

SCALE AND SKILL IN ACTIVE MANAGEMENT

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Motivation

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 - * Perold and Solomon (1991), Berk and Green (2004)
 - * Evidence: Chen et al. (2004), Bris et al. (2007), Yan (2008), Ferreira et al. (2013), Reuter and Zitzewitz (2013)

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 - * Evidence: Chen et al. (2004), Bris et al. (2007), Yan (2008), Ferreira et al. (2013), Reuter and Zitzewitz (2013)
 - **Industry level?**
 - * Industry size $\uparrow \Rightarrow$ All funds' performance \downarrow
 - * Pástor and Stambaugh (2012)
 - * Evidence: ?

Main Results

Scale:

- Strong evidence of decreasing returns to scale at **industry** level
 - Stronger for high-turnover, high-volatility, and small-cap funds
- Mixed evidence of decreasing returns to scale at **fund** level
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Skill:

- Active funds have become **more skilled** over time
 - Yet their performance has not improved
- Negative **age-performance** relation
 - A fund's performance decreases over its lifetime
 - Younger funds outperform older funds

Narrative

- New funds tend to be more skilled than existing funds
 - Education? Technology?
- Given their better skill, new funds tend to outperform initially
- As these funds grow older, their performance suffers
 - Because industry keeps growing (\Rightarrow more skilled competition)

Methodology

- Three methods for estimating **fund-level** returns to scale:

1. **Pooled OLS:** $R_{it} = a + \beta q_{it-1} + \varepsilon_{it}$

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3. **Recursive demeaning:** new procedure

– Unbiased

Sample

Data: CRSP and Morningstar, 1979–2011

- Check accuracy across databases (return, size, expense ratio)
- Only domestic active equity mutual funds with size \geq \$15 million

Final sample: \sim 350,000 monthly observations of 3,126 funds

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- Main sample: 1993–2011
- Extended sample: 1979–2011
 - Noisier data but very similar results, same conclusions

Main Variables

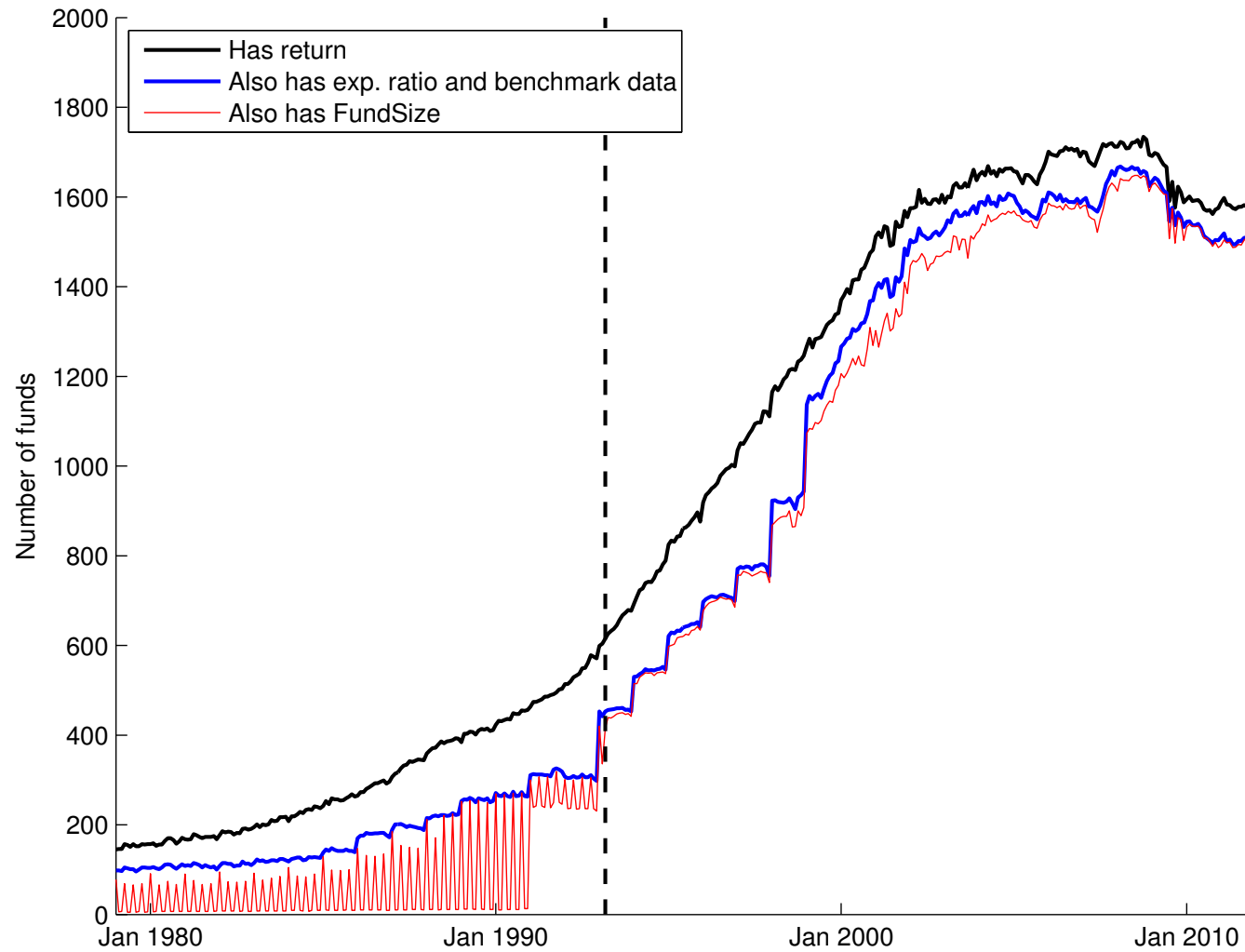
GrossR: Fund return gross of fees, minus benchmark return

