

Defined Contribution Pension Plans: Sticky or Discerning Money?

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June, 2014

Motivation

Over the last decades there have been significant changes in the structure of retirement savings in the United States:

- The relative importance of government-provided social security has declined.
- Firms have switched from Defined Benefit (DB) to Defined Contribution (DC) plans.

DC pension plans (e.g., 401(k) and 403(b)) have become an important source of retirement funding for many households.

Mutual Funds and DC Plans

- Mutual funds are the main investment vehicle in tax-qualified DC plans.
- However, the same mutual funds can also be held directly in traditional taxable accounts.
- These mixed clienteles have different investment horizons, different tax statuses, and different distribution channels.

Our paper analyzes the properties of money flows into mutual funds from DC investors and other investors.

Mutual Fund Choice

- Directly Held Accounts
 - Investors generally have the flexibility to choose among the universe of mutual funds.
- Defined Contribution Plan Accounts
 - Plan sponsors (i.e., employers) offer a limited number of mutual fund investment options and adjust these menus by removing or adding options.
 - Plan participants (i.e., employees) allocate DC balances among the available investment options.

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DC and Non-DC Fund Flows

Conventional wisdom suggests that Defined Contribution (DC) plan assets are sticky and not discerning.

- Many participants in DC pension plans are inert and reluctant to adjust portfolio allocations.

Benartzi and Thaler (2001); Madrian and Shea (2001); Choi, Laibson, Madrian, and Metrick (2002, 2004); Huberman and Jiang (2006)

- Retail mutual fund investors have been shown to chase prior fund performance.

Brown, Harlow, and Starks (1996); Chevalier and Ellison (1997); Sirri and Tufano (1998)

- Sponsors in pension plans may actively monitor investment options.

DelGuercio and Tkac (2002); Goyal and Wahal (2008)

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Main Results

- Is DC money sticky?
 - DC fund flows have a more sensitive flow-performance relation than non-DC flows.
 - Most of the sensitivity of DC money is driven by plan sponsors and not by plan participants.
- Is DC pension plan money discerning?
 - DC fund flows do not have significant predictability for future performance, whereas non-DC flows predict future performance negatively.

Main Results

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Data

- Assets held in DC plans:
 - Annual surveys of *Pensions & Investments* of large mutual fund families between 1997-2010.
- Mutual fund size, characteristics, and performance:
 - CRSP survivor-bias free mutual fund database.
- Plan flows into mutual funds:
 - Hand-collected data from Form 11-K filed with the SEC on the allocation of plan assets from Pool, Sialm, and Stefanescu (2013).

Sample Description

- We focus our sample on domestic equity funds from fund families that participate in the surveys.
- Families in the sample control about 77% of total mutual fund assets.
- Our sample covers 1,078 distinct equity funds and 5,808 fund-year observations over the period between 1997 and 2010.

Fund Flow Definitions

- DC Flows:

$$DCFlow_{f,t} = \frac{DCAssets_{f,t} - DCAssets_{f,t-1}(1 + R_{f,t})}{DCAssets_{f,t-1}(1 + R_{f,t})}$$

- Non-DC Flows:

$$NonDCFlow_{f,t} = \frac{NonDCAssets_{f,t} - NonDCAssets_{f,t-1}(1 + R_{f,t})}{NonDCAssets_{f,t-1}(1 + R_{f,t})}$$

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Flow Performance Sensitivity

We estimate the following model:

$$\begin{aligned}
 Flow_{f,t} = & \beta_1 LowPerf_{f,t-1} + \beta_2 MidPerf_{f,t-1} + \beta_3 HighPerf_{f,t-1} \\
 & + \beta_4 DCSIZE_{f,t-1} + \beta_5 NonDCSize_{f,t-1} + \beta_6 FamSize_{f,t-1} \\
 & + \beta_7 Age_{f,t-1} + \beta_8 Exp_{f,t-1} + \beta_9 Turn_{f,t-1} \\
 & + \beta_{10} Vol_{f,t-1} + \beta_{11} StyleFlow_{f,t} + \beta_t + \epsilon_{f,t}
 \end{aligned}$$

- Performance percentiles $Perf_{f,t}$ are calculated based on raw returns of domestic equity funds in the CRSP database over the prior year.
- To adjust for non-linearities we use a piecewise linear performance specification following Sirri and Tufano (1997):

$$LowPerf_{f,t} = \min(Perf_{p,f,t}, 0.2),$$

$$MidPerf_{f,t} = \min(Perf_{p,f,t} - LowPerf_{f,t}, 0.6),$$

$$HighPerf_{f,t} = Perf_{p,f,t} - LowPerf_{f,t} - MidPerf_{f,t}.$$

- The regressions include time-fixed effects and the standard errors are adjusted for clustering at the fund level.

