214) | -0.830*** (0.270) |
| Observations | 69,912 | 36,936 |
| R-squared | 0.061 | 0.129 |

Subsample Analysis

| | Exclude Top 3 MF Trustees | Only Top 3 MF Trustees | Small Plans | Large Plans |
|-----------------------|---------------------------------|------------------------------|----------------------|----------------------|
| Trustee Fund | -0.143*** (0.024) | -0.183*** (0.038) | -0.174*** (0.024) | -0.140*** (0.023) |
| LowPerf | -0.308*** (0.033) | -0.385*** (0.069) | -0.330*** (0.037) | -0.331*** (0.044) |
| HighPerf | -0.043* (0.023) | -0.113** (0.046) | -0.072*** (0.024) | -0.034 (0.030) |
| LowPerf*Trustee Fund | 0.212*** (0.060) | 0.310*** (0.084) | 0.279*** (0.055) | 0.232*** (0.054) |
| HighPerf*Trustee Fund | -0.037 (0.040) | 0.058 (0.052) | 0.006 (0.036) | -0.015 (0.037) |
| Maximum Corr | 0.010*** (0.001) | 0.012*** (0.002) | 0.010*** (0.001) | 0.010*** (0.001) |
| Log(Option Size) | -0.010*** (0.002) | -0.007** (0.003) | -0.002 (0.002) | -0.021*** (0.004) |
| No. of Options | -0.002*** (0.001) | -0.004*** (0.001) | -0.001 (0.001) | -0.003*** (0.000) |
| Exp. Ratio | 6.174*** (1.177) | 15.129*** (2.272) | 6.824*** (1.197) | 8.810*** (1.494) |
| Turnover | 0.014*** (0.004) | 0.028*** (0.009) | 0.012*** (0.004) | 0.025*** (0.005) |
| Log(Fund Size) | -0.019*** (0.002) | -0.024*** (0.004) | -0.022*** (0.002) | -0.013*** (0.003) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.014 (0.214) | -0.830*** (0.270) | -0.253 (0.205) | -0.103 (0.282) |
| Observations | 69,912 | 36,936 | 47,387 | 52,869 |
| R-squared | 0.061 | 0.129 | 0.068 | 0.100 |

Subsample Analysis

| | Exclude Top 3 MF Trustees | Only Top 3 MF Trustees | Small Plans | Large Plans | Prior to 2007 | After 2006 |
|-----------------------|---------------------------------|------------------------------|----------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.143*** (0.024) | -0.183*** (0.038) | -0.174*** (0.024) | -0.140*** (0.023) | -0.125*** (0.029) | -0.157*** (0.025) |
| LowPerf | -0.308*** (0.033) | -0.385*** (0.069) | -0.330*** (0.037) | -0.331*** (0.044) | -0.311*** (0.051) | -0.325*** (0.040) |
| HighPerf | -0.043* (0.023) | -0.113** (0.046) | -0.072*** (0.024) | -0.034 (0.030) | -0.116*** (0.030) | 0.021 (0.031) |
| LowPerf*Trustee Fund | 0.212*** (0.060) | 0.310*** (0.084) | 0.279*** (0.055) | 0.232*** (0.054) | 0.246*** (0.065) | 0.215*** (0.058) |
| HighPerf*Trustee Fund | -0.037 (0.040) | 0.058 (0.052) | 0.006 (0.036) | -0.015 (0.037) | 0.021 (0.038) | -0.021 (0.040) |
| Maximum Corr | 0.010*** (0.001) | 0.012*** (0.002) | 0.010*** (0.001) | 0.010*** (0.001) | 0.010*** (0.001) | 0.011*** (0.001) |
| Log(Option Size) | -0.010*** (0.002) | -0.007** (0.003) | -0.002 (0.002) | -0.021*** (0.004) | -0.008*** (0.002) | -0.010*** (0.002) |
| No. of Options | -0.002*** (0.001) | -0.004*** (0.001) | -0.001 (0.001) | -0.003*** (0.000) | -0.002*** (0.001) | -0.002*** (0.000) |
| Exp. Ratio | 6.174*** (1.177) | 15.129*** (2.272) | 6.824*** (1.197) | 8.810*** (1.494) | 9.416*** (1.570) | 7.023*** (1.223) |
| Turnover | 0.014*** (0.004) | 0.028*** (0.009) | 0.012*** (0.004) | 0.025*** (0.005) | 0.019*** (0.006) | 0.014*** (0.005) |
| Log(Fund Size) | -0.019*** (0.002) | -0.024*** (0.004) | -0.022*** (0.002) | -0.013*** (0.003) | -0.022*** (0.003) | -0.016*** (0.002) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.014 (0.214) | -0.830*** (0.270) | -0.253 (0.205) | -0.103 (0.282) | -1.298*** (0.390) | 0.047 (0.203) |
| Observations | 69,912 | 36,936 | 47,387 | 52,869 | 52,301 | 54,547 |
| R-squared | 0.061 | 0.129 | 0.068 | 0.100 | 0.085 | 0.078 |