E.g., for Large Growth, benchmark is Russell 1000 Growth Index

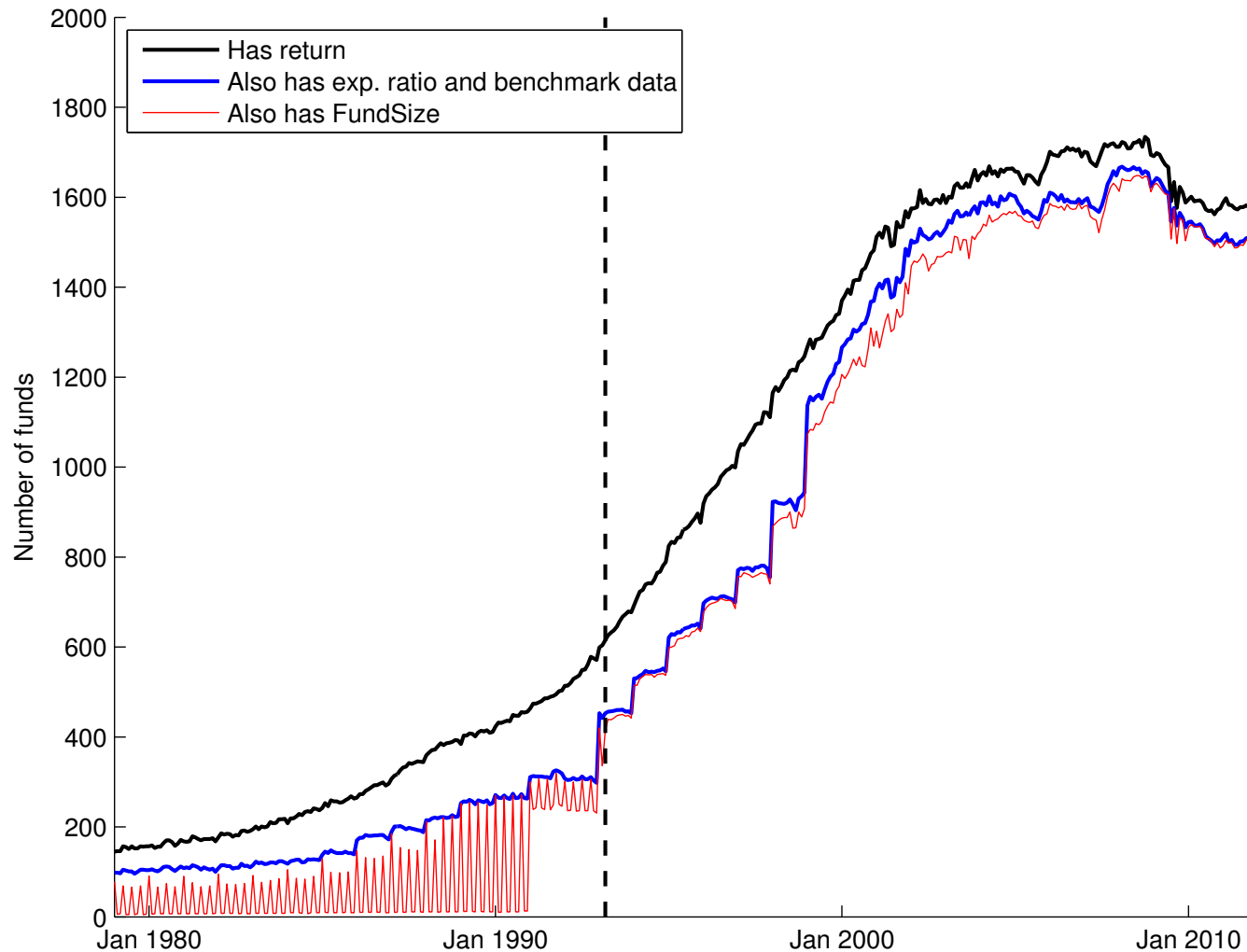
$$FundSize = \frac{\text{Fund's AUM today}}{\text{Total mkt.cap. today}} \times \text{Total mkt.cap. in Dec. 2011}$$

$$IndustrySize = \frac{\text{Funds' total AUM today}}{\text{Total mkt.cap. today}}$$