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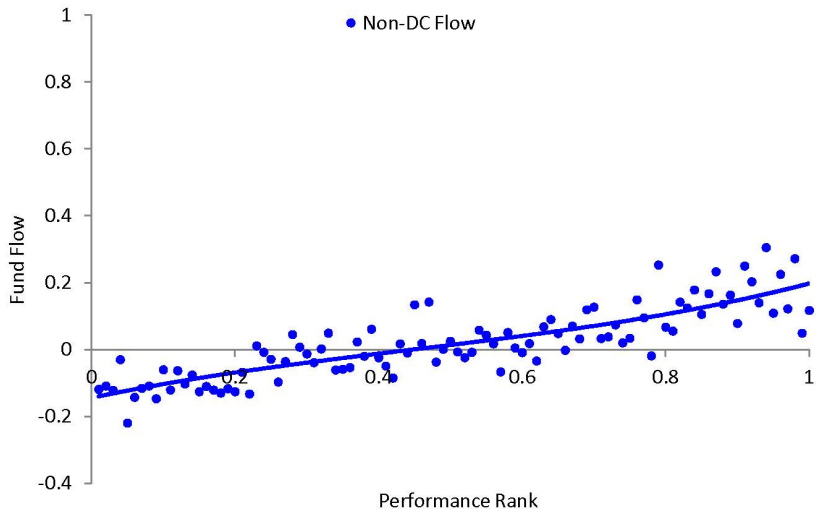
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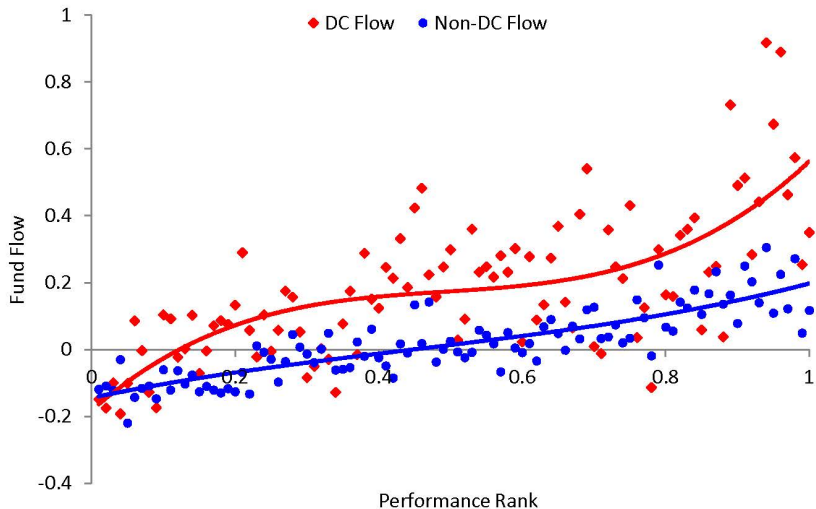
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Flow-Performance Relation



Flow-Performance Relation



Flow-Performance Sensitivity (Raw Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	1.194*** (0.377)	0.328** (0.142)	0.866** (0.374)
Mid Perf	0.236*** (0.086)	0.284*** (0.037)	-0.049 (0.090)
High Perf	1.776*** (0.497)	0.487*** (0.180)	1.289*** (0.476)
Log DC Size	-0.136*** (0.017)	0.007 (0.006)	-0.143*** (0.016)
Log Non-DC Size	0.041** (0.016)	-0.070*** (0.009)	0.111*** (0.018)
Log Family Size	0.039*** (0.014)	0.039*** (0.007)	0.000 (0.013)
Log Age	-0.037 (0.024)	0.003 (0.010)	-0.040* (0.022)
Expense Ratio	-0.471 (0.551)	-0.223 (0.219)	-0.248 (0.511)
Turnover	-0.026 (0.019)	-0.018** (0.008)	-0.007 (0.016)
Volatility	1.026 (0.870)	0.009 (0.317)	1.017 (0.857)
Style Flow	0.359 (0.324)	0.282** (0.132)	0.077 (0.295)
Observations	3,851	3,851	3,851
R-squared	0.098	0.124	0.064

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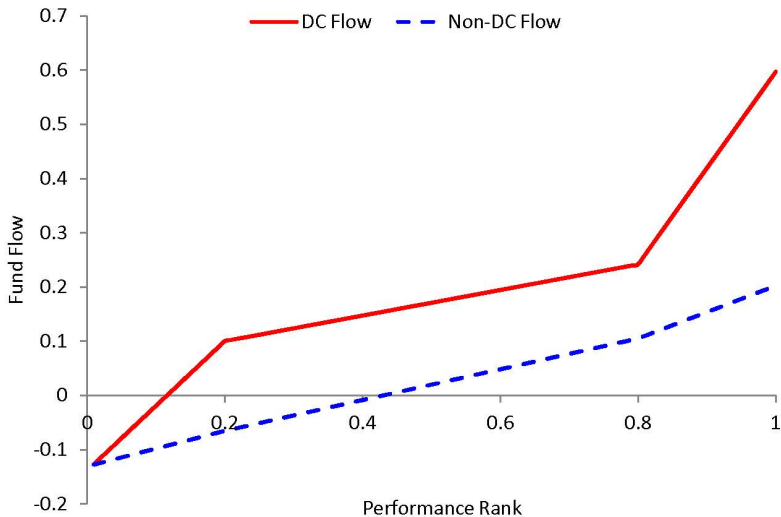
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Flow-Performance Sensitivity



