Are Mutual Fund Managers Paid For Investment Skill?

Markus Ibert[1] Ron Kaniel[2]
Stijn Van Nieuwerburgh[3] Roine Vestman[4]

[1]Stockholm School of Economics and Swedish House of Finance

[2]University of Rochester Simon, CEPR

[3]New York University Stern, NBER, and CEPR

[4]Stockholm University and Swedish House of Finance

University of Cologne, November 16, 2017

Motivation

- Large and growing number of investors delegate their risky asset portfolio to mutual fund advisers
- Much is known about how about the performance of mutual funds and their investment process
  - Laboratory to infer presence and nature of skill
  - Laboratory to explore manager incentives to exert effort, take risk, acquire information, etc.
  - Facilitated by ample data

Motivation

- Large and growing number of investors delegate their risky asset portfolio to mutual fund advisers
- Much is known about how about the performance of mutual funds and their investment process
- Little is known about second layer of delegation between fund advisers and their employees, fund managers. One blind spot is fund manager **compensation**:
  - Compensation has implications for incentive provision, risk sharing within firm, frictions/conflicts of interest between fund owners and fund managers
  - Recently, Ma, Tang, Gomez (16) characterize qualitatively structure of compensation contracts. Unclear how quantitatively meaningful performance-based pay is.

What We Do and What We Find

- Explore universe of mutual fund managers in Sweden and match on their pay from tax records

What We Do and What We Find

- Explore universe of mutual fund managers in Sweden and match on their pay from tax records
- Manager compensation depends on fund's fee revenue ($AUM \times TER$)
  - Alignment of incentives between fund owners and managers
  - Elasticity is fairly small at 0.15: much of extra revenue goes to owners
  - Pay-revenue sensitivity arises from revenue component that is orthogonal to current and past performance

What We Do and What We Find

- Explore universe of mutual fund managers in Sweden and match on their pay from tax records
- Manager compensation depends on fund's fee revenue ($AUM \times TER$)
- Weak link between pay and fund's performance
  - Both economically and statistically insignificant
  - Longer performance horizons strengthen PPS, but survivorship bias creeps in and magnitude of PPS remains small
  - Some non-linearity: Higher pay for top-quartile performers
  - PPS estimates much lower than in benchmark model (Berk and Green, JPE 04)

What We Do and What We Find

- Explore universe of mutual fund managers in Sweden and match on their pay from tax records
- Manager compensation depends on fund's fee revenue ($AUM \times TER$)
- Weak link between pay and fund's performance
- Fund family as important driver of compensation
  - Firm-year fixed effects explain large fraction of variation in compensation
  - Firm-level revenue and profit important determinants of pay
  - PPS stronger and PRS weaker in more profitable firms
  - Large commercial banks with mutual fund arm follow different compensation schemes

Related Literature

- Contracts between investors and fund advisers:
  - Empirical: Elton, Gruber, Blake (03), Coles, Suay, Woodbury (00), Warner Wu (11), Berk and Binsbergen (16a, 16b)
  - Theoretical: Stoughton (93), Admati and Pfleidere (97), Das and Sunderam (02), Ou-Yang (03), Li and Tiwari (09), **Cuoco and Kaniel (11)**, Buffa, Vayanos, and Woolley (14)
- Inference on managerial ability, incentives, and risk preferences:
  - **Berk and Green (04)**, Basak, Pavlova, Shapiron (07), Cuoco and Kaniel (11), Basak and Pavlova (13), Koijen (15)
  - Kacperczyk, Van Nieuwerburgh and Veldkamp (14,15): information acquisition
- Role of the firm complex:
  - Gaspar, Massa, and Matos (06): performance shifting across funds in a family
  - Berk, Binsbergen, Liu (17): owners have private info on manager's talent which they use in internal AUM allocation

Related Literature

- Compensation in the financial sector and CEOs
  - Gabaix and Landier (08), Philippon and Resheff (12), Böhm, Metzger, and Strömberg (15), Celerier and Vallee (17)
- Mutual funds as money doctors
  - Del Guercio and Reuter (14), Gennaioli, Shleifer, and Vishny (15)
  - **Ben Naim and Sokolinski (17)** extend GSV model with managerial pay and confront it with Israeli MF compensation data: MF managers contribute familiarity which attracts fund flows and increases pay-performance sensitivity
- Swedish mutual funds
  - Bondaruk and Simonov (15, 16) study Swedish mutual fund managers' personal portfolios and find they do not outperform or do not suffer fewer behavioral biases (such as loss aversion)
  - Performance studies on equity funds focused on Swedish stock market: Dahlquist et al. (00), Engström (04), Flam and Vestman (17)

Outline

- **Data and Measurement**
- 1. Sensitivity of pay to revenue and performance
- 2. Importance of firm
- Robustness

Sweden: A Good Laboratory (1)

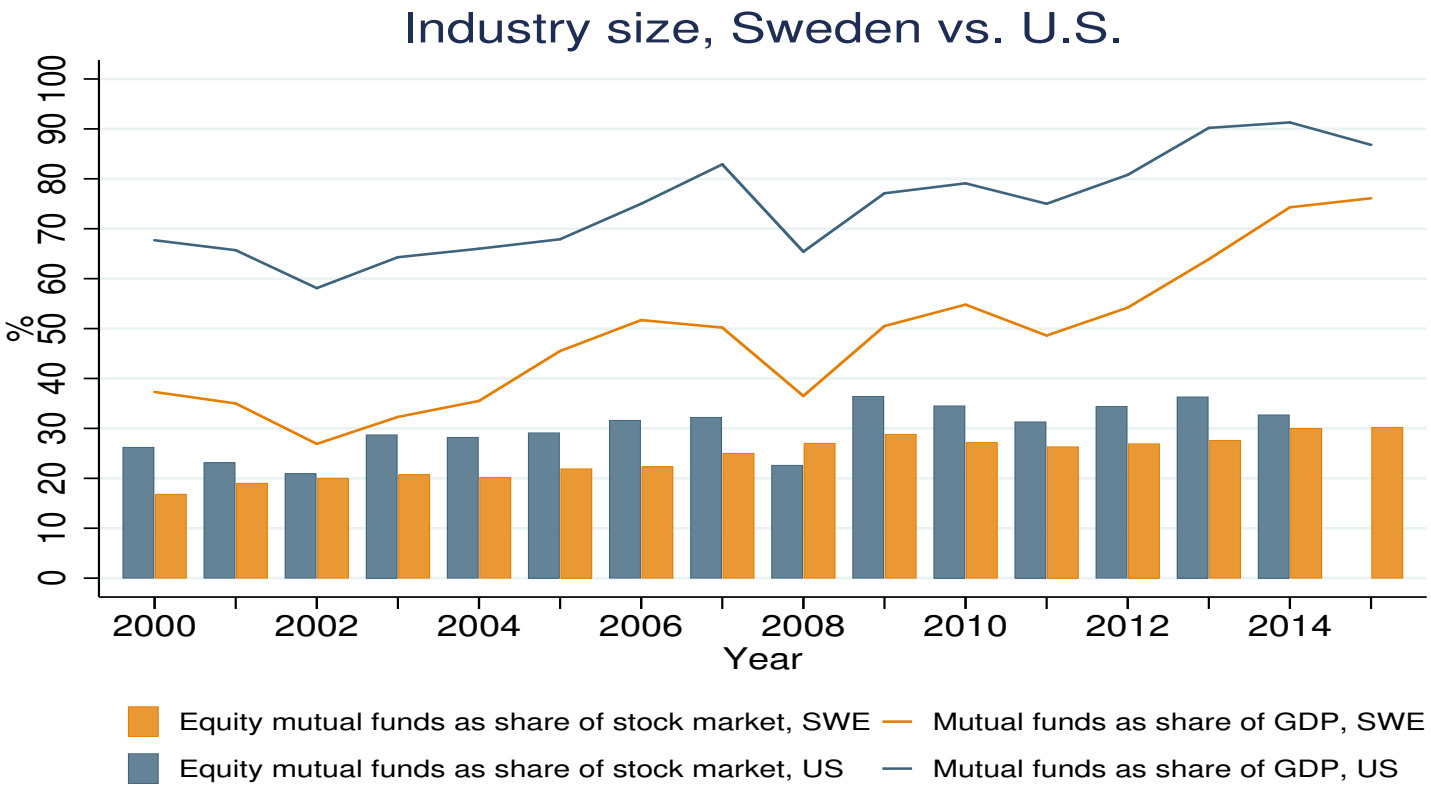
- Wage data hard to get in other places

Sweden: A Good Laboratory (1)

- Wage data hard to get in other places
- Large MF industry: above average among 56 countries in 2002 (Khorana, Servaes, Tufano, 05); even more relative to population

Sweden: A Good Laboratory (1)

- Wage data hard to get in other places
- Large MF industry: above average among 56 countries in 2002 (Khorana, Servaes, Tufano, 05); even more relative to population
- AUM/GDP ratio and equity MF AUM/stock market cap ratio

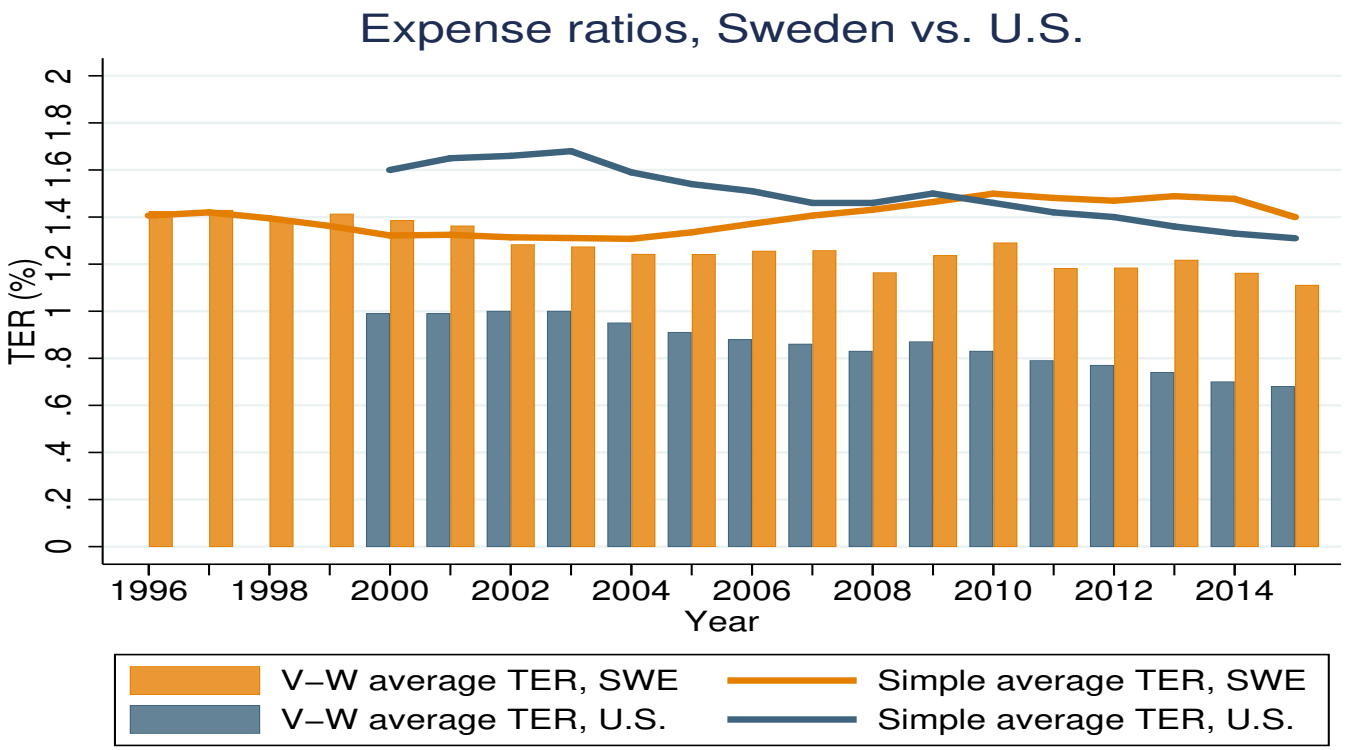


Sweden: A Good Laboratory (2)

