Remeasuring Scale in Active Management

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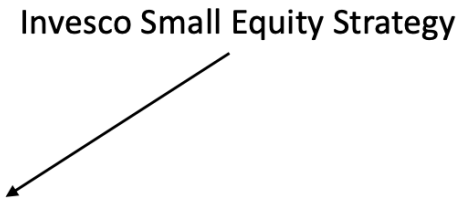
- This paper: **scale has been mismeasured.**
  - At least 65% more total assets should be included in the scale metric.

Example: Invesco small-cap strategy



Mutual fund

Invesco Small Cap Equity A

Invesco Small Cap Equity B

Invesco Small Cap Equity C

Invesco Small Cap Equity R

Invesco Small Cap Equity R5

Invesco Small Cap Equity R6

Invesco Small Cap Equity Y

AUM: 1,515 million

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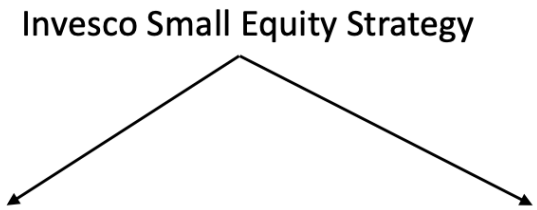

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Invesco Small Cap Equity Y

AUM: 1,515 million

Institutional vehicle

Invesco Small Cap Equity Composite

Separate Account

AUM: 2,403 million

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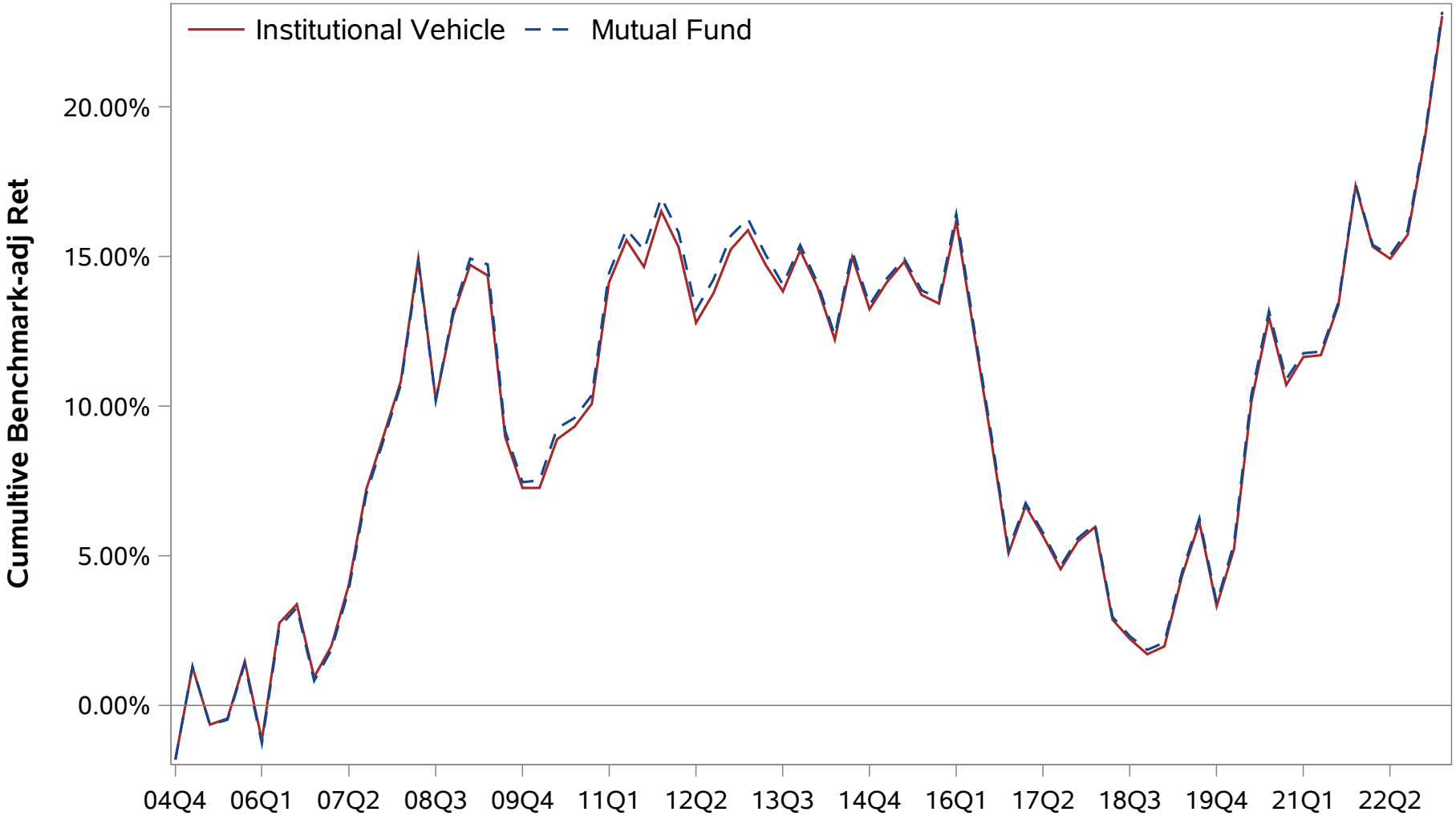
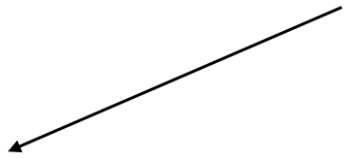


Gross return correlation: 1

Example: T.Rowe Price large-cap growth strategy

T. Rowe Price US Large-Cap Growth Strategy



Mutual fund

T. Rowe Price Large-Cap Growth Fund I Class

T. Rowe Price Large-Cap Growth Fund Investor Class

AUM: 12,709 million

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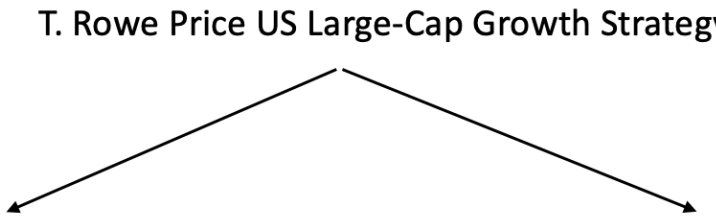

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Institutional vehicles (IVs)