Robustness Tests

The results remain robust using alternative samples or specifications:

- Different Performance Horizons ▶ 5-Year Perf
- Different Performance Measures ▶ Obj-Adj ▶ Style-Adj ▶ Carhart
- Different Performance Functional Forms ▶ Linear ▶ Cubic
- Inclusion of Size and Age Interactions ▶ Size ▶ Age
- Analysis of Flow Volatilities and Correlations ▶ Moments
- Sample Selection: Entry and Exit Decisions ▶ Selection
- Different Subsample Periods ▶ Subsamples

Decomposition into Sponsor and Participant Flows

Are the flow-performance results driven by plan sponsors or participants?

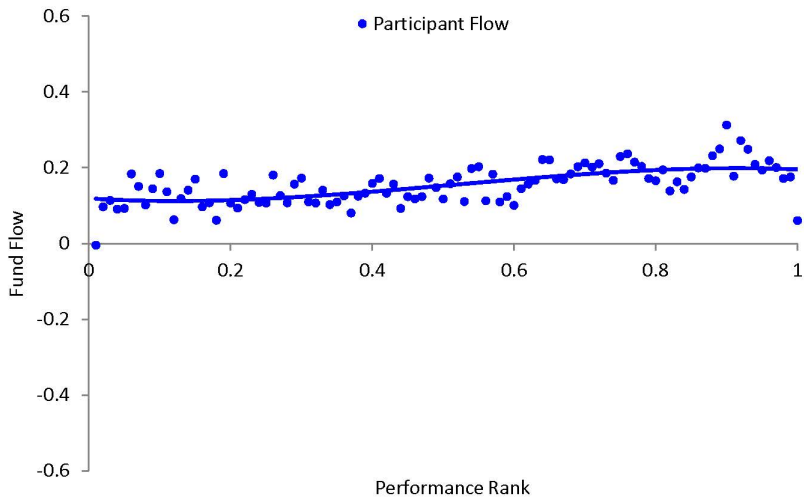
- Sponsors of 401(k) plans that have employer stock as an investment option need to annually file Form 11-K with the SEC (Pool, Sialm, and Stefanescu, 2013).
- We decompose the DC fund flows into:
 - Sponsor Flows:
 - Flows driven by the addition and the deletion decisions taken by the plan sponsors (i.e., employers).
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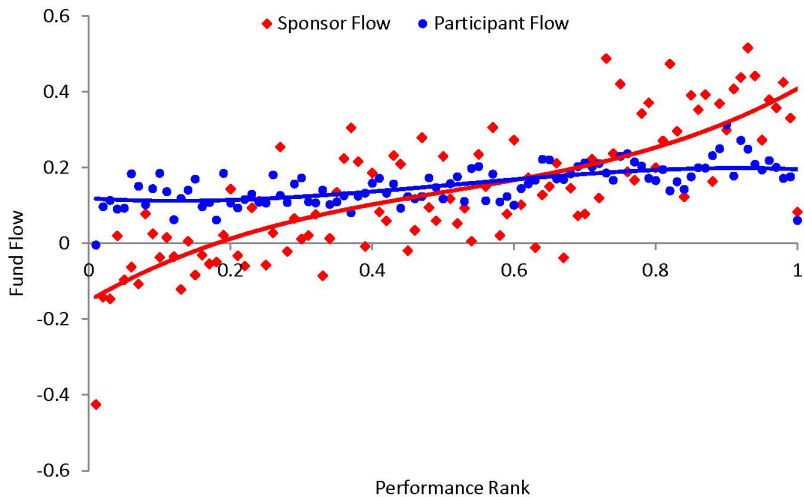
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DC Flow Decomposition



DC Flow Decomposition



Flow-Performance Sensitivity (Pensions & Investments)

	Total Flow
Low Perf	1.046*** (0.399)
Mid Perf	0.465*** (0.091)
High Perf	1.584*** (0.482)
Log Plan Size	-0.089*** (0.010)
Log Fund Size	0.047** (0.021)
Log Family Size	0.006 (0.017)
Log Age	-0.056* (0.033)
Expense Ratio	-1.473*** (0.528)
Turnover	0.032 (0.025)
Volatility	1.061 (1.056)
Style Flow	0.811** (0.341)
Observations	2,815
R-squared	0.120