Robustness Tests

| | Include Trustee FE | Only MF Trustees | MF Trustees With At Least 10 Funds | Exclude Trustee Changes | Exclude Target Date Funds | Only Equity Funds | Only Active Funds |
|-----------------------|----------------------|----------------------|------------------------------------|-------------------------|---------------------------|----------------------|----------------------|
| Trustee Fund | -0.166*** (0.018) | -0.172*** (0.021) | -0.179*** (0.022) | -0.139*** (0.019) | -0.143*** (0.021) | -0.126*** (0.024) | -0.139*** (0.022) |
| LowPef | -0.315*** (0.033) | -0.325*** (0.039) | -0.317*** (0.043) | -0.313*** (0.035) | -0.370*** (0.034) | -0.397*** (0.036) | -0.372*** (0.034) |
| HighPef | -0.058*** (0.022) | -0.049* (0.027) | -0.061** (0.031) | -0.038 (0.024) | -0.043* (0.024) | -0.065*** (0.024) | -0.049* (0.025) |
| LowPerf*Trustee Fund | 0.233*** (0.043) | 0.268*** (0.049) | 0.261*** (0.052) | 0.248*** (0.044) | 0.206*** (0.048) | 0.166*** (0.055) | 0.209*** (0.050) |
| HighRank*Trustee Fund | 0.008 (0.029) | -0.011 (0.034) | -0.006 (0.038) | -0.021 (0.030) | 0.030 (0.034) | 0.041 (0.037) | 0.008 (0.037) |
| Maximum Corr | 0.011*** (0.001) | 0.011*** (0.001) | 0.011*** (0.001) | 0.009*** (0.001) | 0.011*** (0.001) | 0.014*** (0.001) | 0.011*** (0.001) |
| Log(Option Size) | -0.010*** (0.001) | -0.010*** (0.002) | -0.010*** (0.002) | -0.007*** (0.002) | -0.010*** (0.002) | -0.011*** (0.002) | -0.011*** (0.002) |
| No. of Options | -0.003*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 8.868*** (1.040) | 7.947*** (1.259) | 8.132*** (1.299) | 6.560*** (1.075) | 7.906*** (1.223) | 6.429*** (1.193) | 7.422*** (1.234) |
| Turnover | 0.015*** (0.004) | 0.017*** (0.004) | 0.020*** (0.005) | 0.017*** (0.004) | 0.014*** (0.004) | 0.024*** (0.007) | 0.014*** (0.004) |
| Log(Fund Size) | -0.021*** (0.002) | -0.018*** (0.002) | -0.020*** (0.002) | -0.018*** (0.002) | -0.019*** (0.002) | -0.021*** (0.002) | -0.020*** (0.003) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | -0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.272** (0.135) | -0.171 (0.213) | -0.236 (0.227) | -0.043 (0.209) | 0.023 (0.188) | 0.227 (0.216) | 0.111 (0.195) |
| Observations | 101,190 | 86,761 | 72,879 | 96,168 | 92,235 | 71,055 | 81,227 |
| R-squared | 0.110 | 0.087 | 0.093 | 0.074 | 0.075 | 0.091 | 0.073 |