T. Rowe Price Large-Cap Growth Composite

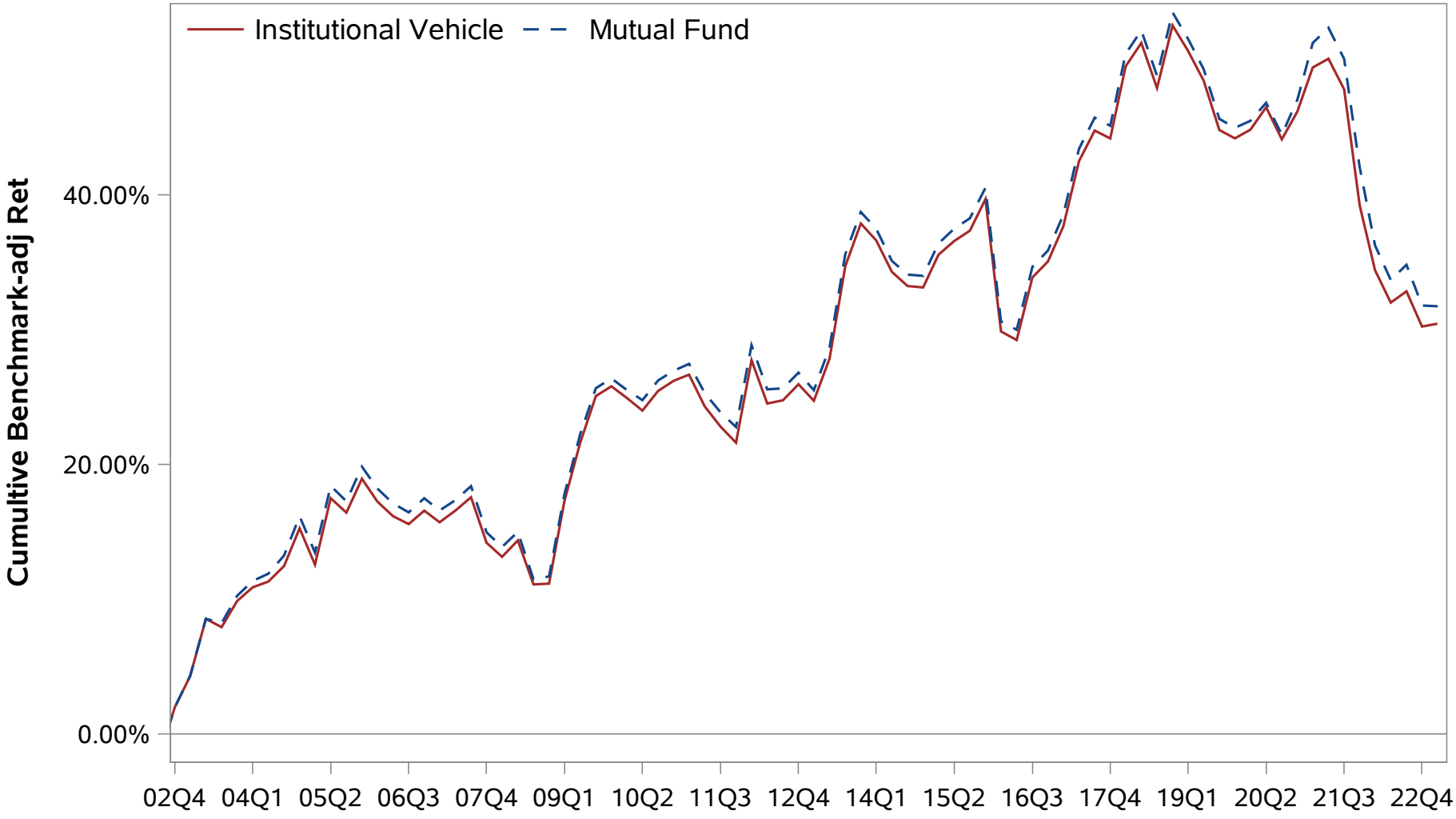
Separate Account

T. Rowe Price Large-Cap Growth Trust

Commingled Fund

AUM: 19,370 million

Example: T.Rowe Price large-cap growth strategy



Gross return correlation: 0.999

Investment strategies are delivered using various vehicles

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LSV U.S. Large Cap Value

Investment Approach

- Quantitative
- Deep Value Orientation
- Well Diversified / Risk Controlled

The LSV U.S. Large Cap Value Strategy applies the LSV quantitative model to a universe of stocks to create and maintain a broadly diversified portfolio of primarily large and mid cap U.S. listed equities. The portfolio will typically have deep value orientation relative to the portfolio benchmark, including low price to earnings, low price to cash flow, and high dividend yield relative to the portfolio benchmark.

Strategy Information (as of 12/31/2024)

Asset Class: U.S. Equity

Strategy Inception: December 1993

Assets in Strategy: $22.0 billion

Minimum Holdings: 75

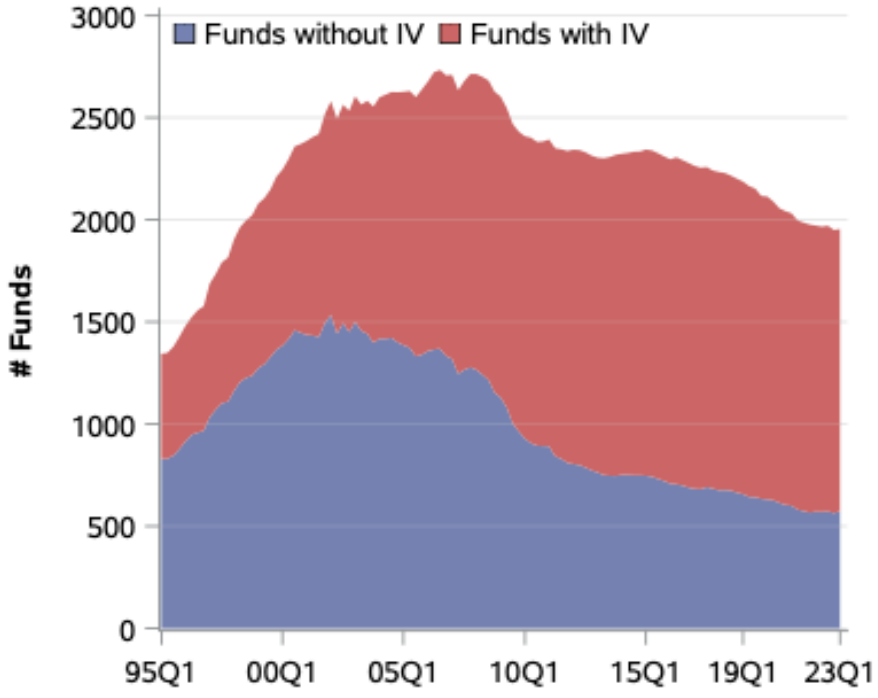
Market Cap Range: $500 million and greater