Sample Size Over Time

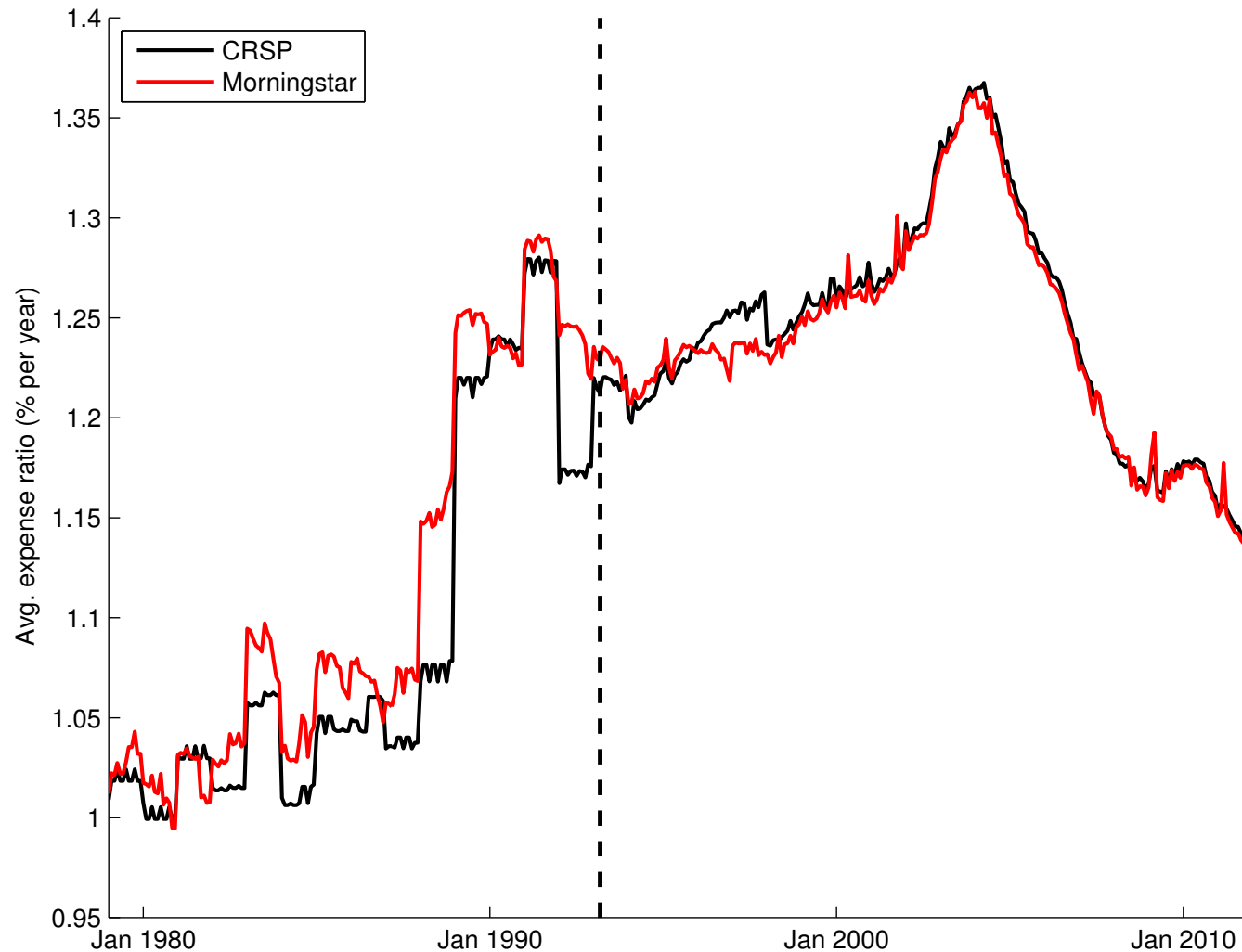


Sample Size Over Time



Main sample: March 1993 – December 2011
Extended sample: January 1979 – December 2011

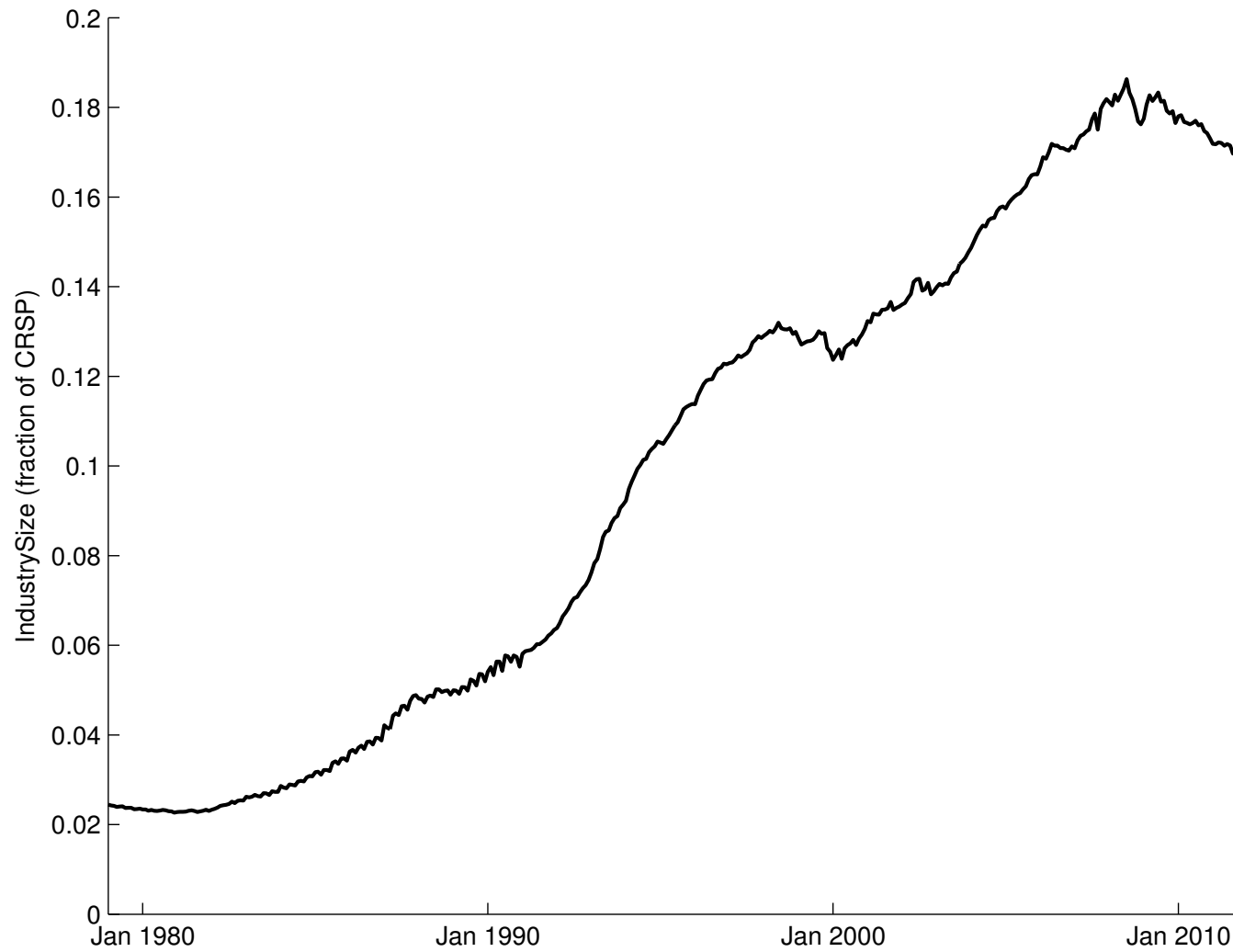
Average Expense Ratio Over Time



Main sample: March 1993 – December 2011

Extended sample: January 1979 – December 2011

Industry Size over Time



Decreasing Returns to Scale at Fund Level?