Probit Model with Ai and Norton Interactions

| | 1 Year | 3 Years | 5 Years |
|-----------------------|----------------------|----------------------|----------------------|
| Trustee Fund | -0.074*** (0.008) | -0.085*** (0.009) | -0.054*** (0.010) |
| LowPerf | -0.137*** (0.012) | -0.215*** (0.013) | -0.116*** (0.015) |
| HighPerf | -0.018 (0.012) | -0.051*** (0.012) | -0.128*** (0.012) |
| LowPerf*Trustee Fund | 0.091*** (0.024) | 0.102*** (0.024) | -0.014 (0.026) |
| HighPerf*Trustee Fund | -0.049** (0.023) | -0.010 (0.023) | 0.064*** (0.023) |
| Maximum Corr | 0.010*** (0.001) | 0.010*** (0.001) | 0.009*** (0.001) |
| Log(Option Size) | -0.008*** (0.001) | -0.008*** (0.001) | -0.008*** (0.001) |
| No. of Options | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 7.213*** (0.626) | 6.735*** (0.628) | 7.109*** (0.629) |
| Turnover | 0.012*** (0.002) | 0.012*** (0.002) | 0.012*** (0.002) |
| Log(Fund Size) | -0.020*** (0.001) | -0.018*** (0.001) | -0.017*** (0.001) |
| Fund Age | 0.000*** (0.000) | 0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.415*** (0.117) | -0.145 (0.115) | -0.057 (0.111) |
| Observations | 106,848 | 106,848 | 106,848 |
| Adj R-Squared | 0.0887 | 0.0948 | 0.0921 |

Alternative Fund Rankings

| | Plan Ranking | | | Family Ranking | | |
|-----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | 1 Year | 3 Years | 5 Years | 1 Year | 3 Years | 5 Years |
| Trustee Fund | -0.088*** (0.014) | -0.102*** (0.015) | -0.103*** (0.016) | -0.075*** (0.014) | -0.093*** (0.018) | -0.090*** (0.018) |
| LowPerf | -0.183*** (0.019) | -0.262*** (0.023) | -0.160*** (0.021) | -0.100*** (0.025) | -0.160*** (0.029) | -0.134*** (0.033) |
| HighPerf | 0.025 (0.021) | -0.015 (0.022) | -0.165*** (0.019) | -0.013 (0.025) | -0.029 (0.025) | -0.066** (0.026) |
| LowPerf*Trustee Fund | 0.119*** (0.033) | 0.144*** (0.033) | 0.089*** (0.026) | 0.071** (0.034) | 0.122*** (0.043) | 0.109** (0.046) |
| HighPerf*Trustee Fund | -0.002 (0.031) | 0.032 (0.032) | 0.107*** (0.026) | 0.033 (0.034) | -0.003 (0.037) | 0.006 (0.039) |
| Maximum Corr | 0.011*** (0.001) | 0.011*** (0.001) | 0.010*** (0.001) | 0.011*** (0.001) | 0.011*** (0.001) | 0.011*** (0.001) |
| Log(Option Size) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) | -0.009*** (0.002) |
| No. of Options | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) | -0.002*** (0.000) |
| Exp. Ratio | 8.806*** (1.114) | 8.558*** (1.100) | 8.232*** (1.139) | 8.593*** (1.120) | 8.469*** (1.111) | 8.668*** (1.111) |
| Turnover | 0.016*** (0.004) | 0.016*** (0.004) | 0.018*** (0.004) | 0.017*** (0.004) | 0.017*** (0.004) | 0.017*** (0.004) |
| Log(Fund Size) | -0.021*** (0.002) | -0.019*** (0.002) | -0.017*** (0.002) | -0.021*** (0.002) | -0.021*** (0.002) | -0.020*** (0.002) |
| Fund Age | 0.000 (0.000) | 0.000 (0.000) | -0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) | 0.000 (0.000) |
| Std. Dev. | -0.568*** (0.201) | -0.300 (0.202) | -0.042 (0.196) | -0.451** (0.206) | -0.319 (0.197) | -0.177 (0.195) |
| Observations | 107,355 | 107,355 | 107,355 | 107,175 | 107,175 | 107,175 |
| R-squared | 0.071 | 0.077 | 0.075 | 0.069 | 0.071 | 0.071 |