Products:

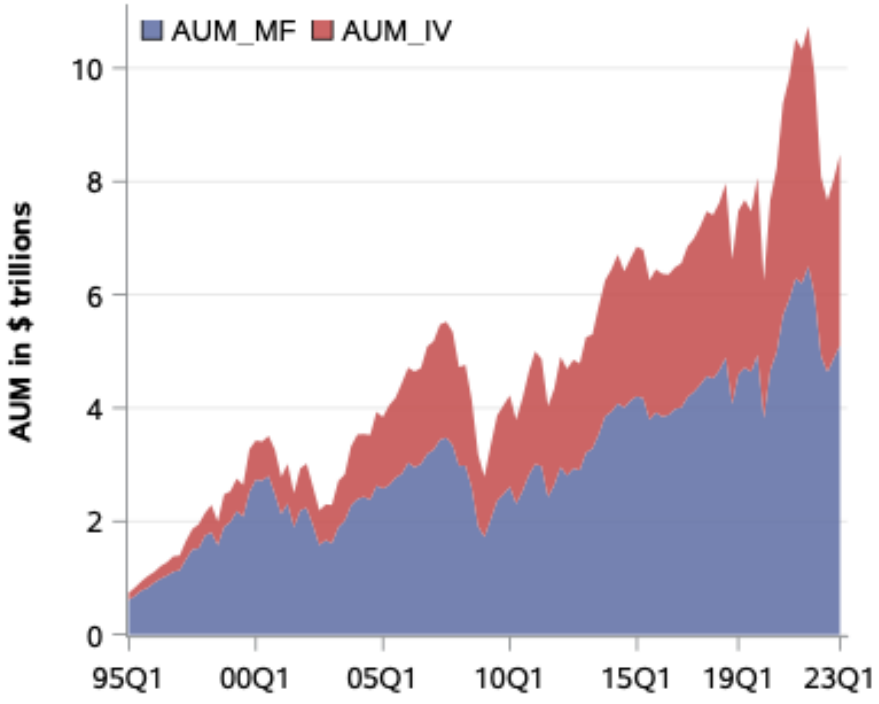
- Separate Account (open)
- Mutual Fund (open)
- Collective Investment Trust (open)
- UCITS (open)

Source: website of LSV Asset Management.

The "missing" assets are huge



(a) # Funds



(b) AUM

We require the IVs to have at least 99% return correlation with their twin MFs

Two targeted case studies

- Diminishing returns to scale (Pastor-Stambaugh-Taylor, 2015)
  - Fund-level DRS is overestimated by as much as 90%.
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- Dollar value added (Berk-van Binsbergen, 2015)
  - Active portfolio managers add more value than previously estimated.
  - Dollar value added is more persistent.
  - $\Rightarrow$ Portfolio managers have skill to extract value from the markets.

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- Flows need to be re-measured for many studies:
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  - Aggregate flows between active and passive spaces were significantly underestimated.

Outline

Data

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- For now, we focus on domestic active equity strategies & sample period is from Q1 1995 to Q1 2023.

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- **Our focus: mutual fund (MF)–institutional vehicle (IV) twins.**

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Identify MF-IV twins

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- eVestment reports, for each strategy, different forms of investment vehicles, including mutual funds, separate accounts, etc.

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- To be conservative, **we require the IVs to have at least 99% return correlation with their twin mutual funds.**
  - Our sample average return correlation: 99.9%

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- We make sure that the "twins" have highly identical returns.

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	Mean	SD	P1	P10	P25	P50
MF& Twin IV	0.999	0.002	0.991	0.996	0.999	1.000

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Within Category	0.890	0.126	0.429	0.786	0.869	0.922
Within Family-Category	0.938	0.069	0.667	0.861	0.924	0.958

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- Average difference between MF & IV in quarterly returns: 1.7 bps.
- MF–IV twins are indeed **"identical."**

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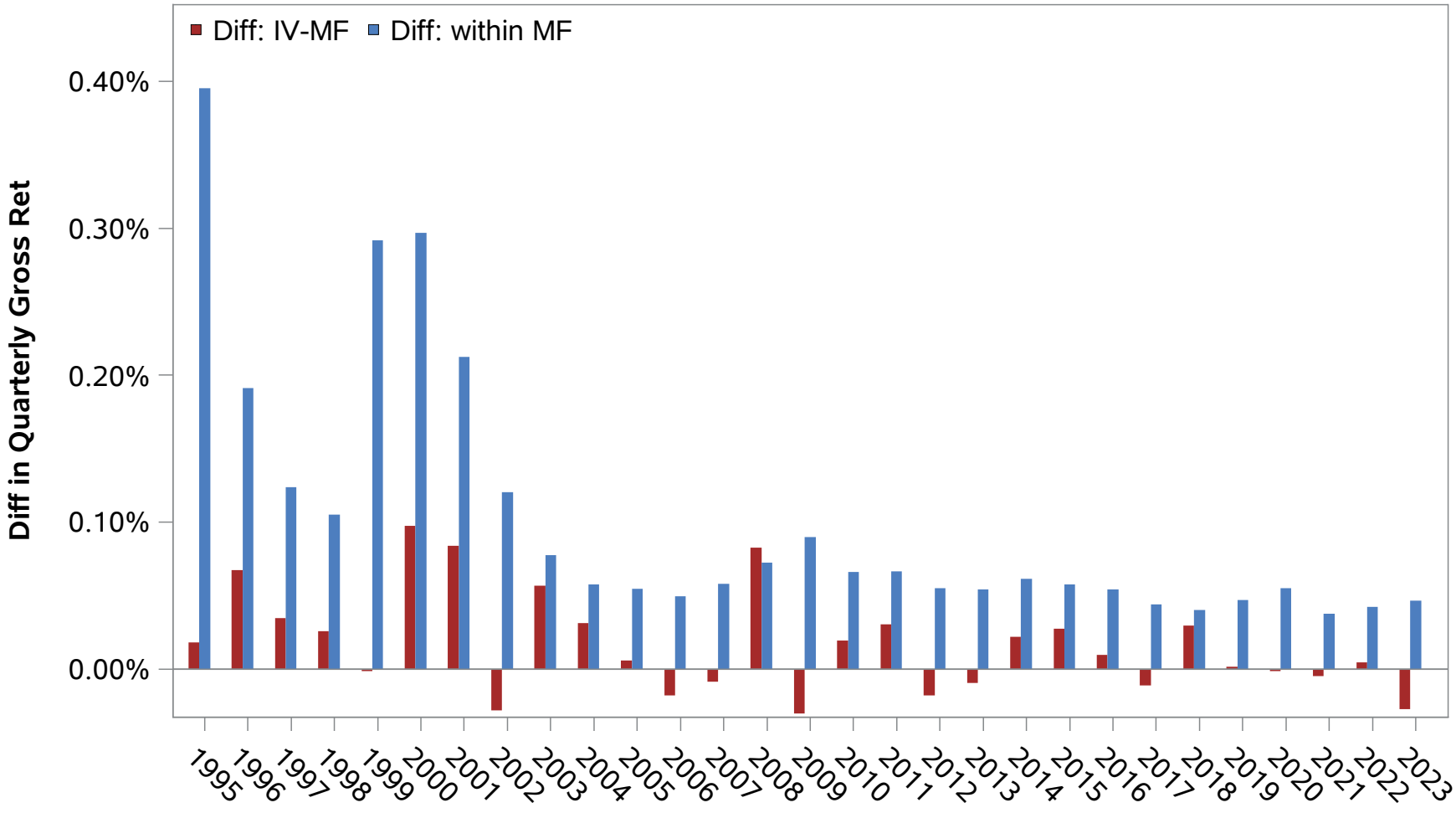