Flow-Performance Sensitivity (Pensions & Investments)

	Total Flow	Sponsor Flow
Low Perf	1.046*** (0.399)	1.050*** (0.376)
Mid Perf	0.465*** (0.091)	0.310*** (0.083)
High Perf	1.584*** (0.482)	1.389*** (0.427)
Log Plan Size	-0.089*** (0.010)	-0.063*** (0.009)
Log Fund Size	0.047** (0.021)	0.036* (0.019)
Log Family Size	0.006 (0.017)	0.005 (0.015)
Log Age	-0.056* (0.033)	-0.040 (0.029)
Expense Ratio	-1.473*** (0.528)	-1.136** (0.478)
Turnover	0.032 (0.025)	0.038 (0.025)
Volatility	1.061 (1.056)	0.277 (0.919)
Style Flow	0.811** (0.341)	0.461 (0.303)
Observations	2,815	2,815
R-squared	0.120	0.081

Flow-Performance Sensitivity (Pensions & Investments)

	Total Flow	Sponsor Flow	Participant Flow
Low Perf	1.046*** (0.399)	1.050*** (0.376)	-0.004 (0.111)
Mid Perf	0.465*** (0.091)	0.310*** (0.083)	0.156*** (0.024)
High Perf	1.584*** (0.482)	1.389*** (0.427)	0.194 (0.136)
Log Plan Size	-0.089*** (0.010)	-0.063*** (0.009)	-0.026*** (0.003)
Log Fund Size	0.047** (0.021)	0.036* (0.019)	0.011* (0.006)
Log Family Size	0.006 (0.017)	0.005 (0.015)	0.002 (0.005)
Log Age	-0.056* (0.033)	-0.040 (0.029)	-0.016* (0.009)
Expense Ratio	-1.473*** (0.528)	-1.136** (0.478)	-0.336** (0.165)
Turnover	0.032 (0.025)	0.038 (0.025)	-0.006 (0.007)
Volatility	1.061 (1.056)	0.277 (0.919)	0.783** (0.354)
Style Flow	0.811** (0.341)	0.461 (0.303)	0.350*** (0.087)
Observations	2,815	2,815	2,815
R-squared	0.120	0.081	0.115

Performance Predictability

Do fund flows predict fund performance?

- Berk and Green (2004) derive in a rational model that flows should not predict future abnormal performance.
- The empirical evidence suggests that flows are smart in the short term (Gruber (1996) and Zheng (1999)) but dumb at longer horizons (Frazzini and Lamont (2008)).

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Performance Predictability

To investigate whether DC and Non-DC flows have differential predictability of fund returns, we run the following regression:

$$\begin{aligned}
 Perf_{f,t} &= \beta_1 DCFlow_{f,t-1} + \beta_2 NonDCFlow_{f,t-1} + \beta_3 Perf_{f,t-1} \\
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 &+ \beta_8 Turn_{f,t-1} + \beta_9 DCRatio_{f,t-1} + \beta_t + \epsilon_{f,t}
 \end{aligned}$$

- We use various performance measures (raw returns, objective-code adjusted performance, style-adjusted performance, CAPM alpha, Fama-French alpha, Carhart alpha).
- The regressions include time-fixed effects and the standard errors are adjusted for clustering at the fund level.

Performance Predictability

	Performance Measures					
	Raw Return	Obj-Adj Ret	Style-Adj Ret	CAPM Alpha	FF Alpha	Carhart Alpha
DC Flow	-0.262 (0.163)	-0.260 (0.160)	-0.091 (0.133)	-0.176 (0.144)	0.114 (0.128)	-0.011 (0.121)
Non-DC Flow	-1.567*** (0.455)	-1.102** (0.436)	-0.815** (0.351)	-1.261*** (0.405)	-0.657** (0.286)	-0.948*** (0.276)
Past Year Return	0.089*** (0.021)	0.089*** (0.022)	0.021 (0.023)	0.132*** (0.019)	0.189*** (0.019)	0.162*** (0.018)
Log Size	-1.006*** (0.183)	-0.877*** (0.179)	-0.550*** (0.145)	-0.967*** (0.169)	-0.257** (0.118)	-0.352*** (0.115)
Log Family Size	0.642*** (0.168)	0.553*** (0.162)	0.414*** (0.134)	0.598*** (0.153)	0.257** (0.106)	0.280*** (0.103)
Log Age	-0.143 (0.295)	-0.038 (0.292)	0.109 (0.228)	-0.094 (0.261)	0.193 (0.196)	0.114 (0.184)
Expense Ratio	0.089 (0.408)	-0.213 (0.405)	-0.969*** (0.327)	-0.352 (0.388)	-0.788*** (0.253)	-0.613** (0.247)
Turnover	-0.444* (0.231)	-0.604*** (0.231)	-0.615*** (0.205)	-0.379* (0.205)	-0.568*** (0.162)	-0.531*** (0.145)
DC Ratio	0.848 (0.818)	0.427 (0.786)	0.118 (0.633)	0.014 (0.777)	-0.275 (0.516)	-0.097 (0.517)
Observations	4,116	4,075	3,999	4,009	4,009	4,009
R-squared	0.025	0.021	0.010	0.039	0.080	0.068