Alternative Functional Forms

| Ranking | Linear Performance | | | Three Segments | | |
|------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| | Overall | Plan | Family | Overall | Plan | Family |
| Trustee Fund | -0.105*** (0.014) | -0.085*** (0.013) | -0.072*** (0.013) | -0.172*** (0.035) | -0.124*** (0.025) | -0.116*** (0.030) |
| Perf | -0.167*** (0.014) | -0.142*** (0.017) | -0.089*** (0.015) | | | |
| LowPerfQ | | | | -0.521*** (0.122) | -0.699*** (0.089) | -0.449*** (0.109) |
| MidPerfQ | | | | -0.187*** (0.018) | -0.105*** (0.015) | -0.065*** (0.020) |
| HighPerfQ | | | | 0.207*** (0.074) | 0.107 (0.088) | -0.044 (0.074) |
| Perf*Trustee Fund | 0.103*** (0.018) | 0.086*** (0.020) | 0.055*** (0.019) | | | |
| LowPerfQ*Trustee Fund | | | | 0.468** (0.188) | 0.318** (0.129) | 0.320* (0.164) |
| MidPerfQ*Trustee Fund | | | | 0.110*** (0.025) | 0.068*** (0.020) | 0.031 (0.026) |
| HighPerfQ*Trustee Fund | | | | -0.167 (0.102) | 0.049 (0.121) | 0.098 (0.121) |
| (...) | | | | | | |
| Observations | 106,848 | 107,355 | 107,175 | 106,848 | 107,355 | 107,175 |
| R-squared | 0.077 | 0.075 | 0.070 | 0.079 | 0.078 | 0.071 |

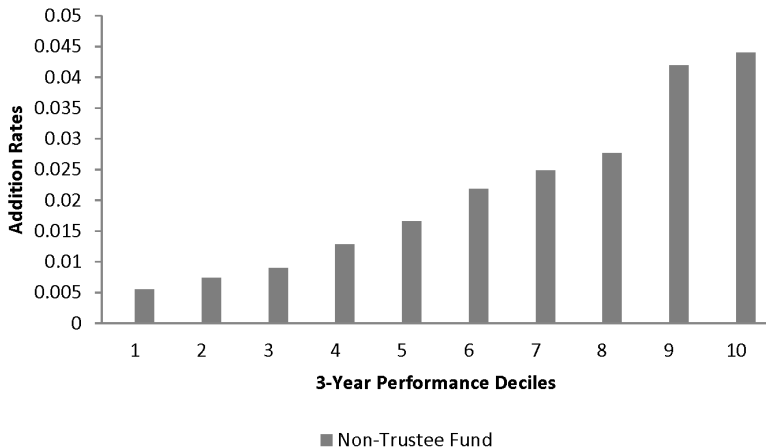
Mutual Fund Additions

Do mutual fund trustees' competing incentives leave a footprint on the plan's menu?

Compute the ratio of the number of affiliated (unaffiliated) menus to which the fund is added during the year to the total number of affiliated (unaffiliated) menus that do not yet include the fund as an option.