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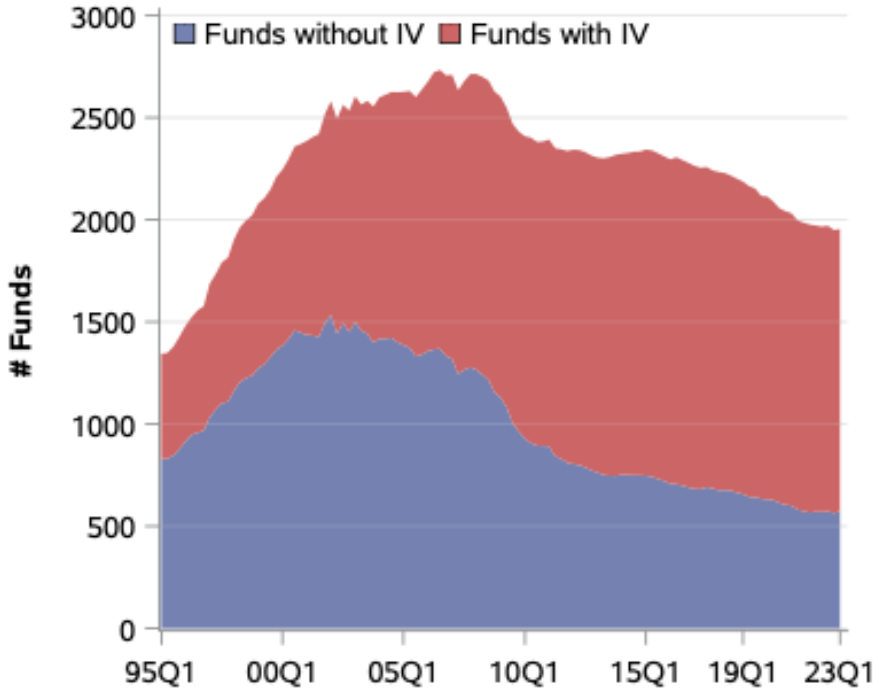

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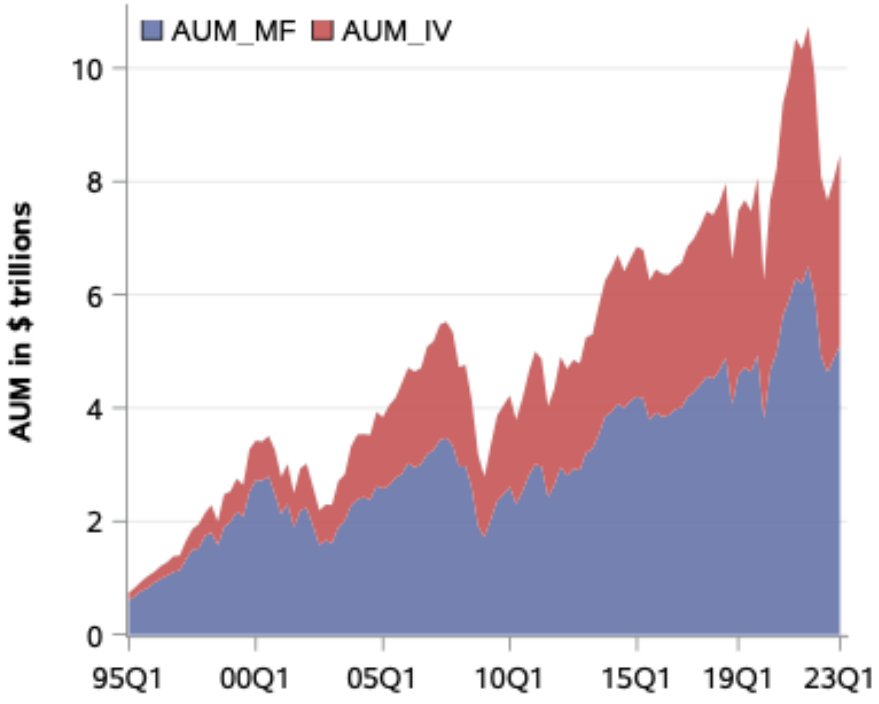