Performance Predictability

	Performance Measures					
	Raw Return	Obj-Adj Ret	Style-Adj Ret	CAPM Alpha	FF Alpha	Carhart Alpha
DC Flow	-0.262 (0.163)	-0.260 (0.160)	-0.091 (0.133)	-0.176 (0.144)	0.114 (0.128)	-0.011 (0.121)
Non-DC Flow	-1.567*** (0.455)	-1.102** (0.436)	-0.815** (0.351)	-1.261*** (0.405)	-0.657** (0.286)	-0.948*** (0.276)
Past Year Return	0.089*** (0.021)	0.089*** (0.022)	0.021 (0.023)	0.132*** (0.019)	0.189*** (0.019)	0.162*** (0.018)
Log Size	-1.006*** (0.183)	-0.877*** (0.179)	-0.550*** (0.145)	-0.967*** (0.169)	-0.257** (0.118)	-0.352*** (0.115)
Log Family Size	0.642*** (0.168)	0.553*** (0.162)	0.414*** (0.134)	0.598*** (0.153)	0.257** (0.106)	0.280*** (0.103)
Log Age	-0.143 (0.295)	-0.038 (0.292)	0.109 (0.228)	-0.094 (0.261)	0.193 (0.196)	0.114 (0.184)
Expense Ratio	0.089 (0.408)	-0.213 (0.405)	-0.969*** (0.327)	-0.352 (0.388)	-0.788*** (0.253)	-0.613** (0.247)
Turnover	-0.444* (0.231)	-0.604*** (0.231)	-0.615*** (0.205)	-0.379* (0.205)	-0.568*** (0.162)	-0.531*** (0.145)
DC Ratio	0.848 (0.818)	0.427 (0.786)	0.118 (0.633)	0.014 (0.777)	-0.275 (0.516)	-0.097 (0.517)
Observations	4,116	4,075	3,999	4,009	4,009	4,009
R-squared	0.025	0.021	0.010	0.039	0.080	0.068

Performance Predictability

	Performance Measures					
	Raw Return	Obj-Adj Ret	Style-Adj Ret	CAPM Alpha	FF Alpha	Carhart Alpha
DC Flow	-0.262 (0.163)	-0.260 (0.160)	-0.091 (0.133)	-0.176 (0.144)	0.114 (0.128)	-0.011 (0.121)
Non-DC Flow	-1.567*** (0.455)	-1.102** (0.436)	-0.815** (0.351)	-1.261*** (0.405)	-0.657** (0.286)	-0.948*** (0.276)
Past Year Return	0.089*** (0.021)	0.089*** (0.022)	0.021 (0.023)	0.132*** (0.019)	0.189*** (0.019)	0.162*** (0.018)
Log Size	-1.006*** (0.183)	-0.877*** (0.179)	-0.550*** (0.145)	-0.967*** (0.169)	-0.257** (0.118)	-0.352*** (0.115)
Log Family Size	0.642*** (0.168)	0.553*** (0.162)	0.414*** (0.134)	0.598*** (0.153)	0.257** (0.106)	0.280*** (0.103)
Log Age	-0.143 (0.295)	-0.038 (0.292)	0.109 (0.228)	-0.094 (0.261)	0.193 (0.196)	0.114 (0.184)
Expense Ratio	0.089 (0.408)	-0.213 (0.405)	-0.969*** (0.327)	-0.352 (0.388)	-0.788*** (0.253)	-0.613** (0.247)
Turnover	-0.444* (0.231)	-0.604*** (0.231)	-0.615*** (0.205)	-0.379* (0.205)	-0.568*** (0.162)	-0.531*** (0.145)
DC Ratio	0.848 (0.818)	0.427 (0.786)	0.118 (0.633)	0.014 (0.777)	-0.275 (0.516)	-0.097 (0.517)
Observations	4,116	4,075	3,999	4,009	4,009	4,009
R-squared	0.025	0.021	0.010	0.039	0.080	0.068

Conclusions

Our paper documents important differences across DC and non-DC flows:

- Is DC money sticky?
 - DC fund flows have a more sensitive flow-performance relation than non-DC flows.
 - Most of the sensitivity of DC money is driven by plan sponsors and not by plan participants.
- Is DC pension plan money discerning?
 - DC fund flows do not have significant predictability for future performance, whereas non-DC flows predict future performance negatively.