Dependent variable: GrossR

FundSize	-0.0137 (-1.87)
Constant	0.000503* (2.18)
Observations	275847
Estimator	OLS no FE

Decreasing Returns to Scale at Fund Level?

Dependent variable: GrossR

FundSize	-0.0137 (-1.87)	-0.168*** (-9.38)
Constant	0.000503* (2.18)	
Observations	275847	275847
Estimator	OLS no FE	OLS FE

Decreasing Returns to Scale at Fund Level?

Dependent variable: GrossR

FundSize	-0.0137 (-1.87)	-0.168*** (-9.38)	-0.220 (-0.62)
Constant	0.000503* (2.18)		
Observations	275847	275847	270556
Estimator	OLS no FE	OLS FE	RD

Decreasing Returns to Scale at Industry Level?

Dependent variable: GrossR

IndustrySize	-0.0169 (-1.93)	-0.0326*** (-3.60)	-0.0326* (-2.49)
Constant	0.00304* (2.18)		
Observations	283046	283046	283046
Estimator	OLS no FE	OLS FE	RD

Fund- vs. Industry-level Returns to Scale

Dependent variable: GrossR

FundSize	-0.0147* (-2.02)	-0.148*** (-9.09)	-0.425 (-1.25)
IndustrySize	-0.0165 (-1.90)	-0.0295** (-3.27)	-0.0277* (-2.14)
Constant	0.00300* (2.09)		
Observations	275847	275847	270556
Estimator	OLS no FE	OLS FE	RD

Industry Size: Just a Time Trend?

Dependent variable: GrossR

IndustrySize	-0.0326	
	(-3.60)	
Time Trend	-10.26	
	(-2.99)	
Observations	283046	283046

Industry Size: Just a Time Trend?

Dependent variable: GrossR

IndustrySize	-0.0326 (-3.60)	-0.0852 (-3.04)
Time Trend	-10.26 (-2.99)	23.89 (2.21)
Observations	283046	283046

A Closer Look at Industry Size

Dependent variable: GrossR

Average Fund Size	-3.862 (-3.03)	-8.885 (-3.56)
Number of Funds	0.450 (0.83)	-4.031 (-3.23)
Observations	283046	283046

A Closer Look at Industry Size

Dependent variable: GrossR

IndustrySize				-0.115 (-2.60)
Average Fund Size	-3.862 (-3.03)	-8.885 (-3.56)	4.315 (0.73)	
Number of Funds		0.450 (0.83)	-4.031 (-3.23)	8.493 (1.61)
Observations	283046	283046	283046	283046

Determinants of the Size-Performance Relation

Dependent variable: GrossR

[illegible]

Estimating Skill

- Our measure of **skill**:
 - Gross alpha when $FundSize = IndustrySize = 0$
(Average benchmark-adjusted return on the fund's first dollar invested, with no other funds in the industry)

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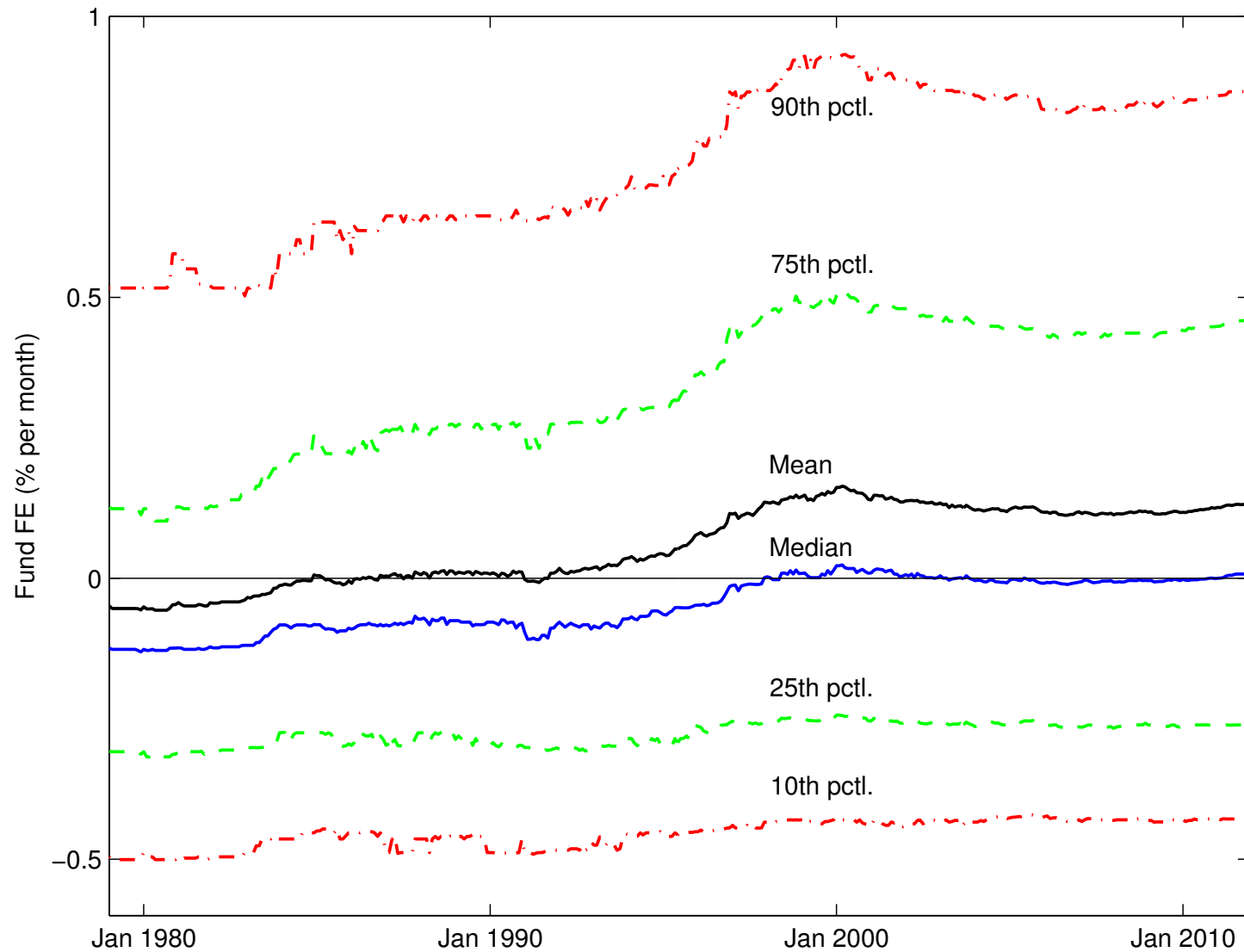
- (Average benchmark-adjusted return on the fund's first dollar invested, with no other funds in the industry)