- Performance and expense ratios of mutual funds
  - Average among 28 OECD countries in 2001-07 (Ferreira et al., 12)
  - Quarterly returns (1.9%), one-factor alpha (-0.80), and four-factor alpha (-0.83) all close to average
  - Equity mutual funds with focus on Sweden perform as their U.S. counterparts (Flam and Vestman, 2017)
  - Fund fees (1.38%) close to average (1.29%)

Sweden: A Good Laboratory (2)

- Performance and expense ratios of mutual funds
  - Average among 28 OECD countries in 2001-07 (Ferreira et al., 12)
  - Quarterly returns (1.9%), one-factor alpha (-0.80), and four-factor alpha (-0.83) all close to average
  - Equity mutual funds with focus on Sweden perform as their U.S. counterparts (Flam and Vestman, 2017)
  - Fund fees (1.38%) close to average (1.29%)



Sweden: A Good Laboratory (3)

- Flow-performance relationship: strongest among 28 countries in 2001-07 (Ferreira et al., 12)
  - Convexity found in 10/28 countries, including U.S. and Sweden. All 9 non-US countries show stronger convexity than U.S.
  - Own flow-performance regressions show convexity ▸ regression, similar to Sirri and Tufano estimates, declining sensitivity in U.S. since

Fund and Fund Manager Data

- Three hierarchical levels: firms, funds, managers
- *Morningstar Direct*: universe of open-ended mutual funds for sale in Sweden or Nordic countries during Jan 1990–Dec 2015
  - 1,744 funds that belong to 182 fund companies (126 fund complexes)
  - For 1,600 funds: **5,162 fund-fund manager spells, 1,324 managers**
  - Construct manager experience, team management variables
  - Fund investment category, fund benchmark
- Drop index funds, money market funds, government pension funds
- For each fund, collect monthly fund returns, benchmark returns, assets under management (AUM), total expense ratio (TER)

Matching Fund Manager to Income Data

- Using publicly available sources, we hand-match fund manager names (age, university, geography) to their social security number
  - Some are not Swedish tax payers (Finnish, Danish, Norwegian)
  - Some names are common, and even after using age, location, industry there is no unique match
  - High quality social security matches found for 628 managers at 1,099 funds
- *Statistics Sweden*: tax registry data on labor and dividend income
  - Labor income includes variable pay (bonus)
  - Dividend income: more comprehensive, but includes all sources
  - Also obtain manager age and education
  - Information on privately held companies (partial if multiple layers of ownership)
- After merging with fund data and imposing requirement of presence in year $t+1$, we have sample of **941 funds**, **529 managers**, **2,898 manager-year observations**

Measurement

- At the fund level i

$$R_{it}^{gross} = R_{it}^{net} + TER_{it}$$
$$R_{it}^{abn} = R_{it}^{gross} - R_{it}^{B}$$
$$REV_{it} = AUM_{it-1} TER_{it}$$
$$V_{it} = AUM_{it-1}\left(R_{it}^{gross} - R_{it}^{B}\right) = \underbrace{AUM_{it-1}(R_{it}^{net} - R_{it}^{B})}_{\equiv NV_{it}} + REV_{it}$$

- At the manager level m

$$AUM_{mt} = \sum_{i \in \Omega_{mt}} \frac{AUM_{it}}{N_{it}}$$
$$TER_{mt} = \frac{1}{AUM_{mt-1}} \sum_{i \in \Omega_{mt-1}} \frac{AUM_{it-1}}{N_{it-1}} TER_{it}$$
$$REV_{mt} = AUM_{m,t-1} TER_{mt}$$
$$R_{mt}^{k} = \frac{1}{AUM_{mt-1}} \sum_{i \in \Omega_{mt-1}} \frac{AUM_{it-1}}{N_{it-1}} R_{it}^{k}, \qquad k = \{net,\ gross,\ abn\}$$
$$V_{mt} = \sum_{i \in \Omega_{mt-1}} \frac{V_{it}}{N_{it-1}}, \qquad NV_{mt} = \sum_{i \in \Omega_{mt-1}} \frac{NV_{it}}{N_{it-1}}$$

Summary Statistics at Manager Level

A. Characteristics

	10%	25%	50%	75%	90%	Mean	Sd	N
Age_m	33	37	42	48	52	42	7.5	2898
$Exper_m$	1.0	2.4	4.8	8.1	12.2	5.9	4.7	2898
Edu_m	12	15	15	16	16	15	2	2898
$Coman_m$	0.00	0.00	0.12	1.00	1.00	0.45	0.48	2898
$Teams_m$	0.00	0.00	0.92	1.00	3.00	1.21	2.26	2898
$TeamSize_m$	0.00	0.00	0.14	1.00	2.00	0.72	1.03	2898
$NumCat_m$	1.0	1.0	1.0	1.0	2.0	1.2	0.5	2898

B. Income (1000s of SEK)

	10%	25%	50%	75%	90%	Mean	Sd	N
Labor inc. L_m	510.6	788.3	1206.5	1806.7	2739.8	1559.3	1522.5	2898
Dividend inc. D_m	0.0	0.0	4.2	41.8	450.6	813.0	8730.1	2898
Total inc. Y_m	548.1	856.4	1341.5	2042.8	3427.1	2372.3	8864.5	2898

Summary Statistics at Manager Level

C. AUM

	10%	25%	50%	75%	90%	Mean	Sd	N
AUM_m (mio. SEK)	99.3	355.4	1361.3	4521.6	9982.6	3911.2	6573.2	2861
TER_m (%)	0.56	1.00	1.40	1.66	2.18	1.40	0.66	2898
REV_m (mio. SEK)	1.3	4.4	16.1	52.4	132.5	47.0	76.6	2898
$\log(REV_m)$	14.1	15.3	16.6	17.8	18.7	16.5	1.8	2898
L_m/REV_m (%)	1.2	2.5	7.7	24.1	73.7	49.1	268.8	2898

D. Gross performance (%)

	10%	25%	50%	75%	90%	Mean	Sd	N
$\log(1+R_m^{exc})$	-21.9	-2.6	7.3	18.2	30.5	5.6	22.8	2898
$\log(1+R_m^{abn})$	-8.5	-2.7	0.9	5.0	12.0	1.3	9.7	2898
$\log(1+R_m^{abn,CAPM})$	-10.8	-4.0	0.5	5.3	12.4	0.7	10.9	2885
$\log(1+R_m^{abn,FF3})$	-10.0	-3.5	1.1	5.5	11.8	1.1	10.4	2885
$\log(1+R_m^{abn,GF5})$	-9.3	-3.6	0.5	4.9	11.6	0.9	9.5	2795
$ValueAdded_m$ (mio. SEK)	-132.4	-20.1	3.8	56.2	251.6	40.6	295.8	2898

▸ Fraction of income and AUM by income ▸ Turnover statistics

Outline

- Data and Measurement
- **1. Sensitivity of pay to revenue and performance**
  - **Baseline results**
  - Revenue as performance measure?
  - Longer performance evaluation horizon
- 2. Importance of firm
- Robustness

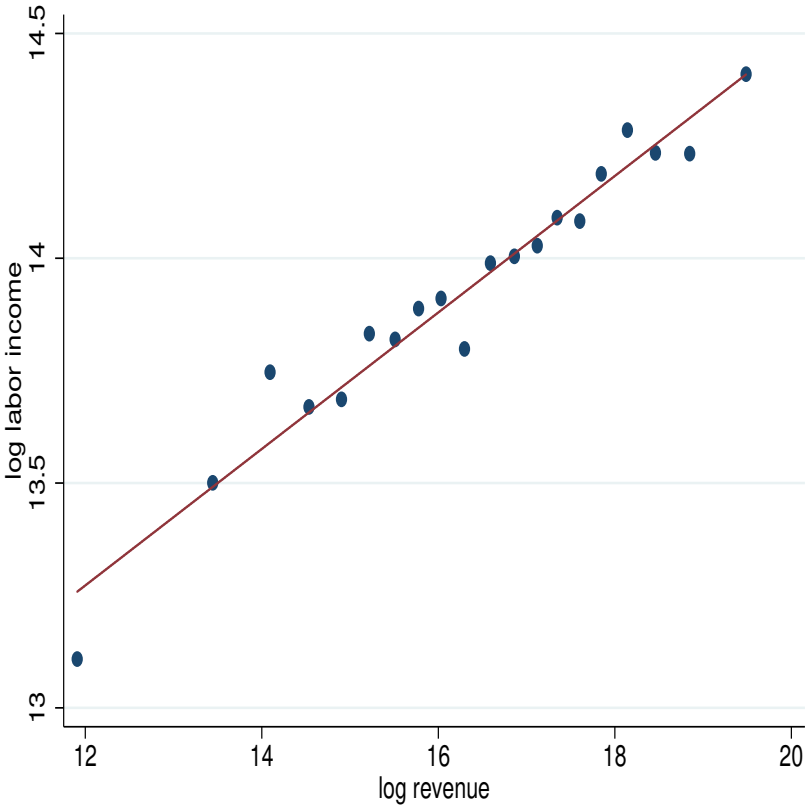
Main Specification

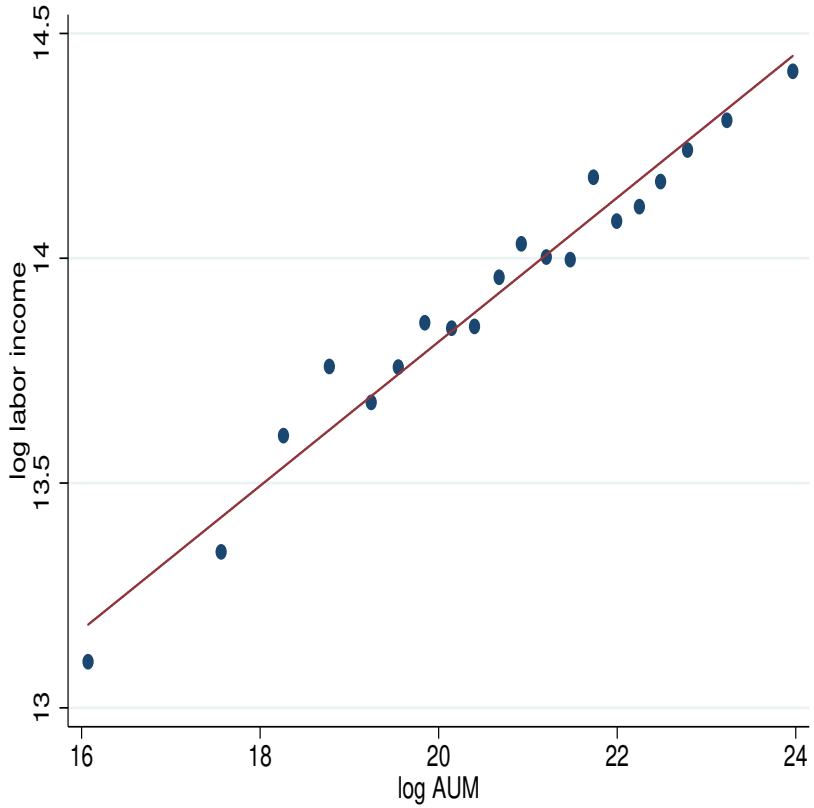
- Main specification:

$$\log(L_{m,t}) = \alpha_m + \alpha_t + \beta \log(REV_{m,t}) + \gamma \log\left(1 + R^{abn}_{m,t-1}\right) + \delta X_{m,t-1} + \varepsilon_{m,t}$$

- All objects measured at manager-level
- Year fixed effects soak up aggregate conditions
- Manager fixed effects absorb constant manager characteristics
- Category fixed effects - equity is the omitted category
- Control variables: experience, age, education, management team composition
- Standard errors clustered at the manager level

Log Pay and Log Revenues





- Log-log specification between pay and size fits the data very well
- Using revenue (AUM $\times$ TER) or AUM as size measure makes little difference

Sensitivity of Pay to Revenue (Size)

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.153***	0.141***	0.123***
	(0.0179)	(0.0194)	(0.0239)
Year FE	Yes	Yes	Yes
Controls	No	Yes	Yes
Category FE	No	Yes	Yes
Manager FE	No	No	Yes
N	3016	2898	2898
Adjusted R^2	0.138	0.229	0.614
	Standardized Revenue		
$\log(REV_{m,t})_{std}$	0.279***	0.253***	0.187***

Economic Magnitudes

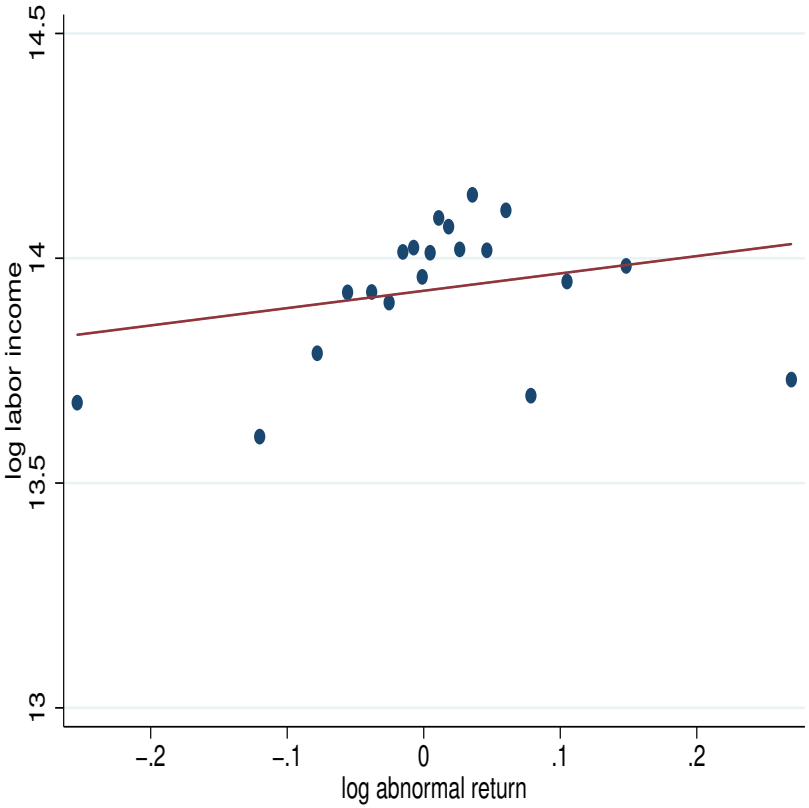
- **Pay-Revenue Sensitivity**
  - 1% increase in revenues increases pay by .15%
  - 1-std increase in revenues increases pay by 28% (0.4-std)
  - Doubling of revenue from \$6.2mi (avg.) to \$12.4mi (AUM from \$450 to \$900mi) increases pay from \$210,000 to \$241,200
  - *Share* of revenue going to manager pay falls from 3.3% to 1.9%
  - Suggests incentives of owners and managers are aligned
  - But, owner captures bulk of revenue increase (99.5% in example)

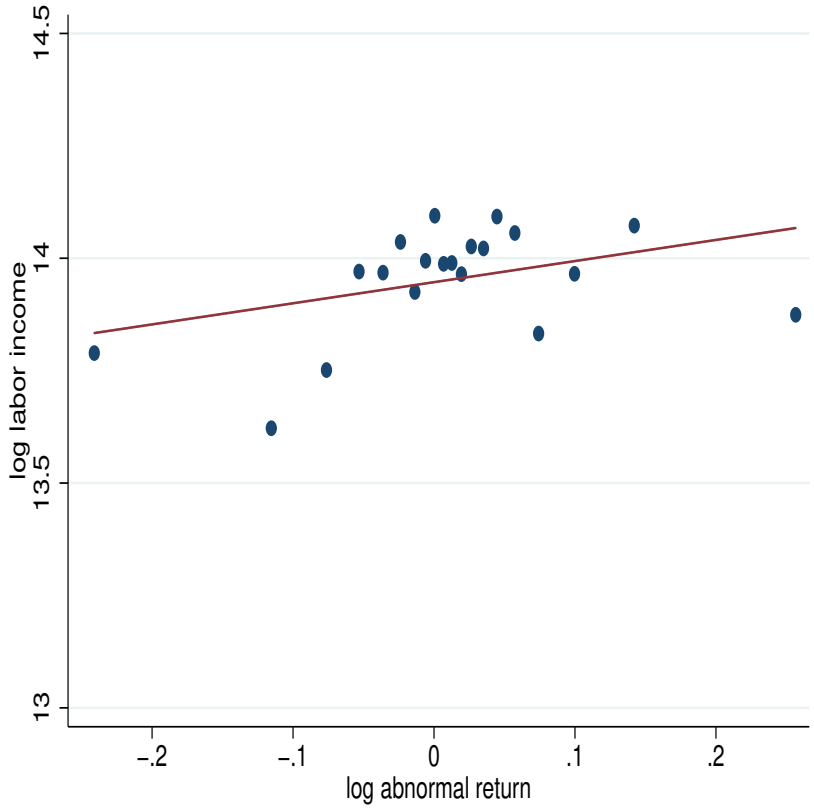
Economic Magnitudes

- **Pay-Revenue Sensitivity**

- Effect is mostly unchanged by controls and manager fixed effects
  - Experience and age matter substantially, concave
  - Co-management and several management teams lower pay
  - Sensitivity affected little by manager FE: time, not just XS variation
  - Detailed results: ▸ table with controls

Log Pay and Log Performance





- Log pay and log abnormal return: not great fit
- Adding controls (right panel) does not help much

Sensitivity of Pay to Performance

	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.385*	0.407**	0.0913
	(0.208)	(0.189)	(0.143)
Year FE	Yes	Yes	Yes
Controls	No	Yes	Yes
Category FE	No	Yes	Yes
Manager FE	No	No	Yes
N	3016	2898	2898
Adjusted R^2	0.022	0.146	0.594
	Standardized Revenue and Performance		
$\log\left(1+R^{abn}_{m,t-1}\right)_{std}$	0.0318	0.0290	-0.00328

Economic Magnitudes

- **Pay-Performance Sensitivity**
  - 1% point increase in abnormal return increases pay by 0.39%
  - Increasing abnormal return from 0% to 1% increases pay by $372
  - 1-std increase in performance increases pay by 2.9% (0.04-std)
  - Average manager's pay seems to have only very small performance component

- Does not survive inclusion of controls and manager FE ▸ table with controls

Economic Magnitudes: Model of Berk and Green (JPE, 04)

- $AUM_t = q_t$ (infinite elasticity of supply from investors)
- $TER = f$
- $R^{\text{gross}}_{t+1} = \alpha + \varepsilon_{t+1}$
  - $\alpha \sim N(\phi_0, \eta^2)$ (cross-sectional distribution)
  - $\varepsilon_{t+1} \sim N(0, \sigma^2)$ (time-series distribution)
- $R^{abn}_{t+1} = R^{\text{gross}}_{t+1} - c(q_t) - f$
  - $c(q)$ increasing in q_t
- $\hat{\alpha}_t = E[R^{\text{gross}}_{t+1} | \hat{\alpha}_{t-1}, R^{\text{gross}}_t, q_{t-1}]$ (Bayesian updating of investors)
- $E[R^{abn}_{t+1}] = 0$ (Equilibrium)
- $\Delta q_t \cdot f$ responds to R^{abn}_t
- Fund company=fund owner=fund manager

Economic Magnitudes: Model of Berk and Green (JPE, 04)

- Our estimates of PPS much lower than model's
- $\eta = 0.06$:
  - PPS estimate of 1.6 (0.7 with manager FE)
  - Factor 4-6 larger than our estimates
- $\eta = 0.03$ + tight prior distribution on α:
  - PPS estimate of 0.6 (0.3 with manager FE)
  - Factor 2 larger than our estimates
  - But precise prior beliefs about manager alpha seem implausible...

Outline

- Data and Measurement
- 1. Sensitivity of pay to revenue and performance
  - Baseline results
  - **Revenue as performance measure?**
  - Longer performance evaluation horizon
- 2. Importance of firm
- Robustness

Decomposing Fund Revenue

- Revenue contains performance-related components that could be behind the pay-revenue sensitivity (PRS)
  - Abnormal returns mechanically grow fund
  - Abnormal returns attract new flows (flow-performance relationship)
  - Abnormal returns could lead to increases in TER
  - Abnormal returns may lead fund owner to allocate new capital to manager (or funds with higher TER)
- Orthogonalize revenue to abnormal return
- Is PRS diminished once contribution of performance to revenue is removed?
- Is PPS enhanced once those components are attributed to abnormal returns?