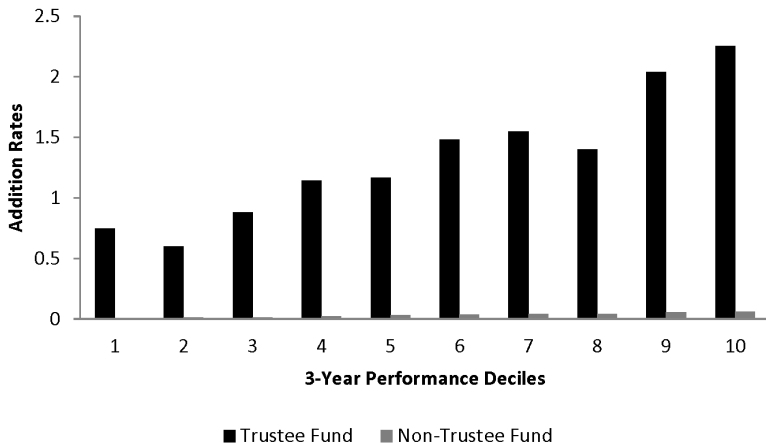
Addition Rates for Non-Trustee Funds

Non-Trustee Sample
(3-Year Style-Adjusted Performance)



Addition Rates by Performance Deciles

Overall Sample
(3-Year Style-Adjusted Performance)



Mutual Fund Flows

Are participants able to see through the trustees' incentives?

We look at three measures of new money growth (flows) into menu options:

$$NMG1_{p,f,t} = \frac{V_{p,f,t} - V_{p,f,t-1}(1 + R_{f,t})}{V_{p,f,t-1}(1 + R_{f,t})}$$

$$NMG2_{p,f,t} = \frac{V_{p,f,t} - V_{p,f,t-1}(1 + R_{f,t})}{V_{p,f,t} + V_{p,f,t-1}(1 + R_{f,t})}$$

$$NMG3_{p,f,t} = \frac{V_{p,f,t} - V_{p,f,t-1}(1 + R_{f,t})}{\sum_f V_{p,f,t-1}(1 + R_{f,t})}$$

We decompose flows into two components:

- Sponsor Flows: Flows due to additions and deletions by sponsor.
- Participant Flows: Flows due to participant reallocations.

Mutual Fund Flows

Are participants able to see through the trustees' incentives?

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Sensitivity of Flows to Fund Performance

| | All Fund Flows | | |
|-----------------------|----------------------|----------------------|---------------------|
| | NMG1 | NMG2 | NMG3 |
| Trustee Fund | 0.270*** (0.042) | 0.200*** (0.024) | 1.141*** (0.256) |
| LowPerf | 0.554*** (0.074) | 0.408*** (0.045) | 3.769*** (0.517) |
| HighPerf | 0.352*** (0.052) | 0.146*** (0.025) | 0.937*** (0.340) |
| LowPerf*Trustee Fund | -0.474*** (0.102) | -0.286*** (0.057) | -1.545** (0.630) |
| HighPerf*Trustee Fund | 0.082 (0.087) | -0.033 (0.039) | -0.848* (0.444) |
| (...) | | | |
| Observations | 96,483 | 117,461 | 116,342 |
| R-squared | 0.159 | 0.515 | 0.138 |