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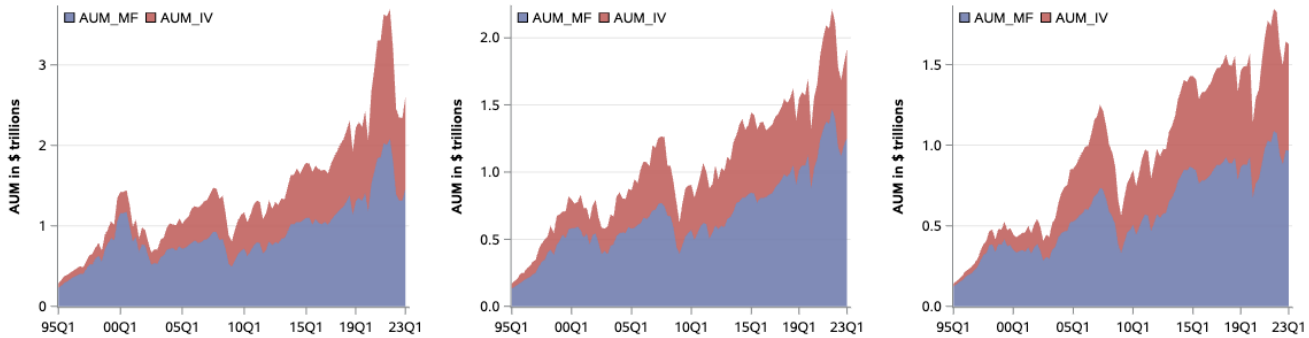
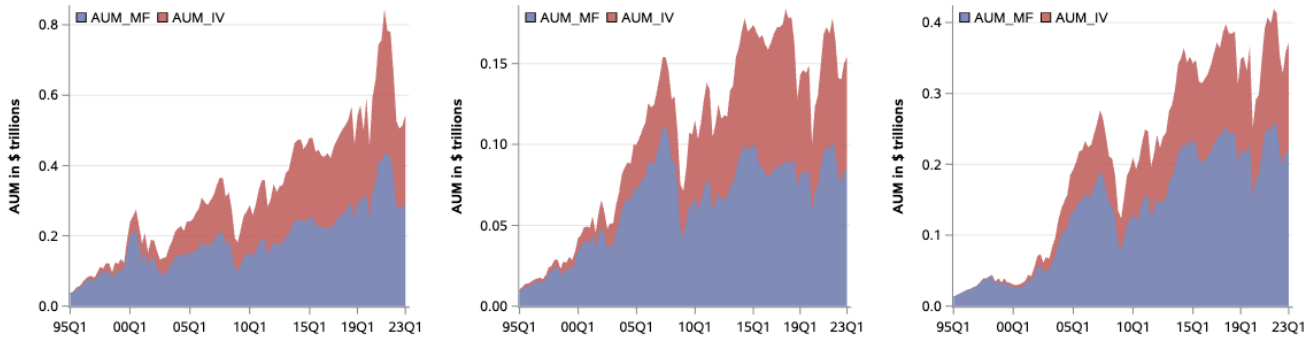
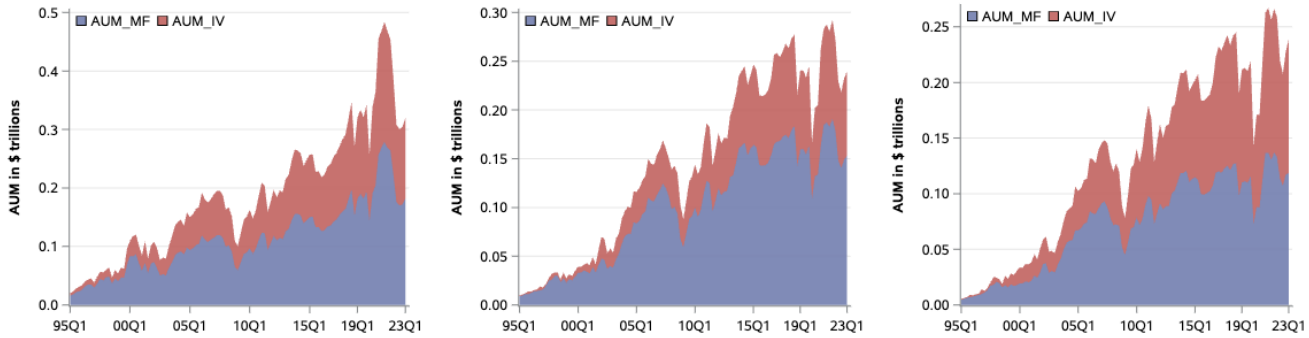
IV assets across categories



(a) Large-Growth (b) Large-Blend (c) Large-Value



(d) Mid-Growth (e) Mid-Blend (f) Mid-Value



(g) Small-Growth (h) Small-Blend (i) Small-Value

Assets of MF and twin IV are highly correlated

DepVar:	(1)	(2)	(3)	(4)
		AUM_IV		
AUM_MF	0.6727***	0.6642***	0.6714***	0.6649***
	(4.39)	(4.66)	(4.36)	(4.62)
Fund FE	N	Y	N	Y
Time FE	N	N	Y	Y
No. Obs.	87,841	87,832	87,841	87,832
Adj. R^2	0.551	0.859	0.552	0.859

- MF assets alone can explain 55% variation in twin IV assets.

Omitting twin IVs can bias important metrics

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- So far, twin IVs:
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  - share the same investments as MFs
  - highly correlated with MF assets
- Two case studies to show the bias due to omitted IVs:
  - Diminishing return to scale
  - Dollar value added

Outline

Case study 1: revisit diminishing returns to scale

- The scale-performance regression in the old days:

$$r_{i,t} = \alpha + \beta FundSize_{i,t-1} + \epsilon_{i,t}$$

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$$r_{i,t} = \alpha_i + \beta FundSize_{i,t-1} + \gamma IndustrySize_{t-1} + \epsilon_{i,t}$$

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- We use the FE regression and the RD approach, and we compare the estimations with/without including IV assets.

Case study 1: Diminishing returns to scale

Regression Method:	FE		RD	
Include IV assets?	No	Yes	No	Yes
	(1)	(2)	(3)	(4)
FundSize	−0.0474***	−0.0248***	−0.1510**	−0.0788*
	(−6.55)	(−6.67)	(−2.16)	(−1.87)
IndustrySize	−0.0308**	−0.0191***	−0.0343***	−0.0199***
	(−2.53)	(−4.05)	(−5.63)	(−9.78)

- Omitting IVs: fund-level DRS over-estimated by 91%

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- Omitting IVs: industry-level DRS over-estimated by 60-70%
- The actual investment capacity is larger than we previously estiamted

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Case study 2: revisit dollar value added

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  - DVA $\sim$ Assets under management $\times$ Gross alpha
- DVA should include both value added from retail assets and value added from institutional assets.

Dollar value added is larger

AUM measure:	AUM_MF	AUM_Total
Cross-sectional weighted mean	**0.58**	**1.75**
***t*-statistic**	**1.23**	**2.99**
Cross-sectional mean	−0.79	−0.63
t-statistic	−2.09	−1.23
Percentile values:		
p1	−55.87	−82.38
p5	−17.06	−25.01
p10	−7.43	−10.90
p50	−0.23	−0.27
p90	5.32	9.15
p95	12.84	23.48
p99	54.60	87.41

- Active portfolio managers on average add more value than previously estimated.