- We measure fund skill by a_i in

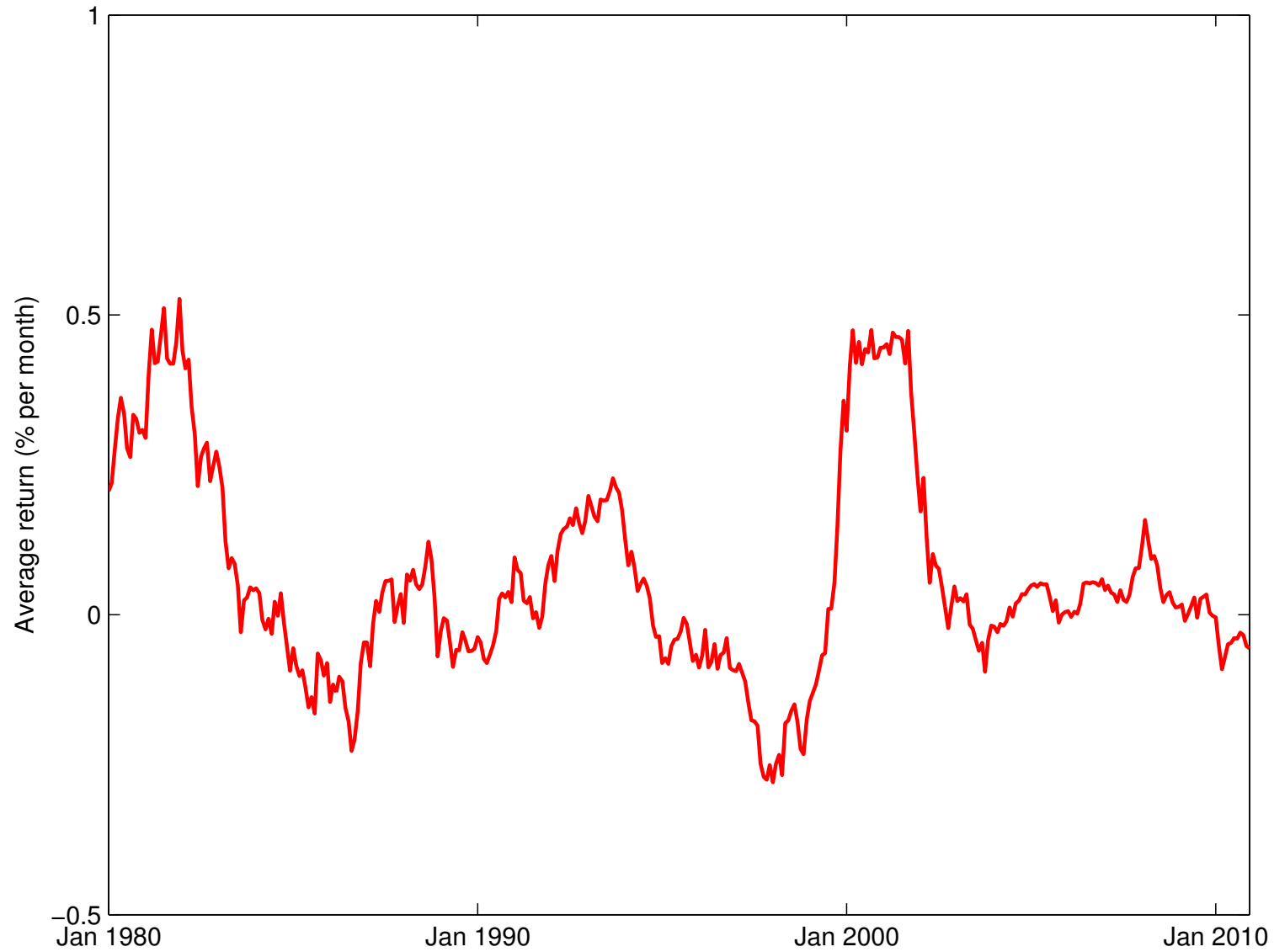
$$GrossR_{it} = a_i + FundSize_{it-1}(\beta_0 + \beta_1 X_i) + IndustrySize_{it-1}(\gamma_0 + \gamma_1 X_i) + \varepsilon_{it}$$