Sensitivity of Flows to Fund Performance

| | All Fund Flows | | | Participant Flows Only | | |
|-----------------------|----------------------|----------------------|---------------------|------------------------|---------------------|---------------------|
| | NMG1 | NMG2 | NMG3 | NMG1 | NMG2 | NMG3 |
| Trustee Fund | 0.270*** (0.042) | 0.200*** (0.024) | 1.141*** (0.256) | 0.076** (0.035) | 0.026** (0.012) | 0.057 (0.133) |
| LowPerf | 0.554*** (0.074) | 0.408*** (0.045) | 3.769*** (0.517) | 0.169*** (0.059) | 0.077*** (0.021) | 1.258*** (0.283) |
| HighPerf | 0.352*** (0.052) | 0.146*** (0.025) | 0.937*** (0.340) | 0.343*** (0.046) | 0.113*** (0.016) | 0.855*** (0.254) |
| LowPerf*Trustee Fund | -0.474*** (0.102) | -0.286*** (0.057) | -1.545** (0.630) | -0.143* (0.085) | -0.044 (0.030) | -0.601* (0.354) |
| HighPerf*Trustee Fund | 0.082 (0.087) | -0.033 (0.039) | -0.848* (0.444) | 0.026 (0.078) | -0.003 (0.026) | -0.131 (0.297) |
| (...) | | | | | | |
| Observations | 96,483 | 117,461 | 116,342 | 82,711 | 82,711 | 82,711 |
| R-squared | 0.159 | 0.515 | 0.138 | 0.250 | 0.221 | 0.108 |

Subsequent Fund Performance

Are the trustee decisions costly or beneficial to plan participants?

We form equal-weighted portfolios at the end of each year:

- For Trustee and Non-Trustee Funds:
 - Kept Funds;
 - Deleted Funds;
 - Added Funds;
- Based on Past Performance Percentiles

The abnormal return $\alpha_{f,t}$ of fund portfolio f at time t is:

$$R_{f,t} - R_{TB,t} = \alpha_{f,t} + \beta_{f,t}^M (R_{M,t} - R_{TB,t}) + \beta_{f,t}^{SMB} (R_{S,t} - R_{B,t}) \\ + \beta_{f,t}^{HML} (R_{H,t} - R_{L,t}) + \beta_{f,t}^{UMD} (R_{U,t} - R_{D,t}) + \epsilon_{f,t}.$$

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Subsequent Fund Performance

| | No Changes | |
|-----------------|-------------------|-------------------|
| | Trustee Funds | Non-Trustee Funds |
| Lowest Decile | -0.33** (0.14) | -0.08 (0.14) |
| Lowest Quintile | -0.20* (0.11) | -0.11 (0.10) |
| All Funds | -0.00 (0.04) | -0.06 (0.05) |

Subsequent Fund Performance

| | No Changes | | Deletions | |
|-----------------|-------------------|-------------------|------------------|-------------------|
| | Trustee Funds | Non-Trustee Funds | Trustee Funds | Non-Trustee Funds |
| Lowest Decile | -0.33** (0.14) | -0.08 (0.14) | -0.28* (0.17) | -0.15 (0.17) |
| Lowest Quintile | -0.20* (0.11) | -0.11 (0.10) | -0.19* (0.11) | -0.13 (0.12) |
| All Funds | -0.00 (0.04) | -0.06 (0.05) | -0.07 (0.05) | -0.09 (0.06) |

Subsequent Fund Performance

| | No Changes | | Deletions | | Additions | |
|-----------------|-------------------|-------------------|------------------|-------------------|-----------------|-------------------|
| | Trustee Funds | Non-Trustee Funds | Trustee Funds | Non-Trustee Funds | Trustee Funds | Non-Trustee Funds |
| Lowest Decile | -0.33** (0.14) | -0.08 (0.14) | -0.28* (0.17) | -0.15 (0.17) | -0.01 (0.28) | 0.12 (0.18) |
| Lowest Quintile | -0.20* (0.11) | -0.11 (0.10) | -0.19* (0.11) | -0.13 (0.12) | -0.11 (0.14) | -0.02 (0.11) |
| All Funds | -0.00 (0.04) | -0.06 (0.05) | -0.07 (0.05) | -0.09 (0.06) | -0.00 (0.05) | -0.06 (0.06) |

Conclusions

Our paper documents favoritism in retirement plans trustee'd by mutual fund families:

- Mutual fund families display leniency toward their own funds following poor fund performance.
- Their decision is not based on an informational advantage as these funds do not subsequently outperform.
- Finally, participants do not counteract the biased decisions of the trustees.