Dollar value added is more persistent

AUM Measure:	AUM_MF		AUM_Total	
Horizon (Years)	Freq (%)	*p*-value (%)	Freq (%)	*p*-value (%)
3	55.86	6.42	59.46	1.11
4	57.66	2.86	61.26	0.38
5	54.95	9.18	59.46	1.11
6	54.05	12.73	58.56	1.82
7	52.25	22.39	57.66	2.86
8	48.65	50.00	54.95	9.18
9	48.65	50.00	53.15	17.13
10	48.65	50.00	54.05	12.73

- Dollar value added is more persistent than previously estimated

Dollar value added is more persistent

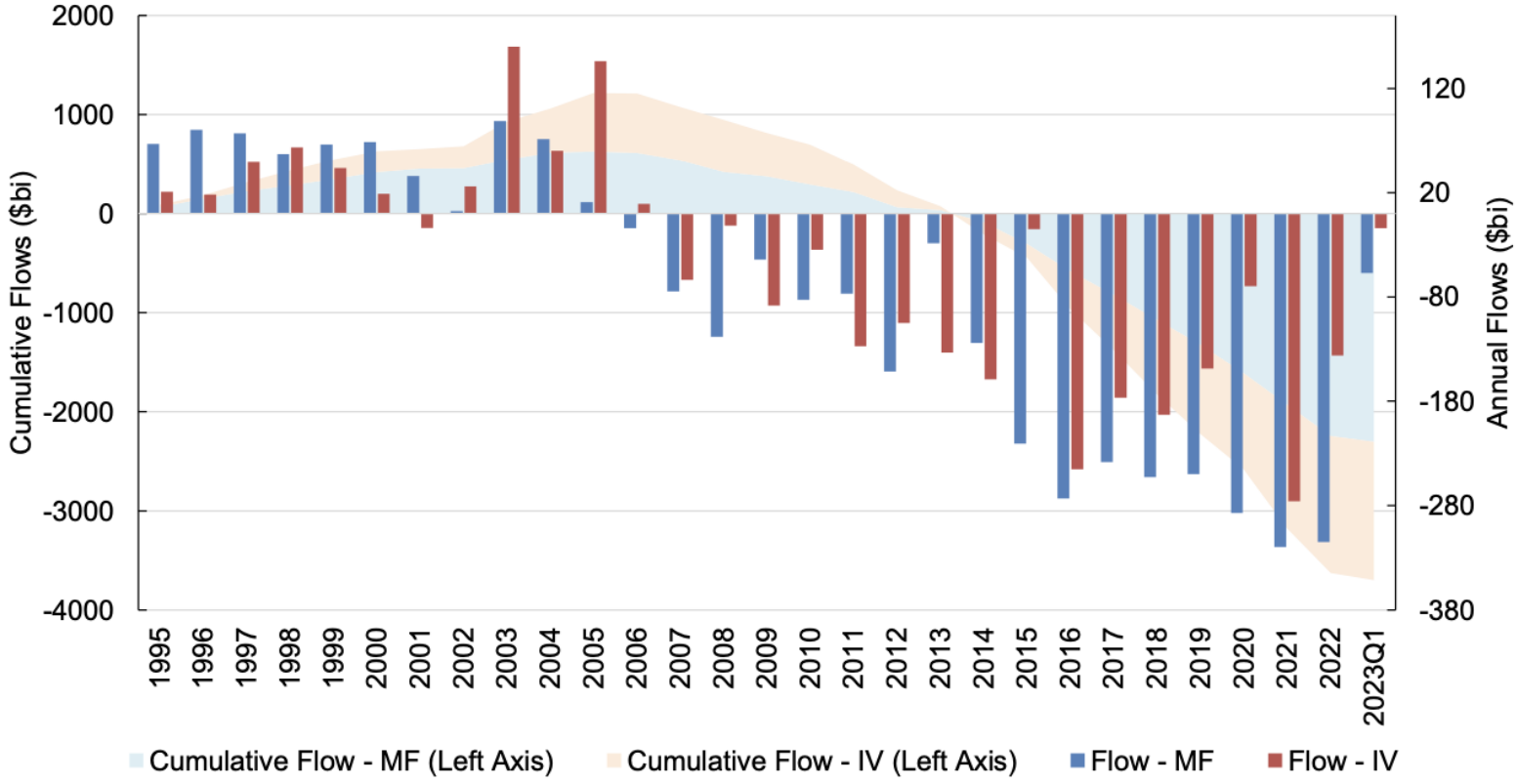
AUM Measure:	AUM_MF		AUM_Total	
Horizon (Years)	Freq (%)	p-value (%)	Freq (%)	p-value (%)
3	55.86	6.42	59.46	1.11
4	57.66	2.86	61.26	0.38
5	54.95	9.18	59.46	1.11
6	54.05	12.73	58.56	1.82
7	52.25	22.39	57.66	2.86
8	48.65	50.00	54.95	9.18
9	48.65	50.00	53.15	17.13
10	48.65	50.00	54.05	12.73