Reallocating Effects of Performance

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.141***			0.140***			
	(0.0194)			(0.0195)			
$\log(REVorth_{m,t})$		0.144***	0.134***		0.144***	0.144***	0.130***
		(0.0194)	(0.0257)		(0.0193)	(0.0193)	(0.0255)
$\log(1+R^{abn}_{m,t})$						0.0646	0.253
						(0.151)	(0.194)
$\log\left(1+R^{abn}_{m,t-1}\right)$				0.148	0.327*	0.325*	0.586**
				(0.176)	(0.174)	(0.170)	(0.236)
$\log\left(1+R^{abn}_{m,t-2}\right)$							0.583***
							(0.200)
$\log\left(1+R^{abn}_{m,t-3}\right)$							0.274*
							(0.158)
Constant	7.173***	9.509***	9.074***	7.212***	9.563***	9.561***	9.141***
	(0.595)	(0.639)	(0.894)	(0.602)	(0.646)	(0.645)	(0.904)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	No
N	2898	2883	1932	2898	2883	2883	1932
Adjusted R^2	0.229	0.233	0.182	0.229	0.234	0.234	0.190

Reallocating Effects of Performance

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.141***			0.140***			
	(0.0194)			(0.0195)			
$\log(REVorth_{m,t})$		0.144***	0.134***		0.144***	0.144***	0.130***
		(0.0194)	(0.0257)		(0.0193)	(0.0193)	(0.0255)
$\log\left(1+R^{abn}_{m,t}\right)$						0.0646	0.253
						(0.151)	(0.194)
$\log\left(1+R^{abn}_{m,t-1}\right)$				0.148	0.327*	0.325*	0.586**
				(0.176)	(0.174)	(0.170)	(0.236)
$\log\left(1+R^{abn}_{m,t-2}\right)$							0.583***
							(0.200)
$\log\left(1+R^{abn}_{m,t-3}\right)$							0.274*
							(0.158)
Constant	7.173***	9.509***	9.074***	7.212***	9.563***	9.561***	9.141***
	(0.595)	(0.639)	(0.894)	(0.602)	(0.646)	(0.645)	(0.904)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	No
N	2898	2883	1932	2898	2883	2883	1932
Adjusted R^2	0.229	0.233	0.182	0.229	0.234	0.234	0.190

Revenue Decomposition: Take-Aways

- Little evidence that PRS is driven by performance-related components of revenue
  - Coefficient on revenue barely diminished
  - Robust to including squared returns in the orthogonalization (e.g., convexity of flow-performance relationship)
  - Explore separate components of revenue (growth) ▸ details
  - Explore dynamic wage response using panel VAR ▸ VAR

Revenue Decomposition: Take-Aways

- Little evidence that PRS is driven by performance-related components of revenue
  - Coefficient on revenue barely diminished
  - Robust to including squared returns in the orthogonalization (e.g., convexity of flow-performance relationship)
  - Explore separate components of revenue (growth) ▸ details
  - Explore dynamic wage response using panel VAR ▸ VAR

- PPS increases, but economic magnitude remains modest
  - Sensitivity to lagged abnormal return is 0.33, similar to baseline estimate
  - Sensitivity to lagged abnormal return increases to 0.59 with longer evaluation period

Outline

- Data and Measurement
- 1. Sensitivity of pay to revenue and performance
  - Baseline results
  - Revenue as performance measure?
  - **Longer performance evaluation horizon**
- 2. Importance of firm
- Robustness

Performance Evaluation Horizon

- Estimating the PPS may require more lags of abnormal returns
  - Returns are volatile: little signal, much noise when making skill inference
- Consistent with current practice
  - U.S. mutual fund companies report mean evaluation periods of 3 years (Ma, Tang, and Gomez, 16)
  - E.U. mandates that 40% of performance-based pay be delayed 3 years starting in 2009
- But requiring more lags of abnormal returns introduces selection (survivorship) bias

Longer Performance Evaluation Windows

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.143***	0.135***	0.141***	0.132***	0.131***	
	(0.0195)	(0.0220)	(0.0256)	(0.0222)	(0.0256)	(0.0255)	
$\log(REVorth_{m,t})$							0.131***
							(0.0256)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	0.276	0.348	0.278	0.348	0.366	0.611**
	(0.176)	(0.214)	(0.248)	(0.214)	(0.249)	(0.253)	(0.246)
$\log\left(1+R^{abn}_{m,t-2}\right)$				0.330**	0.452**	0.462**	0.573***
				(0.163)	(0.193)	(0.197)	(0.196)
$\log\left(1+R^{abn}_{m,t-3}\right)$						0.198	0.286*
						(0.157)	(0.160)
Constant	7.212***	6.939***	6.871***	7.034***	6.904***	6.969***	9.136***
	(0.602)	(0.722)	(0.866)	(0.732)	(0.868)	(0.876)	(0.902)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	No
N	2898	2411	1932	2411	1932	1932	1932
Adjusted R^2	0.229	0.218	0.188	0.219	0.190	0.190	0.190

Longer Performance Evaluation Windows

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.143***	0.135***	0.141***	0.132***	0.131***	
	(0.0195)	(0.0220)	(0.0256)	(0.0222)	(0.0256)	(0.0255)	
$\log(REVorth_{m,t})$							0.131***
							(0.0256)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	0.276	0.348	0.278	0.348	0.366	0.611**
	(0.176)	(0.214)	(0.248)	(0.214)	(0.249)	(0.253)	(0.246)
$\log\left(1+R^{abn}_{m,t-2}\right)$				0.330**	0.452**	0.462**	0.573***
				(0.163)	(0.193)	(0.197)	(0.196)
$\log\left(1+R^{abn}_{m,t-3}\right)$						0.198	0.286*
						(0.157)	(0.160)
Constant	7.212***	6.939***	6.871***	7.034***	6.904***	6.969***	9.136***
	(0.602)	(0.722)	(0.866)	(0.732)	(0.868)	(0.876)	(0.902)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No	No
N	2898	2411	1932	2411	1932	1932	1932
Adjusted R^2	0.229	0.218	0.188	0.219	0.190	0.190	0.190

Outline

- Data and Measurement
- 1. Sensitivity of pay to revenue and performance
- **2. Importance of firm**
  - Firm and firm-year fixed effects
  - Revenue of other managers at firm affects compensation
  - Profitability affects pay level, PRS, and PPS
  - Firm-level analysis
  - Big-4 banks
- Robustness

Importance of the Firm: FEs and Revenue

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.0750***	0.0631***	0.0982***	0.0741***	0.0649***	0.0418**
	(0.0195)	(0.0145)	(0.0156)	(0.0180)	(0.0153)	(0.0167)	(0.0167)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	0.0396	0.358**	0.604	-0.0678	0.901*	0.295
	(0.176)	(0.137)	(0.146)	(0.368)	(0.305)	(0.462)	(0.342)
$\log(REV_{f,-m,t})$				0.0473***	0.0478*	0.0461***	0.111***
				(0.0110)	(0.0259)	(0.0148)	(0.0407)
$\log\left(1+R^{abn}_{f,-m,t-1}\right)$				0.556	0.0126	0.609	0.144
				(0.359)	(0.312)	(0.394)	(0.320)
Constant	7.212***	8.184***	7.924***	6.664***	7.301***	6.690***	5.944***
	(0.602)	(0.609)	(0.846)	(0.555)	(0.731)	(0.534)	(0.859)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	No	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	No	Yes	No	Yes
Firm FE x Year FE	No	No	Yes	No	No	No	No
N	2898	2898	2898	2739	2739	2013	2013
Adjusted R^2	0.229	0.426	0.531	0.246	0.407	0.250	0.394

Importance of the Firm: FEs and Revenue

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.0750***	0.0631***	0.0982***	0.0741***	0.0649***	0.0418**
	(0.0195)	(0.0145)	(0.0156)	(0.0180)	(0.0153)	(0.0167)	(0.0167)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	0.0396	0.358**	0.604	-0.0678	0.901*	0.295
	(0.176)	(0.137)	(0.146)	(0.368)	(0.305)	(0.462)	(0.342)
$\log(REV_{f,-m,t})$				0.0473***	0.0478*	0.0461***	0.111***
				(0.0110)	(0.0259)	(0.0148)	(0.0407)
$\log\left(1+R^{abn}_{f,-m,t-1}\right)$				0.556	0.0126	0.609	0.144
				(0.359)	(0.312)	(0.394)	(0.320)
Constant	7.212***	8.184***	7.924***	6.664***	7.301***	6.690***	5.944***
	(0.602)	(0.609)	(0.846)	(0.555)	(0.731)	(0.534)	(0.859)
Manager FE	No	No	No	No	No	No	No
Year FE	Yes	Yes	No	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	No	Yes	No	Yes
Firm FE x Year FE	No	No	Yes	No	No	No	No
N	2898	2898	2898	2739	2739	2013	2013
Adjusted R^2	0.229	0.426	0.531	0.246	0.407	0.250	0.394

Importance of the Firm: Profits

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.237***	0.116***	0.205***	0.160***	0.234***	0.122***
	(0.0399)	(0.0235)	(0.0370)	(0.0332)	(0.0410)	(0.0244)
$\log\left(1+R^{abn}_{m,t-1}\right)$	-0.132	-0.762*	-0.243	-0.394	-0.177	-0.748*
	(0.443)	(0.428)	(0.304)	(0.290)	(0.433)	(0.412)
$Profit_{f,t-1}$	2.325***	0.880**	2.494***	1.002**	0.144***	0.0581**
	(0.637)	(0.396)	(0.598)	(0.469)	(0.0363)	(0.0233)
$(Profit_{f,t-1}) \times \log\left(1+R^{abn}_{m,t-1}\right)$	0.369	1.045**	0.625*	0.508	0.0253	0.0589**
	(0.451)	(0.443)	(0.331)	(0.320)	(0.0249)	(0.0243)
$(Profit_{f,t-1}) \times \log(REV_{m,t})$	-0.133***	-0.0522**	-0.135***	-0.0544*	-0.00801***	-0.00339**
	(0.0389)	(0.0236)	(0.0376)	(0.0279)	(0.00222)	(0.00139)
Constant	5.657***	8.094***	6.202***	11.44***	5.642***	7.965***
	(0.774)	(0.700)	(0.707)	(1.869)	(0.775)	(0.706)
Manager FE	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	No	Yes	No	Yes
Firm FE x Year FE	No	No	No	No	No	No
Profit variable	Pos/Neg	Pos/Neg	$\geq$ Median	$\geq$ Median	log(Profit) if Pos	log(Profit) if Pos
N	2535	2535	2535	2535	2535	2535
Adjusted R^2	0.250	0.428	0.274	0.633	0.259	0.428