where X_i includes all fund characteristics from previous table

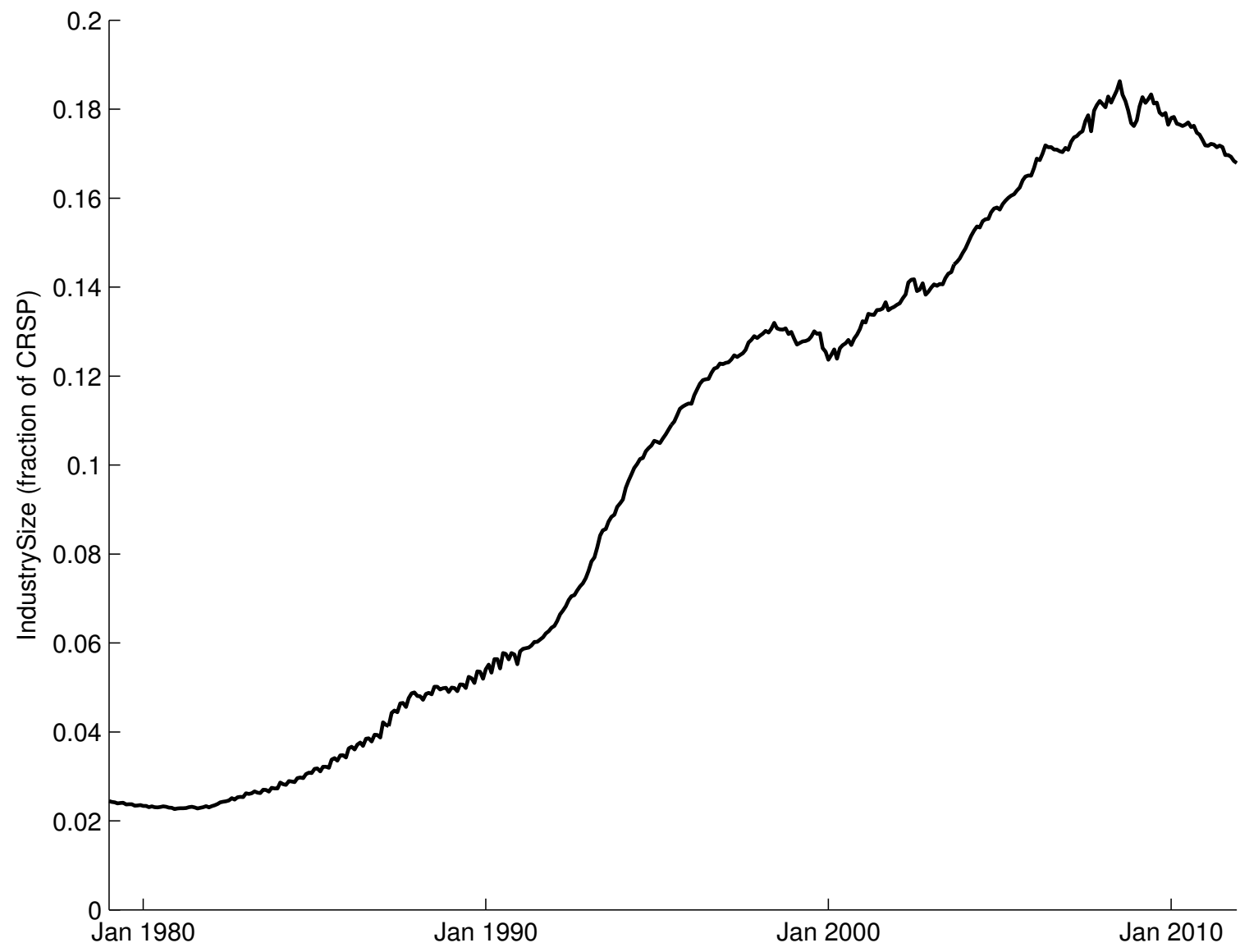
Distribution of Fund Skill over Time



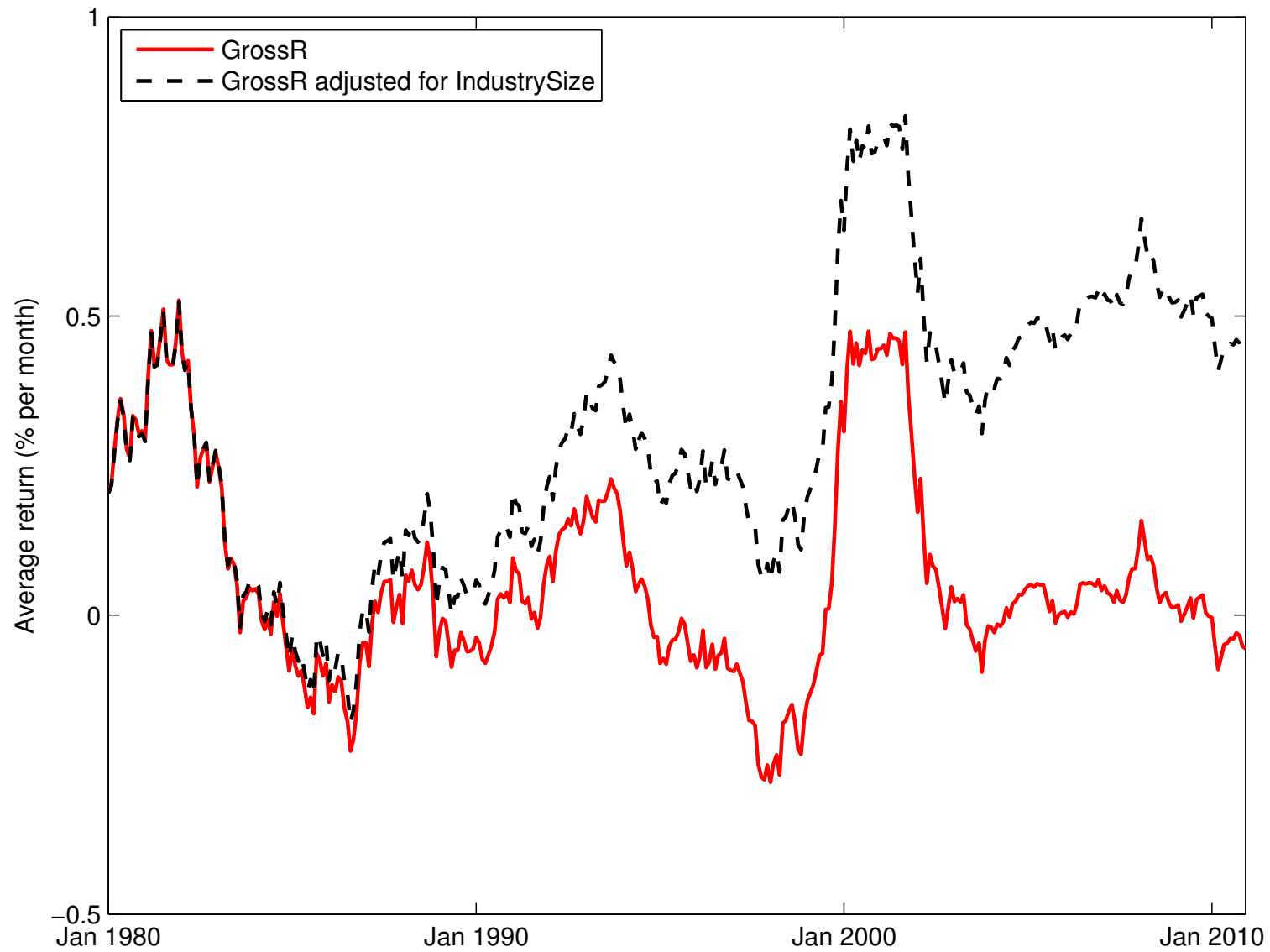
Average Fund Performance over Time



Industry Size over Time



Average Fund Performance over Time



Fund Age vs. Performance

Prediction:

Fund's skill constant

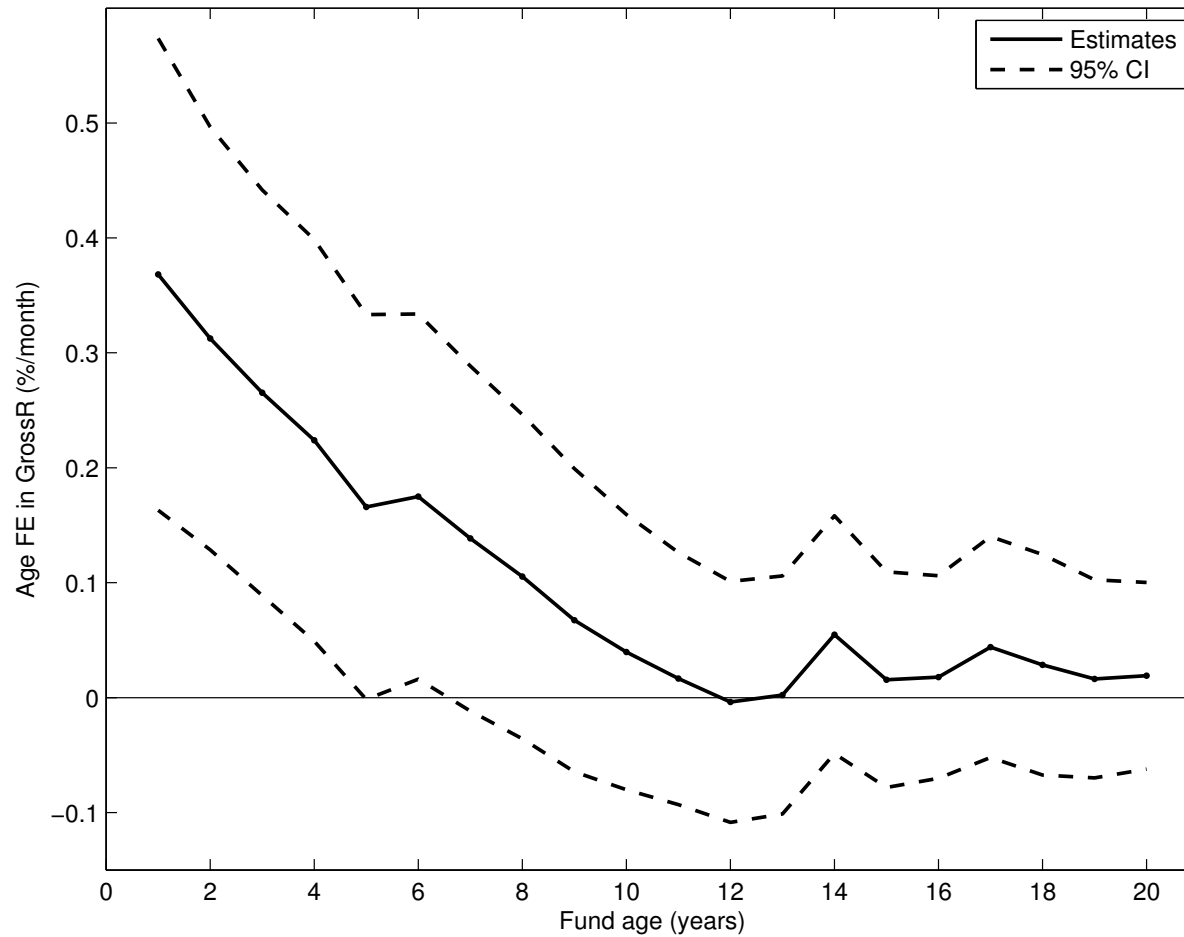
Industry-level DRTS

Industry size \uparrow

} Performance \downarrow over fund's life

Fund Age vs. Performance: Age Fixed Effects

$$GrossR_{it} = a_i + \beta_1 1_{\{age=1\}} + \dots + \beta_{20} 1_{\{age=20\}} + \varepsilon_{it}$$



Fund Age vs. Performance: Continuous Age

Dependent variable: GrossR

Fund age	-0.000123** (-3.00)	-0.000102* (-2.37)
Observations	283046	248050
Fund ages	All	≥ 3 years