- Dollar value added is more persistent than previously estimated

$\Rightarrow$ Portfolio managers have skills to extract value from the markets

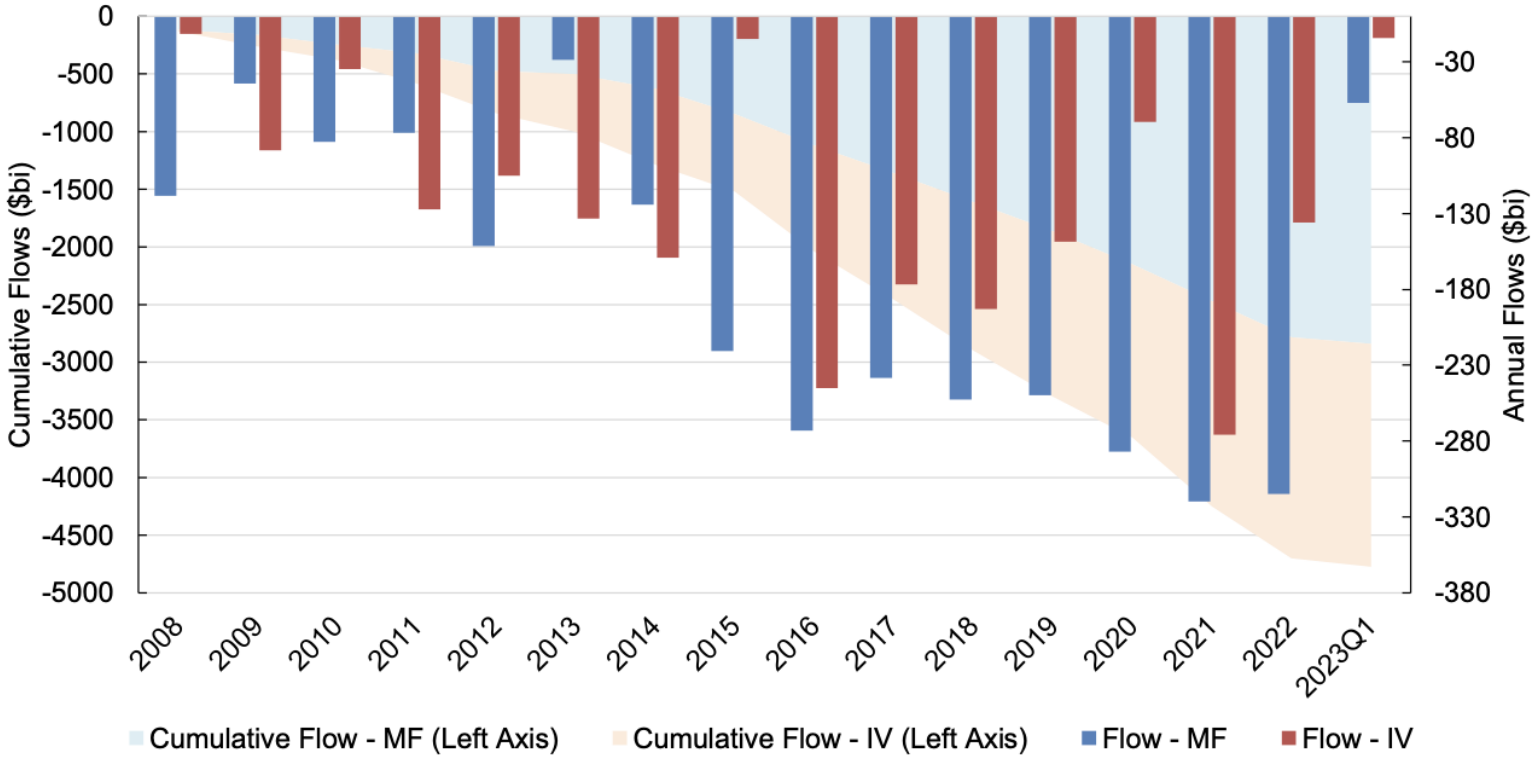
Outline

Aggregate flows



(a) Sample period: 1995-2023Q1

Aggregate flows



(b) Sample period: 2008-2023Q1

- Flow movements from active to passive space are at least twice larger than previous estimates.

Flow-to-performance sensitivity: fund level

Panel A: Flow-to-Performance Sensitivity								
Sample:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	MFs				IVs			
GRet	0.492***	0.477***			0.326***	0.307***		
	(15.56)	(15.21)			(5.15)	(4.96)		
AdjGRet			0.682***	0.649***			0.508***	0.473***
			(16.50)	(16.14)			(6.53)	(6.21)
Time FE	Y	Y	Y	Y	Y	Y	Y	Y
Fund FE	N	Y	N	Y	N	Y	N	Y
No. Obs.	75,598	75,574	75,566	75,542	75,598	75,574	75,566	75,542
Adj. R^2	0.027	0.063	0.027	0.063	0.004	0.035	0.004	0.035

- IVs exhibit lower flow-to-performance sensitivity
  - IV flow-to-performance sensitivity is about 30% lower than MF

Flow-to-performance sensitivity: style level

Panel C: Style-Level Flow-to-Performance Sensitivity

	(1)	(2)	(3)	(4)
DepVar:	Style-Level MF Pct_Flow		Style-Level IV Pct_Flow	
Gret_Style	0.372***	0.367***	0.068	0.063
	(4.33)	(4.29)	(1.31)	(1.23)
Time FE	Y	Y	Y	Y
Style FE	N	Y	N	Y
No. Obs.	1,130	1,130	1,130	1,130
Adj. R^2	0.209	0.223	0.029	0.028

- IV flows do not chase past style performance.

Compare MF flows and flows of twin IVs

Panel A: Fund-Level Flows of IV and MF

DepVar:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Dollar_Flow_IV				Pct_Flow_IV			
Dollar_Flow_MF	0.601***	0.599***	0.642***	0.636***				
	(4.36)	(4.30)	(4.88)	(4.74)				
Pct_Flow_MF					0.330***	0.319***	0.328***	0.309***
					(13.63)	(13.10)	(13.54)	(12.62)
Time FE	N	Y	N	Y	N	Y	N	Y
Fund FE	N	N	Y	Y	N	N	Y	Y
No. Obs.	75,811	75,811	75,787	75,787	75,811	75,811	75,787	75,787
Adj. R^2	0.008	0.009	-0.011	-0.010	0.017	0.019	0.045	0.047

- IV flows and MF flows are largely independent to each other
  - MF flows explain up to 1.9% of variations in twin IV flows

Twin IVs affect portfolio choice

Category	Port Wght	Without IV	With IV	Diff	Diff t-Value
Full Sample	VW	14.6	26.4	11.7	(9.31)
	EW	−1.3	3.9	5.3	(9.91)
Large-Cap	VW	17.6	29.8	12.2	(7.42)
	EW	−0.9	3.8	4.7	(6.56)
Mid-Cap	VW	13.8	13.0	−0.8	(−0.74)
	EW	−2.0	3.2	5.2	(9.03)
Small-Cap	VW	8.7	17.8	9.1	(8.41)
	EW	−2.2	3.1	5.3	(7.76)
Sector	VW	7.3	19.2	11.3	(8.28)
	EW	−1.1	9.2	10.5	(10.93)

- Portfolio holding horizon of mutual funds with twin IVs is 12-month longer than funds without twin IV.