Firm-level analysis

- If firm costs increase as revenue increases, how should we gauge magnitude of PRS elasticity?
  - Is elasticity higher out of profits?
- Use accounting data at firm level (Serrano)
- $REV_{f,t} = L_{f,t} + COSTS_{f,t} + PROFIT_{f,t}$

Firm-level analysis

	(1) $\log(L_{f,t})$	(2) $\log(L_{f,t})$	(3) $\log(L_{f,t})$	(4) $\log(L_{f,t})$
$\log(REV_{f,t})$	0.600^{***}		0.637^{***}	
	(0.0326)		(0.0298)	
$\log(REV_{f,t} - COSTS_{f,t})$		0.585^{***}		
		(0.0388)		
$\log(1 - COSTS_{f,t}/REV_{f,t})$			0.254^{***}	
			(0.0495)	
$\log(PROFIT_{f,t})$				0.479^{***}
				(0.0508)
Constant	4.317^{***}	5.592^{***}	4.050^{***}	7.397^{***}
	(0.616)	(0.691)	(0.541)	(0.866)
Year FE	Yes	Yes	Yes	Yes
Controls	No	No	No	No
N	579	565	565	474
Adjusted R^2	0.674	0.645	0.734	0.500

Importance of the Firm: Big-4 Banks

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.172***	0.0982***	0.107***	0.126***	0.155***
	(0.0195)	(0.0265)	(0.0180)	(0.0243)	(0.0205)	(0.0284)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	0.101	0.604	0.472	0.485	0.315
	(0.176)	(0.224)	(0.368)	(0.382)	(0.388)	(0.411)
$Big4_{m,t}$		1.836***		3.313***		1.851***
		(0.505)		(0.654)		(0.559)
$Big4_{m,t} \times \log(REV_{m,t})$		-0.108***		-0.0473		-0.0912***
		(0.0304)		(0.0299)		(0.0338)
$Big4_{m,t} \times \log\left(1+R^{abn}_{m,t-1}\right)$		0.134		-0.167		0.181
		(0.290)		(0.645)		(0.704)
$\log(REV_{f,-m,t})$			0.0473***	0.0976***		
			(0.0110)	(0.0164)		
$\log\left(1+R^{abn}_{f,-m,t-1}\right)$			0.556	0.564	0.441	0.350
			(0.359)	(0.401)	(0.360)	(0.408)
$Big4_{m,t} \times \log(REV_{f,-m,t})$				-0.133***		
				(0.0271)		
$Big4_{m,t} \times \log\left(1+R^{abn}_{f,-m,t-1}\right)$				-0.451		-0.0563
				(0.587)		(0.642)
$\log\left(Profit^{+}_{f,t-1}\right)$					0.0168***	0.0214***
					(0.00377)	(0.00502)
$Big4_{m,t} \times \log\left(Profit^{+}_{f,t-1}\right)$						-0.0212***
						(0.00646)
Constant	7.212***	6.588***	6.664***	5.493***	7.499***	7.017***
	(0.602)	(0.629)	(0.555)	(0.589)	(0.637)	(0.664)
Manager FE	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	No	No	No
Firm FE x Year FE	No	No	No	No	No	No
N	2898	2898	2739	2739	2533	2533
Adjusted R^2	0.229	0.239	0.246	0.272	0.243	0.256

Importance of the Firm: Take-Aways

- Adding firm FE and firm-year FE raises explained variation in compensation from 23% to 43% and 53%, resp. and reduces sensitivity of pay to own-fund revenue
- Firm revenue generated by colleagues affects pay with sensitivity of 1/2 that of own revenue
- Pay is higher in profitable firms, PRS is lower, and PPS higher. Consistent with anecdotal evidence on bonus pools.
- Big-4 commercial banks have higher pay (fixed salary), but lower sensitivity of pay to manager revenue, firm revenue, and firm profit

Outline

- Data and Measurement
- 1. Sensitivity of pay to revenue and performance
- 2. Importance of firm
- **Robustness**
  - Non-linearities in PPS
  - Dividend and total income
  - Transitions
  - By investment category
  - Alternative performance measures

Sensitivity of Pay to Performance: Non-linearities

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$			0.138***	0.121***	0.130***	0.121***
			(0.0193)	(0.0240)	(0.0195)	(0.0380)
$\log\left(1+R^{abn}_{m,t-1,2}\right)$	0.142***	0.0347	0.0714	0.0221	0.0661	0.0399
	(0.0470)	(0.0386)	(0.0436)	(0.0370)	(0.0583)	(0.0497)
$\log\left(1+R^{abn}_{m,t-1,3}\right)$	0.179***	0.0385	0.0926**	0.0172	0.118**	0.0476
	(0.0507)	(0.0409)	(0.0468)	(0.0407)	(0.0492)	(0.0475)
$\log\left(1+R^{abn}_{m,t-1,4}\right)$	0.165***	0.0918**	0.102**	0.0691*	0.0695	0.0530
	(0.0527)	(0.0402)	(0.0493)	(0.0387)	(0.0588)	(0.0453)
Constant	9.464***	11.54***	7.261***	10.27***	7.672***	12.45***
	(0.633)	(2.207)	(0.606)	(1.848)	(0.624)	(1.958)
Manager FE	No	Yes	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Equity	Equity
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	2898	2898	2898	2898	1740	1740
Adjusted R^2	0.151	0.595	0.230	0.615	0.273	0.627

Non-linearity: Take-Aways

- PPS is positive and significant for the top quartile of managers by abnormal return
  - Economically small effect: 10% compensation gap between Q4 and Q1
  - Smaller still with manager FE: 7% difference
  - Not robust to the (largest) subset of Equity mutual funds
  - Small compared to Berk and Green model: 80% gap between Q4 and Q1
- Reinforces message that PPS is weak

Non-linearity: Take-Aways

- PPS is positive and significant for the top quartile of managers by abnormal return
- Reinforces message that PPS is weak
- Estimate talent distribution among our mutual fund managers using Gabaix-Landier (2008) assignment model
  - Find small marginal revenue benefit from adding marginally more talented manager $\Rightarrow$ Consistent with importance of firm-level contributions
  - Find that tail exponent of manager talent distribution is small (compared to US CEOs) $\Rightarrow$ Consistent with low PPS

Labor, Dividend, and Total Income

	(1) $\log(L_{m,t})$	(2) $\log(D_{m,t})$	(3) $\log(Y_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(D_{m,t})$	(6) $\log(Y_{m,t})$	(7) $\log(L_{m,t})$	(8) $\log(D_{m,t})$	(9) $\log(Y_{m,t})$
$\log(REV_{m,t})$	0.140***	0.0839	0.154***	0.0741***	0.191***	0.0869***	0.0596***	0.195***	0.0686***
	(0.0195)	(0.0694)	(0.0200)	(0.0153)	(0.0665)	(0.0156)	(0.0150)	(0.0701)	(0.0154)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148	2.352***	0.542**	-0.0678	2.164*	0.358	0.244*	0.0378	0.261*
	(0.176)	(0.729)	(0.213)	(0.305)	(1.146)	(0.380)	(0.143)	(0.676)	(0.137)
$\log(REV_{f,-m,t})$				0.0478*	0.309**	0.0712**			
				(0.0259)	(0.134)	(0.0294)			
$\log\left(1+R^{abn}_{f,-m,t-1}\right)$				0.0126	2.175*	0.311			
				(0.312)	(1.133)	(0.356)			
$Board_{m,t}$							-1.548***	0.147	-1.932***
							(0.513)	(2.274)	(0.628)
$Board_{m,t} \times \log\left(1+R^{abn}_{m,t-1}\right)$							-0.649**	1.330	0.0496
							(0.322)	(1.428)	(0.395)
$Board_{m,t} \times \log(REV_{m,t})$							0.0957***	0.0603	0.126***
							(0.0319)	(0.142)	(0.0376)
Constant	7.212***	-4.860	6.545***	7.301***	-9.183**	6.705***	8.369***	-3.277	8.308***
	(0.602)	(3.059)	(0.695)	(0.731)	(3.901)	(0.819)	(0.604)	(2.982)	(0.652)
Manager FE	No	No	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes
N	2898	2262	2898	2739	2132	2739	2898	2262	2898
Adjusted R^2	0.229	0.187	0.245	0.407	0.398	0.483	0.431	0.403	0.499

Other structures for remuneration

- Fund managers may own shares in fund companies or private LLCs that own shares in fund companies
- Can detect direct ownership in fund companies using K-10 tax forms from 2005 and onwards
- Can unravel complex chains if ownership stake $>20\%$
- Add product of ownership shares and fund company profits to pay
- 51 out of 498 fund managers detected as owners
- PPS increases from 0.63 to 0.73 when ownership of profits accounted for

Transitions

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$	(8) $\log(L_{m,t})$
$\log(REV_{m,t-1})$	0.133***	0.128***	0.0627	0.134***	0.141***	0.0845***	0.139***	0.152***
	(0.0185)	(0.0171)	(0.0388)	(0.0184)	(0.0198)	(0.0237)	(0.0205)	(0.0310)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.303*	0.348**	-0.412	0.360**	0.317*	0.310	0.316*	0.425
	(0.176)	(0.173)	(0.617)	(0.181)	(0.190)	(0.466)	(0.184)	(0.420)
$Exit_{m,t}$				1.121**				
				(0.536)				
$Exit_{m,t} \times \log\left(1+R^{abn}_{m,t-1}\right)$				-0.219				
				(0.503)				
$Exit_{m,t} \times \log(REV_{m,t-1})$				-0.0891***				
				(0.0338)				
Constant	7.682***	7.491***	0.560	7.342***	7.658***	9.132***	7.701***	8.113***
	(0.631)	(0.621)	(2.669)	(0.621)	(0.654)	(0.957)	(0.703)	(0.838)
Manager FE	No	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2898	3263	245	3263	2702	315	2184	518
Adjusted R^2	0.224	0.189	0.107	0.200	0.226	0.185	0.210	0.319

Transition 1: Exiting the mutual fund business (columns 1 -4)

Transition 2: Changing firms (columns 5-6)

Transition 3: Changing funds within same firm

By Investment Category

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.133***	0.148**	0.0308	0.189***	-0.0234
	(0.0194)	(0.0587)	(0.0360)	(0.0600)	(0.126)
$\log\left(1 + R^{abn}_{m,t-1}\right)$	0.0776	-0.522	-0.278	0.269	0.382
	(0.161)	(1.041)	(0.386)	(0.616)	(0.885)
Constant	7.532***	9.884***	8.754***	5.401*	19.28**
	(0.619)	(1.581)	(1.089)	(2.739)	(8.281)
Manager FE	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes
Category	Equity	Allocation	Fixed Income	Alternative	Rest
Controls	Yes	Yes	Yes	Yes	Yes
N	1740	352	317	439	50
Adjusted R^2	0.271	0.253	0.294	0.325	0.272

Equity mutual funds largest category - similar PRS of 0.133.

