Pension Funds: Performance, Benchmarks and Costs

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Our Objective

- Measure the domestic equity performance of US pension funds on a total plan level
- For a variety of fund types and arrangements
- Including information on reported benchmarks and cost levels
- Investigate the cross-sectional differences in performance between pension funds

Pension Fund Performance?

- **Pension fund performance literature less developed**
  - Quality of data bases is often poor
  - Data focused on managed accounts (not plan level)
  - Data biases (no reporting obligation)
  - Lack of cost data (often assumed)
  - No information on benchmarks of the funds

Performance Literature

	Risk-adjusted alpha before costs	Risk-adjusted alpha after costs
Mutual Funds	**0**	**negative**
Pension Funds	**?**	**?**

Performance Literature (after costs)

- **Pension fund (mixed results)**
  - Beebower and Bergstrom (1977), DB portfolios +
  - Busse et al. (2006), DB portfolios +
  - Brinson, Hood and Beebower (1986), Plans -
  - Lakonishok et al. (1992), DB and DC Plans -
  - Elton, Gruber and Blake (2006), DC Plans -
- **Mutual Funds (consensus: minus)**
  - Jensen (1968), Malkiel (1995, 2005), Gruber (1996), Carhart (1997), Mahoney (2003), Chen et al. (2004), James and Karceski (2006) and many others.

Our Main Results

- **Pension fund domestic equity performance at total plan level is zero after costs in most cases or slightly positive in some (small cap)**

- **Cost levels in the pension fund industry are significantly lower than in the mutual fund industry**

- **Size of collective not-for-profit vehicle (pension fund) creates economies of scale in costs: these are transferred directly to end-consumers (beneficiaries)**

An Updated Literature?

	Risk-adjusted alpha before costs	Risk-adjusted alpha after costs
Mutual Funds	**0**	**negative**
Pension Funds	**0/positive**	**0**

Our Data

- **The CEM database (introduced by French, JF 2008)**

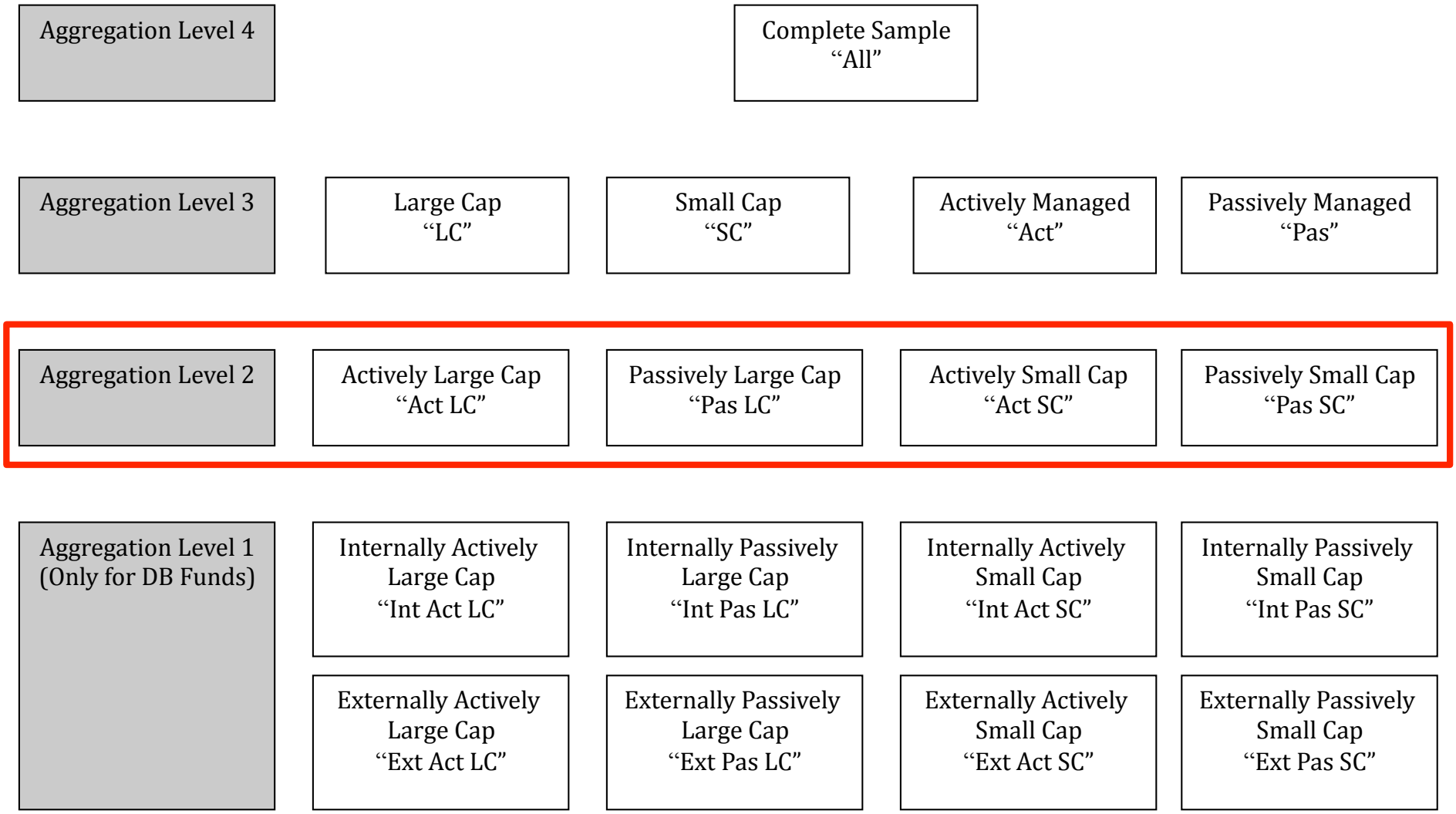
- **Coverage (in market value) of roughly 40% of the pension fund universe in the US (1990 – 2006)**