Conclusions

Our paper documents important differences across DC and non-DC flows:

- Is DC money sticky?
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 - Most of the sensitivity of DC money is driven by plan sponsors and not by plan participants.
- Is DC pension plan money discerning?
 - DC fund flows do not have significant predictability for future performance, whereas non-DC flows predict future performance negatively.

Flow-Performance Relation (Raw Perf; 5-Years)

	DC Flow	Non-DC Flow	Difference
Low Perf	0.845** (0.334)	0.096 (0.166)	0.749** (0.330)
Mid Perf	0.421*** (0.082)	0.281*** (0.036)	0.140* (0.083)
High Perf	0.619* (0.329)	0.102 (0.154)	0.517 (0.334)
Log DC Size	-0.125*** (0.018)	0.006 (0.006)	-0.132*** (0.016)
Log Non-DC Size	0.020 (0.014)	-0.069*** (0.010)	0.089*** (0.016)
Log Family Size	0.042*** (0.014)	0.032*** (0.007)	0.010 (0.013)
Log Age	-0.005 (0.024)	0.020* (0.011)	-0.025 (0.024)
Expense Ratio	-0.152 (0.509)	-0.380* (0.227)	0.229 (0.481)
Turnover	-0.042** (0.018)	-0.019* (0.011)	-0.023 (0.018)
Volatility	0.499 (0.963)	-0.567 (0.477)	1.066 (0.951)
Style Flow	0.051 (0.319)	0.248* (0.138)	-0.197 (0.300)
Observations	3,249	3,249	3,249
R-squared	0.081	0.089	0.054

Flow-Performance Relation (Obj-Adj Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	1.040*** (0.389)	0.379** (0.150)	0.661* (0.394)
Mid Perf	0.237*** (0.090)	0.273*** (0.036)	-0.036 (0.095)
High Perf	1.736*** (0.473)	0.504*** (0.181)	1.232*** (0.455)
Log DC Size	-0.136*** (0.017)	0.006 (0.006)	-0.142*** (0.016)
Log Non-DC Size	0.041** (0.017)	-0.070*** (0.009)	0.111*** (0.018)
Log Family Size	0.039*** (0.014)	0.039*** (0.007)	0.000 (0.013)
Log Age	-0.037 (0.024)	0.004 (0.010)	-0.041* (0.023)
Expense Ratio	-0.401 (0.547)	-0.191 (0.218)	-0.210 (0.506)
Turnover	-0.024 (0.019)	-0.018** (0.008)	-0.006 (0.016)
Volatility	-0.099 (1.304)	-0.506 (0.468)	0.408 (1.284)
Style Flow	0.499 (0.322)	0.389*** (0.132)	0.111 (0.293)
Observations	3,851	3,851	3,851
R-squared	0.097	0.125	0.063

Flow-Performance Relation (Style-Adj Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	1.219*** (0.420)	0.088 (0.161)	1.130** (0.448)
Mid Perf	0.189* (0.097)	0.275*** (0.035)	-0.086 (0.100)
High Perf	1.390*** (0.470)	0.415** (0.180)	0.975** (0.475)
Log DC Size	-0.144*** (0.018)	0.004 (0.006)	-0.148*** (0.017)
Log Non-DC Size	0.037** (0.018)	-0.074*** (0.009)	0.111*** (0.019)
Log Family Size	0.045*** (0.015)	0.044*** (0.007)	0.002 (0.013)
Log Age	-0.047* (0.024)	-0.006 (0.010)	-0.041* (0.022)
Expense Ratio	-0.416 (0.556)	-0.171 (0.221)	-0.245 (0.513)
Turnover	-0.030 (0.019)	-0.022*** (0.008)	-0.008 (0.017)
Volatility	0.096 (1.914)	-0.857* (0.506)	0.953 (1.881)
Style Flow	0.788*** (0.229)	0.661*** (0.089)	0.127 (0.214)
Observations	3,780	3,780	3,780
R-squared	0.098	0.128	0.064

Flow-Performance Relation (Carhart-Adj Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	0.927** (0.406)	0.073 (0.168)	0.854** (0.426)
Mid Perf	0.138 (0.100)	0.281*** (0.037)	-0.143 (0.106)
High Perf	1.625*** (0.504)	0.290 (0.188)	1.336*** (0.474)
Log DC Size	-0.130*** (0.018)	0.011* (0.006)	-0.142*** (0.017)
Log Non-DC Size	0.030* (0.017)	-0.073*** (0.009)	0.103*** (0.019)
Log Family Size	0.040*** (0.015)	0.037*** (0.007)	0.003 (0.014)
Log Age	-0.036 (0.027)	-0.001 (0.010)	-0.035 (0.026)
Expense Ratio	-0.108 (0.579)	0.076 (0.226)	-0.185 (0.536)
Turnover	-0.029 (0.020)	-0.016* (0.008)	-0.014 (0.018)
Volatility	-0.017* (0.008)	-0.016*** (0.003)	-0.001 (0.008)
Style Flow	0.439 (0.331)	0.332** (0.131)	0.107 (0.301)
Observations	3,408	3,408	3,408
R-squared	0.089	0.110	0.063