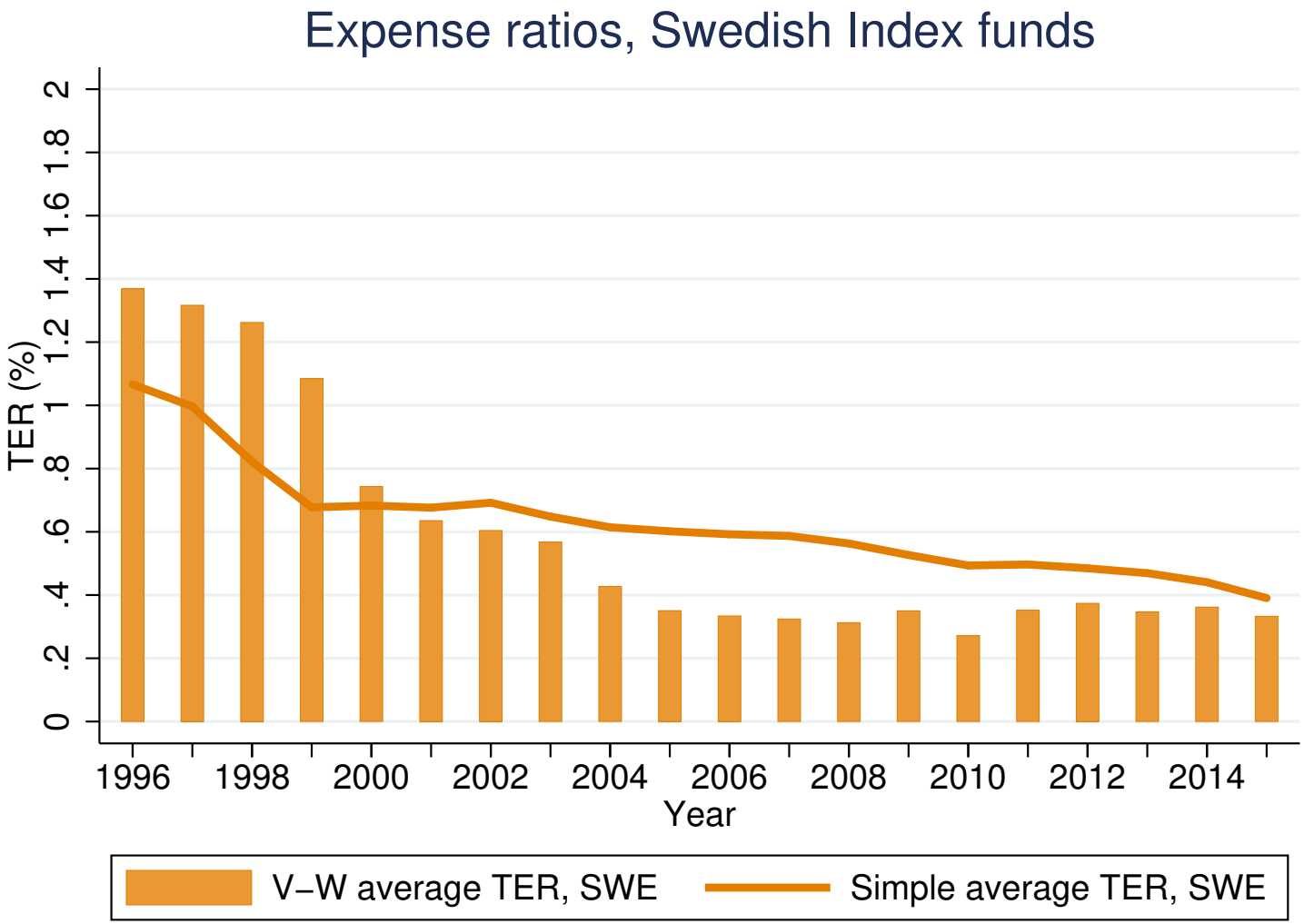
Alternative Performance Measures

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$	(8) $\log(L_{m,t})$	(9) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.140***	0.141***	0.140***	0.140***	0.142***	0.139***	0.140***	0.140***	0.140***
	(0.0195)	(0.0193)	(0.0196)	(0.0196)	(0.0200)	(0.0191)	(0.0198)	(0.0198)	(0.0194)
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.148								
	(0.176)								
$\log\left(1+R^{exc}_{m,t-1}\right)$		-0.0314							
		(0.0840)							
$\log\left(1+R^{abn,CAPM}_{m,t-1}\right)$			0.0511						
			(0.125)						
$\log\left(1+R^{abn,FF3}_{m,t-1}\right)$				0.0727					
				(0.130)					
$\log\left(1+R^{abn,GF5}_{m,t-1}\right)$					-0.0532				
					(0.151)				
$ValueAdded_{m,t-1}$						0.0486			
						(0.0600)			
$rank\left(R^{abn}_{m,t-1}\right)$ within firm							0.00123		
							(0.00192)		
$rank\left(R^{abn}_{m,t-1}\right)_{std}$ within firm								0.000806	
								(0.00192)	
$\log\left(1+R^{exc}_{m,t-1}\right)$ within category									0.0703
									(0.106)
Constant	7.212***	7.172***	7.165***	7.174***	7.574***	7.188***	7.185***	7.181***	7.189***
	(0.602)	(0.596)	(0.609)	(0.609)	(0.637)	(0.595)	(0.595)	(0.596)	(0.600)
Manager FE	No	No	No	No	No	No	No	No	No
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2898	2898	2885	2885	2795	2898	2898	2898	2898
Adjusted R^2	0.229	0.229	0.228	0.228	0.219	0.229	0.229	0.229	0.229

Conclusion

- First study of actual income data for mutual fund managers
- Main finding:
  1. Pay is much more sensitive to revenue than to performance
     - ⋆ Performance-based compensation options are small or expire out-of-the-money
  2. Elasticity of pay to revenue is fairly small: Bulk of the extra revenues goes to the fund family, not managers
  3. Firm-level revenue and profit exert importance influence on manager compensation
- Suggests a more holistic approach to the study of incentives and inference of managerial skill
- Production function of fund performance takes both manager skill and firm characteristics as inputs

Expense Ratios for Index Funds



Flow-Performance Relationship on Abnormal Returns

Similar to Sirri and Tufano (JF, 98)

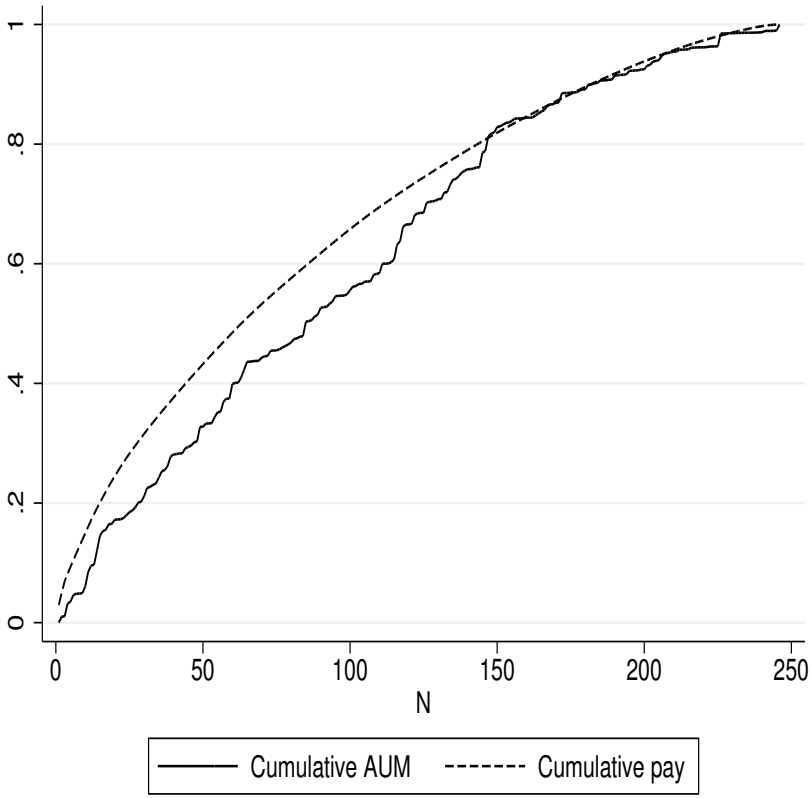
	(1) $FLOW_{it}$	(2) $FLOW_{it}$	(3) $FLOW_{it}$	(4) $FLOW_{it}$	(5) $FLOW_{it}$	(6) $FLOW_{it}$
$LOWPERF_{i,t-1}$	0.374	-0.317	-0.111	-0.397	-1.008**	-0.485
$MIDPERF_{i,t-1}$	0.175**	0.186**	0.307***	0.136	0.182*	0.120
$HIGHPERF_{i,t-1}$	0.977**	0.948**	0.632	1.549***	1.440***	1.974***
$\sigma_{i,t-1}$	0.255	0.815	1.209**	0.556	2.442***	
$TER_{i,t-1}$	-0.0824***	-0.0447	-0.123***	-0.00890	0.0406	
Flows to cat.$_{i,t-1}$	0.0295	-0.00301	0.0822	-0.0202	0.0642	
$AUM_{i,t-1}$	-0.197***	-0.439***	-0.181***			
Fund FE	No	Yes	No	No	Yes	No
Categories	All	All	Equity	All	All	All
N	10576	10576	6295	10576	10576	10633
Adjusted R^2	0.081	0.221	0.082	0.005	0.069	0.005

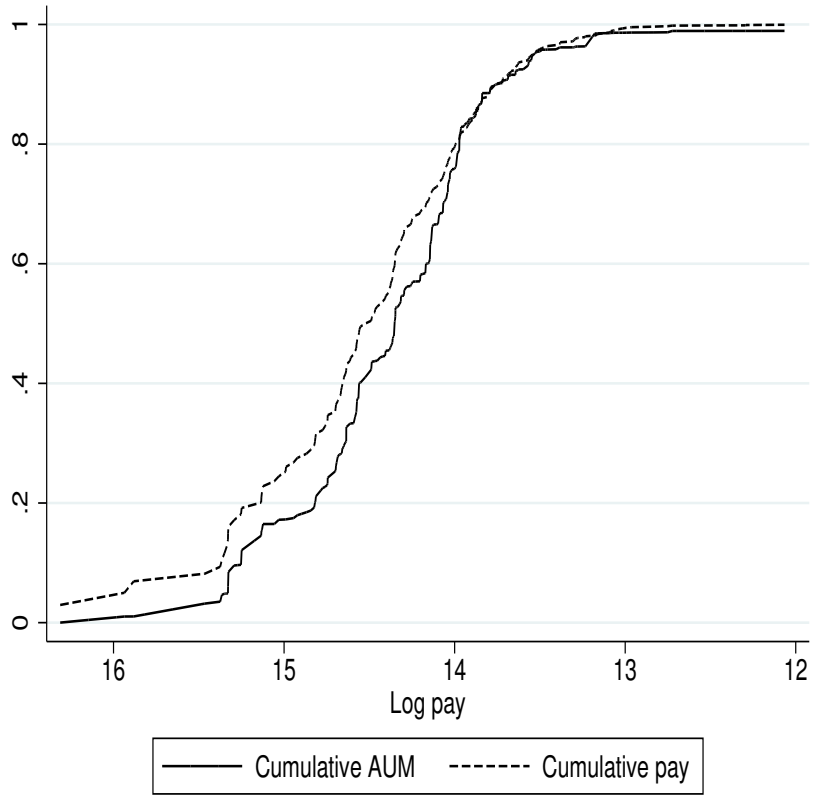
Back

Firm-level Data Sources

- Profitability of fund companies: from Serrano
- Member of board of directors as proxy for partner of the firm - hand collected socials for board members
- Income statements on fund companies from Serrano and FRIDA – in progress
- Fund managers' privately held companies (forms K10, K10a, K12) – in progress – to xplore ties between privately held management companies and fund companies