MFs without IV underperform

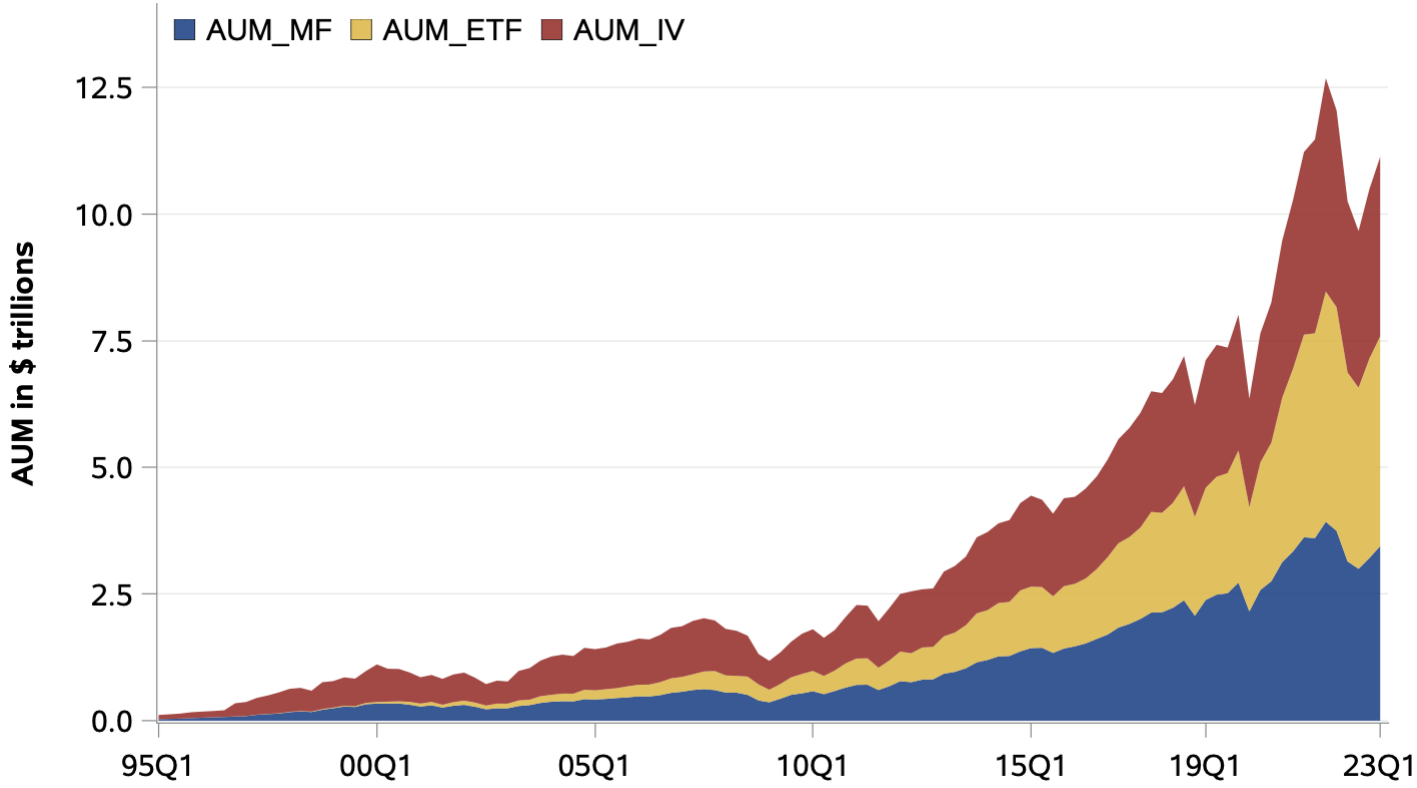
Panel A: Gross ret						
	(1)	(2)	(3)	(4)	(5)	(6)
	All Funds	Funds without IV	Funds with IV	All Funds	Funds without IV	Funds with IV
Alpha	−0.192	−1.128*	0.000	−0.204	−1.236**	0.000
	(−0.50)	(−1.67)	(0.02)	(−0.59)	(−2.03)	(0.01)
MKTRF	0.996***	0.992***	0.994***	0.985***	0.980***	0.984***
	(106.23)	(51.48)	(102.94)	(106.50)	(52.85)	(119.65)
SMB				0.073***	0.117***	0.062***
				(6.80)	(6.81)	(4.56)
HML				−0.007	−0.059**	0.005
				(−0.58)	(−2.58)	(0.37)
UMD				0.003	0.031*	−0.002
				(0.37)	(1.91)	(−0.20)
No. Obs.	339	339	339	339	339	339
Adj. R^2	0.987	0.964	0.988	0.990	0.974	0.990

MFs without IV underperform

Panel B: Net ret						
	(1)	(2)	(3)	(4)	(5)	(6)
	All Funds	Funds without IV	Funds with IV	All Funds	Funds without IV	Funds with IV
Alpha	−1.104***	−2.064***	−0.888**	−1.116***	−2.16***	−0.888***
	(−2.99)	(−3.10)	(−2.46)	(−3.29)	(−3.56)	(−2.75)
MKTRF	0.997***	0.992***	0.994***	0.986***	0.980***	0.984***
	(106.18)	(52.95)	(102.91)	(105.77)	(53.30)	(119.17)
SMB				0.073***	0.114***	0.061***
				(6.60)	(7.03)	(4.47)
HML				−0.007	−0.055**	0.005
				(−0.57)	(−2.47)	(0.36)
UMD				0.003	0.029*	−0.002
				(0.33)	(1.80)	(−0.21)
No. Obs.	339	339	339	339	339	339
Adj. R^2	0.988	0.966	0.988	0.990	0.975	0.990

Outline

Remeasuring passively managed assets



- Chinco and Sammon (2024): passive ownership is twice as large as the total share of index MFs and ETFs.
- Passive IVs, on average, manage 80% total assets as index MFs and ETFs.

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  - Construct holdings data and reassess demand-based asset pricing.

Some technical details

- The OLS estimator of FE regression

$$\hat{\beta}_{FE} - \beta = \left(\sum_{t,i} \tilde{q}_{i,t-1}^2 \right)^{-1} \left(\sum_{t,i} \tilde{q}_{i,t-1} \tilde{\epsilon}_{i,t} \right),$$

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- The recursive demean method of PST:

  - Let $\bar{r}_{i,t} = r_{i,t} - \frac{1}{T_i - t + 1} \sum_{s=t}^{T_i} r_{i,s}$,
    $\bar{q}_{i,t-1} = q_{i,t-1} - \frac{1}{T_i - t + 1} \sum_{s=t}^{T_i} q_{i,s-1}$,
    $\underline{q}_{i,t-1} = q_{i,t-1} - \frac{1}{t-1} \sum_{s=1}^{t-1} q_{i,s-1}$,

  - Using $\underline{q}_{i,t-1}$ as an instrument for $\bar{q}_{i,t-1}$, the two-stage least square is

$$\bar{q}_{i,t-1} = \rho \underline{q}_{i,t-1} + \nu_{i,t-1},$$
$$\bar{r}_{i,t} = \beta \hat{\bar{q}}_{i,t-1} + u_{i,t}.$$

Some technical details (cont.)

- The recursive demean method of Pastor-Stambaugh-Taylor:
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- The refinement of Zhu:
  - Using $q_{i,t-1}$ to instrument $\bar{q}_{i,t-1}$ and introducing intercept in the first stage:

$$\bar{q}_{i,t-1} = \psi + \rho q_{i,t-1} + \nu_{i,t-1},$$
$$\bar{r}_{i,t} = \beta \hat{\bar{q}}_{i,t-1} + u_{i,t}.$$