Linear Flow-Performance Relation (Raw Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Perf	0.494*** (0.059)	0.311*** (0.023)	0.183*** (0.058)
Log DC Size	-0.137*** (0.017)	0.007 (0.006)	-0.144*** (0.016)
Log Non-DC Size	0.041** (0.017)	-0.070*** (0.009)	0.111*** (0.018)
Log Family Size	0.040*** (0.014)	0.039*** (0.007)	0.001 (0.013)
Log Age	-0.041* (0.024)	0.002 (0.010)	-0.043* (0.022)
Expense Ratio	-0.387 (0.543)	-0.202 (0.216)	-0.185 (0.499)
Turnover	-0.026 (0.019)	-0.018** (0.008)	-0.008 (0.016)
Volatility	1.067 (0.815)	0.052 (0.314)	1.015 (0.813)
Style Flow	0.362 (0.326)	0.283** (0.132)	0.079 (0.297)
Constant	0.346*** (0.130)	0.098* (0.058)	0.248** (0.122)
Observations	3,851	3,851	3,851
R-squared	0.095	0.124	0.061

Cubic Flow-Performance Relation (Raw Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
$(Perf - 0.5)$	0.131 (0.126)	0.260*** (0.053)	-0.129 (0.129)
$(Perf - 0.5)^2$	0.064 (0.243)	0.057 (0.084)	0.007 (0.235)
$(Perf - 0.5)^3$	2.454*** (0.855)	0.335 (0.331)	2.118** (0.849)
Log DC Size	-0.136*** (0.017)	0.007 (0.006)	-0.143*** (0.016)
Log Non-DC Size	0.041** (0.016)	-0.070*** (0.009)	0.111*** (0.018)
Log Family Size	0.040*** (0.014)	0.039*** (0.007)	0.001 (0.013)
Log Age	-0.038 (0.024)	0.003 (0.010)	-0.041* (0.022)
Expense Ratio	-0.411 (0.556)	-0.222 (0.220)	-0.189 (0.515)
Turnover	-0.026 (0.019)	-0.018** (0.008)	-0.008 (0.016)
Volatility	1.174 (0.871)	0.023 (0.317)	1.151 (0.863)
Style Flow	0.362 (0.324)	0.282** (0.132)	0.080 (0.295)
Observations	3,851	3,851	3,851
R-squared	0.097	0.124	0.063

Flow-Performance Relation (Raw Perf; 1-Year)

	1996-2002			2003-2009		
	DC Flow	Non-DC Flow	Difference	DC Flow	Non-DC Flow	Difference
Low Perf	0.660 (0.630)	0.318 (0.223)	0.343 (0.649)	1.546*** (0.473)	0.410** (0.196)	1.136** (0.462)
Mid Perf	0.416*** (0.141)	0.333*** (0.051)	0.083 (0.148)	0.120 (0.111)	0.259*** (0.053)	-0.140 (0.113)
High Perf	2.484*** (0.733)	1.234*** (0.297)	1.250* (0.717)	1.296** (0.650)	-0.031 (0.208)	1.327** (0.625)
Log DC Size	-0.163*** (0.028)	0.008 (0.008)	-0.171*** (0.028)	-0.114*** (0.017)	0.010 (0.008)	-0.123*** (0.016)
Log Non-DC Size	0.046 (0.029)	-0.077*** (0.013)	0.122*** (0.032)	0.036** (0.015)	-0.066*** (0.011)	0.103*** (0.017)
Log Family Size	0.039* (0.023)	0.049*** (0.010)	-0.010 (0.022)	0.034** (0.015)	0.028*** (0.008)	0.006 (0.014)
Log Age	0.015 (0.034)	-0.001 (0.013)	0.016 (0.034)	-0.078** (0.032)	0.012 (0.015)	-0.090*** (0.031)
Expense Ratio	0.362 (0.815)	0.125 (0.331)	0.238 (0.772)	-0.435 (0.673)	-0.208 (0.284)	-0.227 (0.619)
Turnover	0.000 (0.027)	-0.016* (0.009)	0.017 (0.024)	-0.065*** (0.023)	-0.023* (0.013)	-0.042* (0.025)
Volatility	1.423 (1.104)	0.540 (0.354)	0.883 (1.110)	-1.865 (1.803)	-1.845** (0.726)	-0.020 (1.756)
Style Flow	-0.118 (0.596)	0.061 (0.186)	-0.179 (0.612)	0.400 (0.375)	0.417** (0.171)	-0.017 (0.345)
Observations	1,759	1,759	1,759	2,092	2,092	2,092
R-squared	0.128	0.203	0.079	0.087	0.092	0.058