AUM and Wage Distribution in 2015

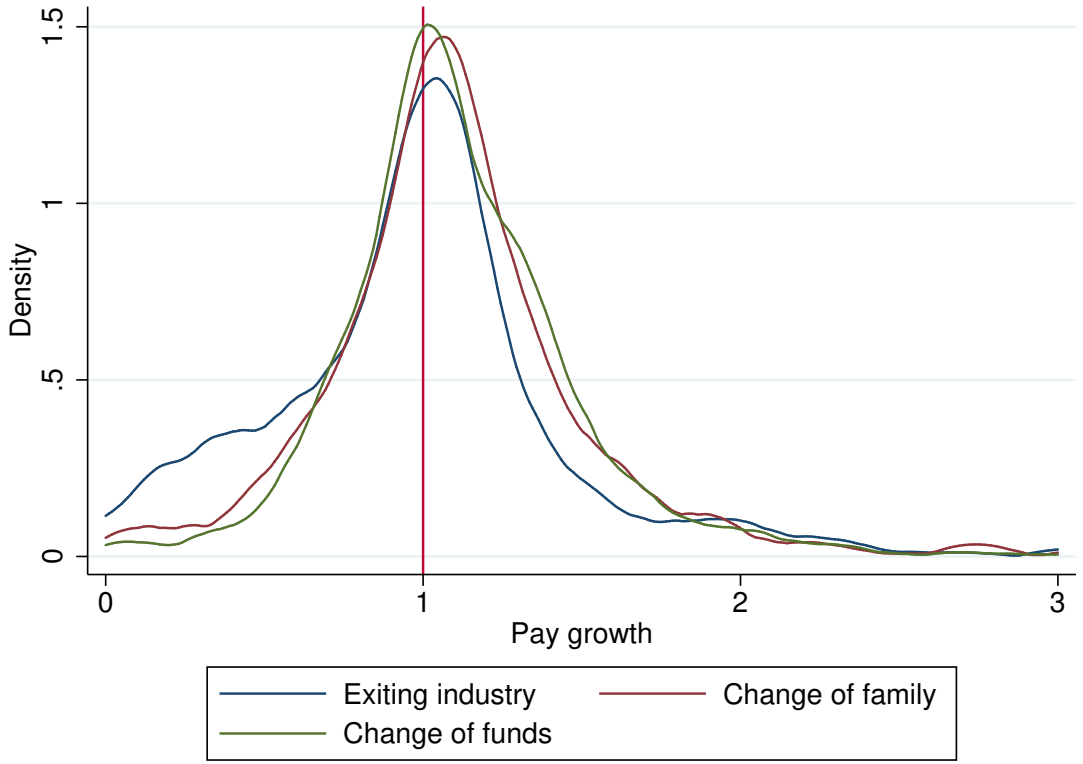




- Order all managers in 2015 from highest to lowest labor income
- Cumulative AUM and cumulative wages
- Rank and file manage a large fraction of AUM and receive a large fraction of wages

Back

Transitions



variable	p10	p25	p50	p75	p90	mean	sd	N
pay growth exiting managers	0.40	0.73	1.02	1.18	1.56	1.06	0.71	303
pay growth change of family	0.65	0.89	1.07	1.27	1.59	1.11	0.50	498
pay growth change of funds	0.72	0.91	1.06	1.30	1.58	1.16	0.65	759
pay growth full sample	0.67	0.90	1.05	1.26	1.60	1.24	3.24	4738

▸ Back

Main Results with Controls

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.153***	0.141***	0.123***			
	(0.0179)	(0.0194)	(0.0239)			
$\log\left(1+R^{abn}_{m,t-1}\right)$				0.385*	0.407**	0.0913
				(0.208)	(0.189)	(0.143)
$Exper_{m,t-1}$		0.0323***	0.0961**		0.0570***	0.121**
		(0.0118)	(0.0482)		(0.0123)	(0.0569)
$Exper^2_{m,t-1}$		-0.000533	-0.0000195		-0.00119***	-0.000731
		(0.000408)	(0.000755)		(0.000446)	(0.000721)
$Age_{m,t-1}$		0.177***	0.0942		0.175***	0.0994
		(0.0292)	(0.0676)		(0.0278)	(0.0751)
$Age^2_{m,t-1}$		-0.00191***	-0.00153***		-0.00193***	-0.00156***
		(0.000351)	(0.000544)		(0.000327)	(0.000584)
$Edu_{m,t-1}$		0.00938	-0.0264		0.0164	-0.00132
		(0.0145)	(0.0493)		(0.0150)	(0.0500)
$Finance_{m,t-1}$		0.259**	0.255***		0.335***	0.280***
		(0.106)	(0.0572)		(0.0892)	(0.0654)
$Coman_{m,t-1}$		-0.223***	0.0626		-0.310***	0.00874
		(0.0830)	(0.106)		(0.0830)	(0.113)
$Teams_{m,t-1}$		-0.0261**	0.00121		0.00781	0.0166*
		(0.0103)	(0.00855)		(0.0104)	(0.00915)
$TeamSize_{m,t-1}$		0.114***	-0.0110		0.0952**	-0.0346
		(0.0384)	(0.0466)		(0.0391)	(0.0504)
$NumCat_{m,t-1}$		0.0988	0.0934*		0.118*	0.151***
		(0.0691)	(0.0511)		(0.0694)	(0.0553)
Constant	10.97***	7.173***	10.35***	13.59***	9.450***	11.64***
	(0.313)	(0.595)	(1.834)	(0.158)	(0.632)	(2.192)
Manager FE	No	No	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	No	Yes	Yes	No	Yes	Yes
N	3016	2898	2898	3016	2898	2898
Adjusted R^2	0.138	0.229	0.614	0.022	0.146	0.594

▸ Back

Main Results with Controls

	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.153***	0.141***	0.123***			
	(0.0179)	(0.0194)	(0.0239)			
$\log\left(1+R^{abn}_{m,t-1}\right)$				0.385*	0.407**	0.0913
				(0.208)	(0.189)	(0.143)
$Exper_{m,t-1}$		0.0323***	0.0961**		0.0570***	0.121**
		(0.0118)	(0.0482)		(0.0123)	(0.0569)
$Exper^2_{m,t-1}$		-0.000533	-0.0000195		-0.00119***	-0.000731
		(0.000408)	(0.000755)		(0.000446)	(0.000721)
$Age_{m,t-1}$		0.177***	0.0942		0.175***	0.0994
		(0.0292)	(0.0676)		(0.0278)	(0.0751)
$Age^2_{m,t-1}$		-0.00191***	-0.00153***		-0.00193***	-0.00156***
		(0.000351)	(0.000544)		(0.000327)	(0.000584)
$Edu_{m,t-1}$		0.00938	-0.0264		0.0164	-0.00132
		(0.0145)	(0.0493)		(0.0150)	(0.0500)
$Finance_{m,t-1}$		0.259**	0.255***		0.335***	0.280***
		(0.106)	(0.0572)		(0.0892)	(0.0654)
$Coman_{m,t-1}$		-0.223***	0.0626		-0.310***	0.00874
		(0.0830)	(0.106)		(0.0830)	(0.113)
$Teams_{m,t-1}$		-0.0261**	0.00121		0.00781	0.0166*
		(0.0103)	(0.00855)		(0.0104)	(0.00915)
$TeamSize_{m,t-1}$		0.114***	-0.0110		0.0952**	-0.0346
		(0.0384)	(0.0466)		(0.0391)	(0.0504)
$NumCat_{m,t-1}$		0.0988	0.0934*		0.118*	0.151***
		(0.0691)	(0.0511)		(0.0694)	(0.0553)
Constant	10.97***	7.173***	10.35***	13.59***	9.450***	11.64***
	(0.313)	(0.595)	(1.834)	(0.158)	(0.632)	(2.192)
Manager FE	No	No	Yes	No	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Category FE	No	Yes	Yes	No	Yes	Yes
N	3016	2898	2898	3016	2898	2898
Adjusted R^2	0.138	0.229	0.614	0.022	0.146	0.594

▸ Back

Main Regressions with Value Added

	(1) $\log(L_{mt})$	(2) $\log(L_{mt})$	(3) $\log(L_{mt})$	(4) $\log(L_{mt})$	(5) $\log(L_{mt})$	(6) $\log(L_{mt})$	(7) $\log(L_{mt})$	(8) $\log(L_{mt})$	(9) $\log(L_{mt})$	(10) $\log(L_{mt})$	(11) $\log(L_{mt})$	(12) $\log(L_{mt})$
$\log(REV_{m,t})$	0.148***	0.137***	0.128***							0.148***	0.138***	0.130***
$\log\left(1+R^{abn}_{m,t-1}\right)$				0.349*	0.357**	0.147						
$V_{m,t}$							0.129	0.130*	0.000660			
$NV_{m,t}$										0.00346	0.0140	-0.0170
Constant	11.05***	6.998***	9.907***	13.59***	9.205***	11.29***	13.54***	9.145***	11.28***	11.05***	7.017***	9.800***
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls+Category FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Manager FE	No	No	Yes	No	No	Yes	No	No	Yes	No	No	Yes
Observations	2996	2878	2878	2996	2878	2878	2981	2864	2864	2981	2864	2864
Adjusted R^2	0.145	0.243	0.628	0.024	0.154	0.603	0.024	0.153	0.601	0.144	0.242	0.627

Back

Revenue Decomposition

- Decompose revenue and explore various components

$$\log\left(REV_{mt}\right) = \log\left(REV_{mt-1}\right) + \log\left(\frac{REV_{mt}}{REV_{mt-1}}\right).$$

- Revenue growth is TER growth plus AUM growth

$$\log\left(\frac{REV_{mt}}{REV_{mt-1}}\right) = \log\left(\frac{TER_{mt}}{TER_{mt-1}}\right) + \log\left(\frac{AUM_{mt}}{AUM_{mt-1}}\right).$$

- AUM growth at the *fund level*

$$\frac{AUM_{it}}{AUM_{it-1}} - 1 = R^{B}_{it} + R^{abn}_{it} + \underbrace{FlowPerf_{it-1} + RestFlow_{it}}_{Flow}$$