Fund Age vs. Performance: Continuous Age

Dependent variable: GrossR

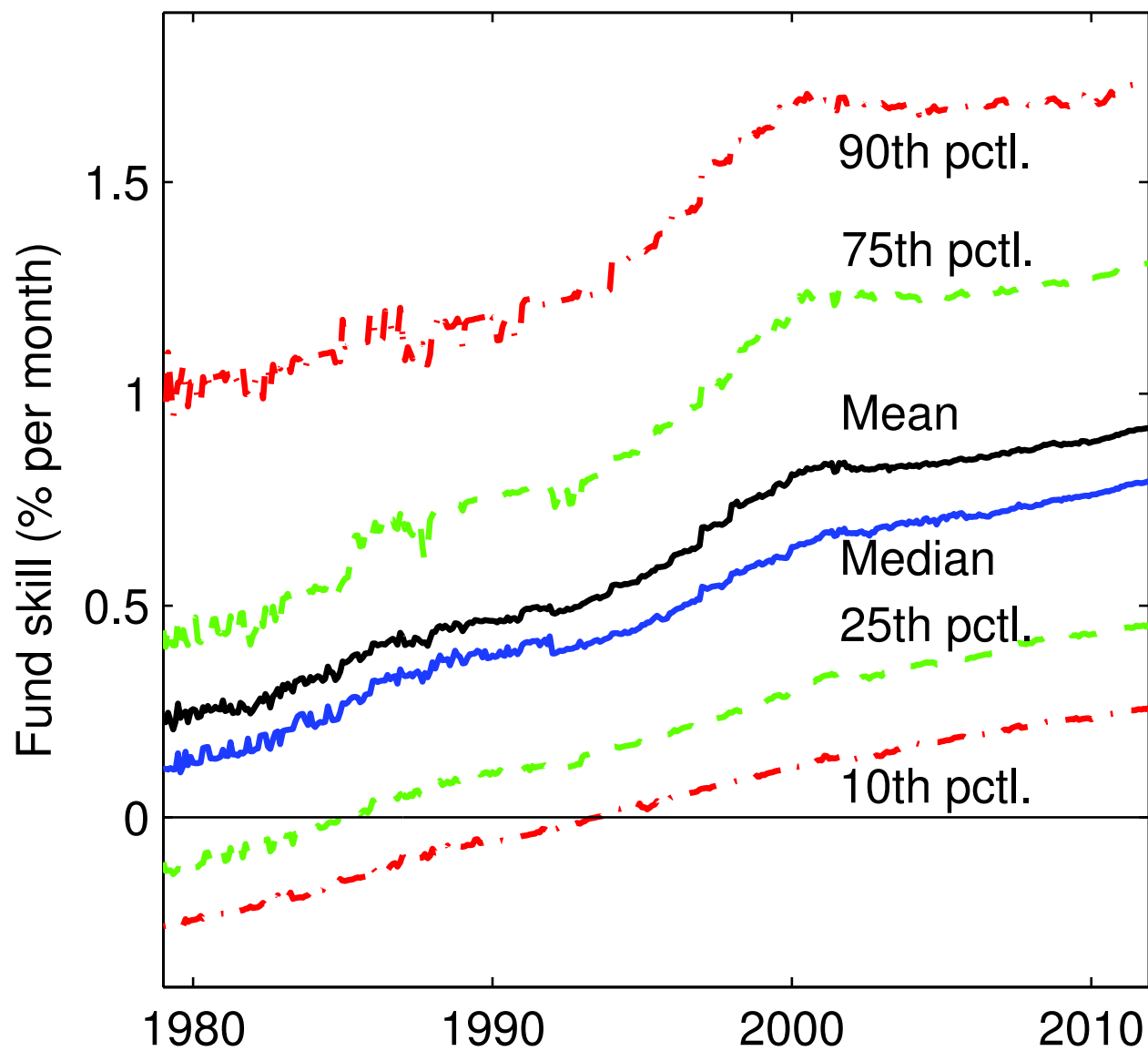
Fund age	-0.000123** (-3.00)	0.000283* (2.19)	-0.000102* (-2.37)	0.000281* (2.19)
IndustrySize		-0.0845** (-3.02)		-0.0799** (-2.86)
Observations	283046	283046	248050	248050
Fund ages	All	All	≥ 3 years	≥ 3 years

Learning on the Job?

- We modify our skill measure to allow learning on the job
- As before, skill is alpha when $FundSize = IndustrySize = 0$
- But now, $Skill_{it} = a_i + b FundAge_{it}$

$$GrossR_{it} = a_i + b FundAge_{it} + FundSize_{it-1}(\beta_0 + \beta_1 X_i) + IndustrySize_{it-1}(\gamma_0 + \gamma_1 X_i) + \varepsilon_{it}$$

Distribution of Fund Skill, With Learning on the Job



Age-based Investment Strategies

Fund age	Average portfolio return				Average differences			<i>F</i> - test
	[0, 3]	(3, 6]	(6, 10]	>10	[0,3] - (>10)	(3,6] - (>10)	(6,10] - (>10)	<i>p</i> -value
Avg. GrossR	0.084 (2.33)	0.056 (1.45)	0.020 (0.55)	0.012 (0.30)	0.072 (2.85)	0.043 (2.48)	0.008 (0.52)	0.014
Avg. NetR	-0.005 (-0.15)	-0.052 (-1.38)	-0.084 (-2.29)	-0.083 (-2.07)	0.077 (3.10)	0.031 (1.79)	-0.001 (-0.08)	0.008

Robustness

Our conclusions are robust to

- Controlling for business cycle variables
- Controlling for *FamilySize*
- Trimming extreme outliers in *FundSize*
- Different functional forms for *FundSize*
- Alternate benchmark-adjustments
 - Fama-French
 - Morningstar benchmark with estimated betas

Main Takeaways for Practitioners

- You are **more skilled** than your predecessors
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 - Likely to hold at strategy level, too
 - ⇒ Stay away from crowded trades/strategies/industries

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 - ⇒ Stay away from crowded trades/strategies/industries
- A fund's **performance deteriorates** over its lifetime
 - Due to growing competition
 - Despite learning on the job
 - ⇒ Invest in younger funds