- **Information on:**
  - fund types (DB, DC)
  - fund characteristics (Public, Corporate, Other)
  - Mandate type (Active, Passive, Large Cap, Small Cap, Internal and External)

CEM (Cost Effective Measurement)

- CEM Benchmarking collects yearly questionnaires and provides annual fund-specific returns, benchmarks and cost data
- Data is available at low aggregation level (portfolio) and can be aggregated to a total plan level
- CEM has information on 463 DB funds (1990-2006) and 248 DC funds (1997-2006)
- No evidence of a performance-related bias

Data Structure



Bias Tests

Exit (Entry) Means	Logit
Match CEM data with Compustat SFAS 158	Match CEM data with Compustat SFAS 158
Split yearly Compustat "Return on (Pension) Assets" into two groups:	Create 0-1 variable indicating fund presence in the CEM data set
1. Funds in years that they leave (enter) the data base 2. Funds in remaining years	Regress "presence dummy" on Compustat ROA
Perform a t-test on the mean difference	Perform a t-test on slope coefficient

No Evidence of a Bias

	DB	DC
Exit		
Mean (p-value)	0.80% (0.31)	2.10% (0.09)
Entry		
Mean (p-value)	0.10% (0.40)	-0.10% (0.40)
Logit		
ROA (p-value)	0.36 (0.53)	0.49 (0.43)

Costs and Size of Equity Holdings

	Costs		Size (million $)	
	DB	DC	DB	DC
Total	28.75	51.09	4,138	1,186
Largest 30%	16.09	42.47	10,759	3,023
Smallest 30%	39.92	61.30	389	192
Corporate	32.63	48.45	2,269	1,190
Largest 30%	24.42	39.16	5,860	2,695
Smallest 30%	40.22	56.90	370	219
Public	21.33	58.68	6,964	1,629
Largest 30%	9.32	55.26	17,313	4,387
Smallest 30%	34.05	73.15	661	234
Other	29.46	-	2,863	-
Largest 30%	14.75	-	6,275	-
Smallest 30%	42.75	-	291	-

Analysis of Cost and Size Differences

- Cost difference between DB and DC of approximately 20 basis points
- Size seems to be a driver of cost differences across fund types and characteristics
- Larger funds have lower cost levels
- Generally: pension fund cost levels are lower than those observed in the mutual fund universe

A Formal Test

$$C_{it} = a_{0t} + a_{1t} log\left(Size_{it}\right) + \epsilon_{it},$$

- **Fama-MacBeth methodology**
- **Cost-Size relationship is stronger in DB than in DC context (there is more heterogeneity within DB fund universe)**

Costs Explained by Size

	DB	
	a_0	a_1
Total	112.22	-9.24
(p-value)	(0.00)	(0.00)
Large Cap	93.15	-7.89
(p-value)	(0.00)	(0.00)
Small Cap	87.80	-8.42
(p-value)	(0.00)	(0.00)
Active	114.64	-5.78
(p-value)	(0.00)	(0.00)
Passive	28.67	-2.53
(p-value)	(0.00)	(0.00)
External	102.65	-7.69
(p-value)	(0.00)	(0.00)
Internal	23.73	-1.78
(p-value)	(0.00)	(0.00)

Size is not the Only Driver

- **Internal management is cheaper than external management (may be indirectly size related)**
- **Passive is cheaper than active (related to the lack of promise of delivering alpha)**