Flow-Performance Relation with Size Interactions (Raw Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	0.970*** (0.370)	0.252* (0.151)	0.718* (0.372)
Mid Perf	0.258*** (0.089)	0.294*** (0.038)	-0.036 (0.092)
High Perf	1.492*** (0.418)	0.365** (0.159)	1.128*** (0.414)
Low Perf x Log DC Size	-0.317 (0.218)	-0.154* (0.091)	-0.163 (0.223)
Mid Perf x Log DC Size	-0.065 (0.083)	-0.002 (0.034)	-0.063 (0.081)
High Perf x Log DC Size	-0.271 (0.389)	0.071 (0.138)	-0.342 (0.379)
Low Perf x Log Non-DC Size	0.162 (0.307)	0.251 (0.165)	-0.089 (0.313)
Mid Perf x Log Non-DC Size	0.033 (0.074)	-0.034 (0.047)	0.067 (0.085)
High Perf x Log Non-DC Size	0.149 (0.451)	-0.311 (0.221)	0.460 (0.481)
(...)			
Observations	3,851	3,851	3,851
R-squared	0.103	0.130	0.067

Flow-Performance Relation with Age Interactions (Raw Perf; 1-Year)

	DC Flow	Non-DC Flow	Difference
Low Perf	1.147*** (0.381)	0.287** (0.141)	0.860** (0.379)
Mid Perf	0.252*** (0.092)	0.302*** (0.039)	-0.050 (0.095)
High Perf	1.639*** (0.489)	0.373** (0.171)	1.266*** (0.476)
Low Perf x Log Age	-0.023 (0.445)	-0.034 (0.146)	0.011 (0.458)
Mid Perf x Log Age	-0.055 (0.135)	-0.078* (0.046)	0.023 (0.141)
High Perf x Log Age	-0.702 (0.686)	-0.446 (0.279)	-0.256 (0.641)
(...)			
Observations	3,851	3,851	3,851
R-squared	0.100	0.129	0.064

▶ Back

Fund Flow Variability and Autocorrelation

	Standard Deviation of Flows		Autocorrelation of Flows	
Constant	0.332*** (0.012)	0.549*** (0.023)	0.093*** (0.023)	0.080*** (0.029)
DC Indicator	0.522*** (0.033)	0.212*** (0.031)	-0.138*** (0.026)	-0.127*** (0.034)
Log Size		-0.163*** (0.014)		0.005 (0.011)
Log Family Size		0.035*** (0.012)		0.027* (0.014)
Log Age		0.033 (0.026)		-0.026 (0.022)
Expense Ratio		1.071** (0.460)		-0.471 (0.501)
Turnover		-0.006 (0.014)		0.029*** (0.011)
Observations	1,032	987	1,032	987
R-Squared	0.162	0.390	0.018	0.030

▶ Back

Multinomial Logit for Sample Entry and Exit Decisions

	Exit	Entry
Perf	-0.958*** (0.221)	0.485** (0.203)
Log Size	-0.644*** (0.060)	-0.653*** (0.063)
Log Family Size	0.594*** (0.058)	0.549*** (0.057)
Log Age	0.071 (0.107)	-0.202** (0.099)
Expenses	3.193* (1.828)	0.953 (1.607)
Turnover	0.065 (0.058)	-0.020 (0.055)
Volatility	2.368 (2.734)	1.184 (2.906)
Style Flow	-3.161** (1.289)	-1.050 (1.169)
Observations	5,006	

▶ Back

Flow-Performance Sensitivity (11-K Sample)

	Total Flow	Sponsor Flow	Participant Flow
Low Perf	0.773*** (0.299)	0.786*** (0.274)	-0.013 (0.100)
Mid Perf	0.516*** (0.068)	0.380*** (0.062)	0.135*** (0.021)
High Perf	0.744** (0.324)	0.718** (0.291)	0.026 (0.101)
Log Plan Size	-0.092*** (0.006)	-0.065*** (0.005)	-0.027*** (0.002)
Log Fund Size	0.048*** (0.012)	0.048*** (0.011)	-0.001 (0.004)
Log Family Size	0.016** (0.007)	0.010* (0.006)	0.006** (0.003)
Log Age	-0.076*** (0.023)	-0.053*** (0.021)	-0.023*** (0.007)
Expense Ratio	-0.741* (0.420)	-0.531 (0.353)	-0.210 (0.142)
Turnover	-0.030* (0.018)	-0.011 (0.018)	-0.020*** (0.005)
Volatility	0.536 (0.746)	-0.037 (0.647)	0.573** (0.254)
Style Flow	0.873*** (0.280)	0.685*** (0.254)	0.188** (0.082)
Observations	8,268	8,268	8,268
R-squared	0.083	0.054	0.079