- Flow-performance relationship at the fund level

$$Flow_{it} = \frac{AUM_{it} - (1 + R^{net}_{it})AUM_{it-1}}{AUM_{it-1}} = \underbrace{bRank_{it-1}(R^{abn}_{it-1})}_{FlowPerf} + \underbrace{a + cZ_{it-1} + e_{it}}_{RestFlow}.$$

- Define new capital allocated to a manager as

$$NewCap_{mt} = \log\left(\frac{AUM_{mt}}{AUM_{mt-1}}\right) - R^{B}_{mt} - R^{abn}_{mt} - FlowPerf_{mt-1} - RestFlow_{mt}.$$

Back

Revenue Decomposition Results

	(1) $\log(TER_{m,t}/TER_{m,t-1})$	(2) $FlowPerf_{m,t-1}$	(3) $RestFlow_{m,t}$	(4) $NewCap_{m,t}$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$	(7) $\log(L_{m,t})$	(8) $\log(L_{m,t})$
$\log\left(1+R^{abn}_{m,t-1}\right)$	0.284***	0.0124	1.994***	-2.203***	0.167	0.413*	0.416*	0.244
	(0.0728)	(0.0129)	(0.224)	(0.225)	(0.182)	(0.236)	(0.238)	(0.216)
$\log\left(1+R^{abn}_{m,t-1}\right)$	-0.0384	0.682***	-0.148	-0.170	0.219	0.748*	0.788*	0.723***
	(0.0825)	(0.0206)	(0.222)	(0.204)	(0.248)	(0.415)	(0.422)	(0.237)
$\log\left(1+R^{abn}_{m,t-2}\right)$	-0.258**	0.00974	0.112	-0.0330			0.450**	0.533***
	(0.105)	(0.0151)	(0.218)	(0.207)			(0.199)	(0.197)
$\log\left(1+R^{abn}_{m,t-3}\right)$	-0.0000817	0.00437	0.0685	-0.0315			0.151	0.137
	(0.0590)	(0.0114)	(0.223)	(0.216)			(0.160)	(0.161)
$\log(REV_{m,t-1})$					0.148***	0.140***	0.136***	0.136***
					(0.0202)	(0.0268)	(0.0268)	(0.0268)
$\log(TER_{m,t}/TER_{m,t-1})$					0.210***	0.151*	0.163**	0.163**
					(0.0658)	(0.0787)	(0.0777)	(0.0777)
$FlowPerf_{m,t-1}$					0.0680	-0.279	-0.317	-0.317
					(0.338)	(0.499)	(0.497)	(0.497)
$RestFlow_{m,t}$					0.0598*	0.0438	0.0395	0.0395
					(0.0305)	(0.0444)	(0.0440)	(0.0440)
$NewCap_{m,t}$					0.0735**	0.0637	0.0620	0.0620
					(0.0295)	(0.0405)	(0.0399)	(0.0399)
$R^{b}_{m,t}$					0.126	0.197*	0.175	0.175
					(0.0936)	(0.118)	(0.116)	(0.116)
$TER_{m,t}$					-10.18**	-7.732	-7.670	-7.670
					(4.367)	(6.207)	(6.218)	(6.218)
Constant	-0.00382	0.139***	0.0817***	-0.253***	7.532***	7.101***	7.211***	9.303***
	(0.00444)	(0.00132)	(0.0204)	(0.0195)	(0.619)	(0.884)	(0.892)	(0.888)
Manager FE	No	No	No	No	No	No	No	No
Year FE	No	No	No	No	Yes	Yes	Yes	Yes
Category FE	No	No	No	No	Yes	Yes	Yes	Yes
Controls	No	No	No	No	Yes	Yes	Yes	Yes
N	1932	1855	1815	1815	2716	1815	1815	1815
Adjusted R^2	0.018	0.611	0.043	0.059	0.241	0.196	0.197	0.197

▸ Back ▸ Flow-performance regression

Estimating Talent Distribution among MF Managers

- Gabaix and Landier (08) propose assignment model where most talented CEOs match with largest firms
- Model implies equilibrium wage dynamics much like our specification

$$\log\left(L_{m,t}\right) = d + e\log\left(REV_{*,t}\right) + f\log\left(REV_{m,t}\right)$$

  - where $REV_{*,t}$ is the median manager revenue
  - Estimates for $e = \frac{\beta}{\alpha}$ and $f = \gamma - \frac{\beta}{\alpha}$ identify tail index of the managerial talent distribution β and elasticity of managerial talent w.r.t. revenue γ
  - Tail index of the revenue distribution α can be identified from regression (Gabaix and Ibragimov 11):

$$\log\left(REV_{m,t}\right) = c - \alpha\log\left(Rank_{m,t} - \frac{1}{2}\right)$$

Back

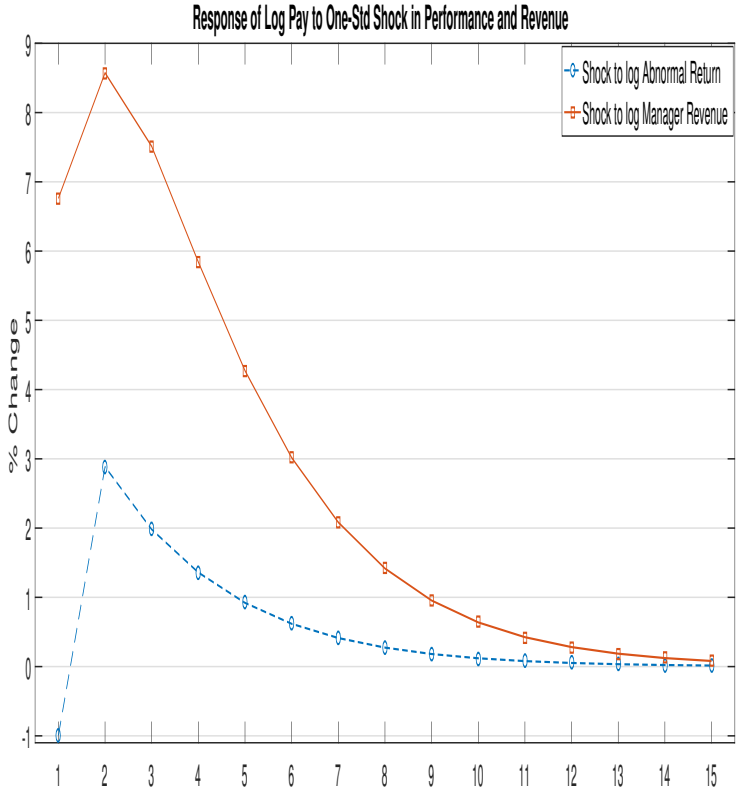
Assignment Model for MF Managers

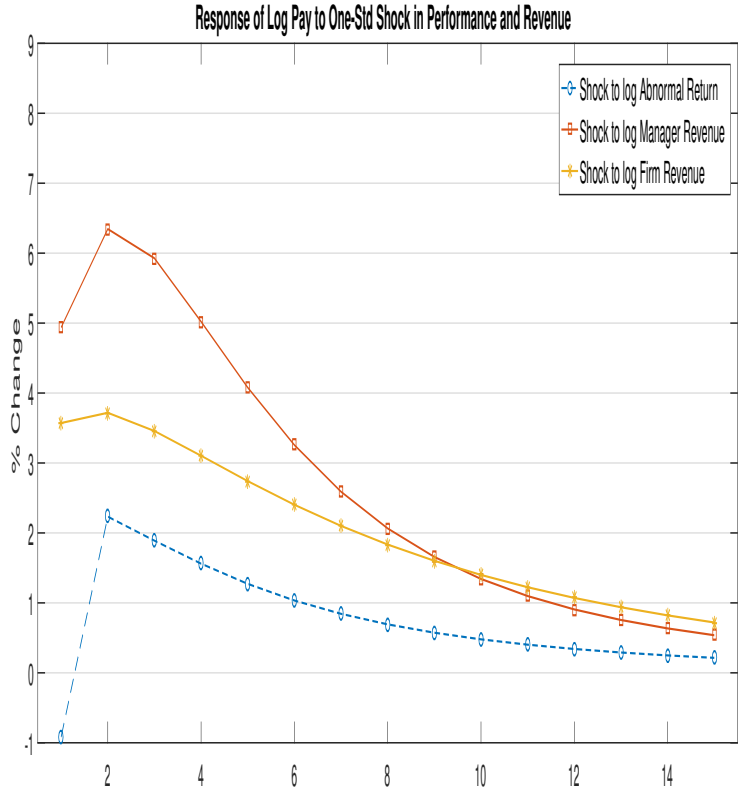
	(1) $\log(L_{m,t})$	(2) $\log(L_{m,t})$	(3) $\log(L_{m,t})$	(4) $\log(L_{m,t})$	(5) $\log(L_{m,t})$	(6) $\log(L_{m,t})$
$\log(REV_{m,t})$	0.126*	0.0997	0.217***	0.160***	0.118***	0.168***
	(0.0714)	(0.0801)	(0.0703)	(0.0376)	(0.0442)	(0.0484)
	(0.0397)	(0.0431)	(0.0472)	(0.0185)	(0.0206)	(0.0299)
$\log(REV_{f,t,median,25})$	0.0842	0.0628	0.0210			
	(0.107)	(0.105)	(0.0728)			
	(0.0838)	(0.0636)	(0.0724)			
$\log(REV_{f,t,median,50})$				0.0784	0.0306	-0.0152
				(0.0498)	(0.0506)	(0.0395)
				(0.0638)	(0.0434)	(0.0585)
Constant	10.29***	5.611**	1.645	9.810***	6.004***	6.083***
	(1.641)	(2.576)	(4.398)	(0.986)	(1.385)	(2.171)
	(1.265)	(1.299)	(2.763)	(1.085)	(0.862)	(1.588)
Manager FE	No	No	Yes	No	No	Yes
Year FE	No	No	No	No	No	No
Category FE	No	Yes	Yes	No	Yes	Yes
Controls	No	Yes	Yes	No	Yes	Yes
N	922	803	803	1848	1607	1607
Adjusted R^2	0.013	0.164	0.700	0.044	0.179	0.671

- $\gamma \approx 0.15 - 0.25 << 1$: strongly decreasing returns to scale from having more talented managers run larger funds
- $\alpha = 0.82 - 1.11$: fund size distribution close to Zipf's law
- $\beta < 0.1$: MF talent distribution much less fat-tailed than that of US CEOs (2/3)

▸ Back

VAR Evidence





- Left: Panel VAR(1) for manager abn. ret., log revenue, log pay
- Response of log pay to shock in abnormal return; shock to revenue $\perp$ abn. ret.
- Right: Add firm level revenue in 3rd position of VAR
- Response of log pay to shock in abn. ret.; shock to manager revenue $\perp$ abn. ret. ; shock to firm revenue $\perp$ abn. ret., manager rev Back