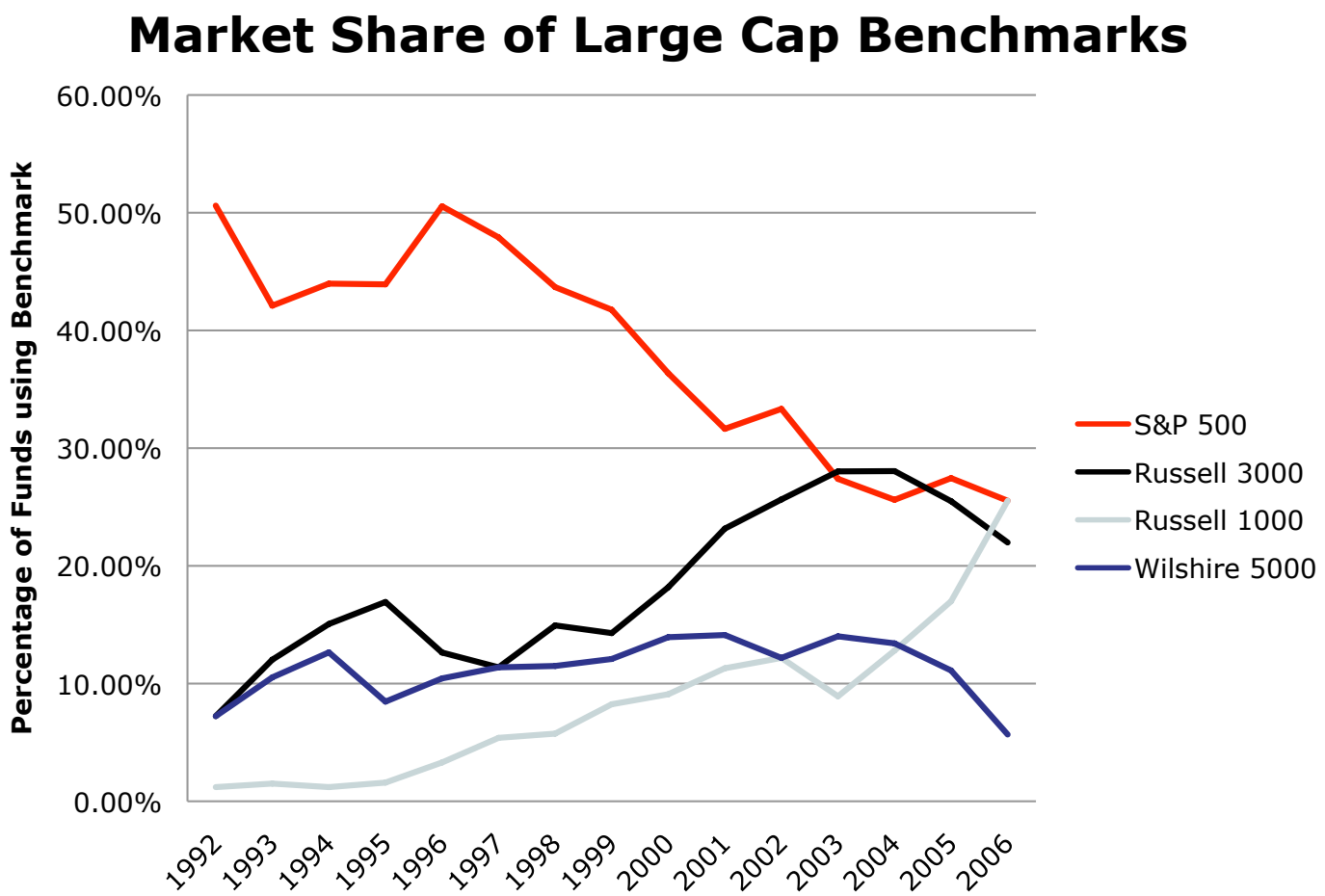
Equity Holdings (DB)

	Total	Cor	Pub	Oth	L30%	S30%
Large Cap	90.49	90.90	89.87	90.26	93.01	88.30
Small Cap	9.51	9.10	10.13	9.74	6.99	11.70
Active	69.41	73.66	63.30	68.61	57.24	78.87
Passive	30.59	26.34	36.70	31.39	42.76	21.13
Internal	13.84	9.62	20.15	7.13	27.74	2.86
External	87.16	90.38	79.85	92.87	72.26	97.14

Analysis of Equity Holdings

- Allocation within equities does not vary a lot between different funds (Corporate, Public and Other)
- One exception: public funds invest more internally (size related)
- Large funds have less invested in small cap portfolios, less active portfolios and more internally managed portfolios (size related) than smaller funds
- Less heterogeneity in DC fund universe

What About Benchmarks?



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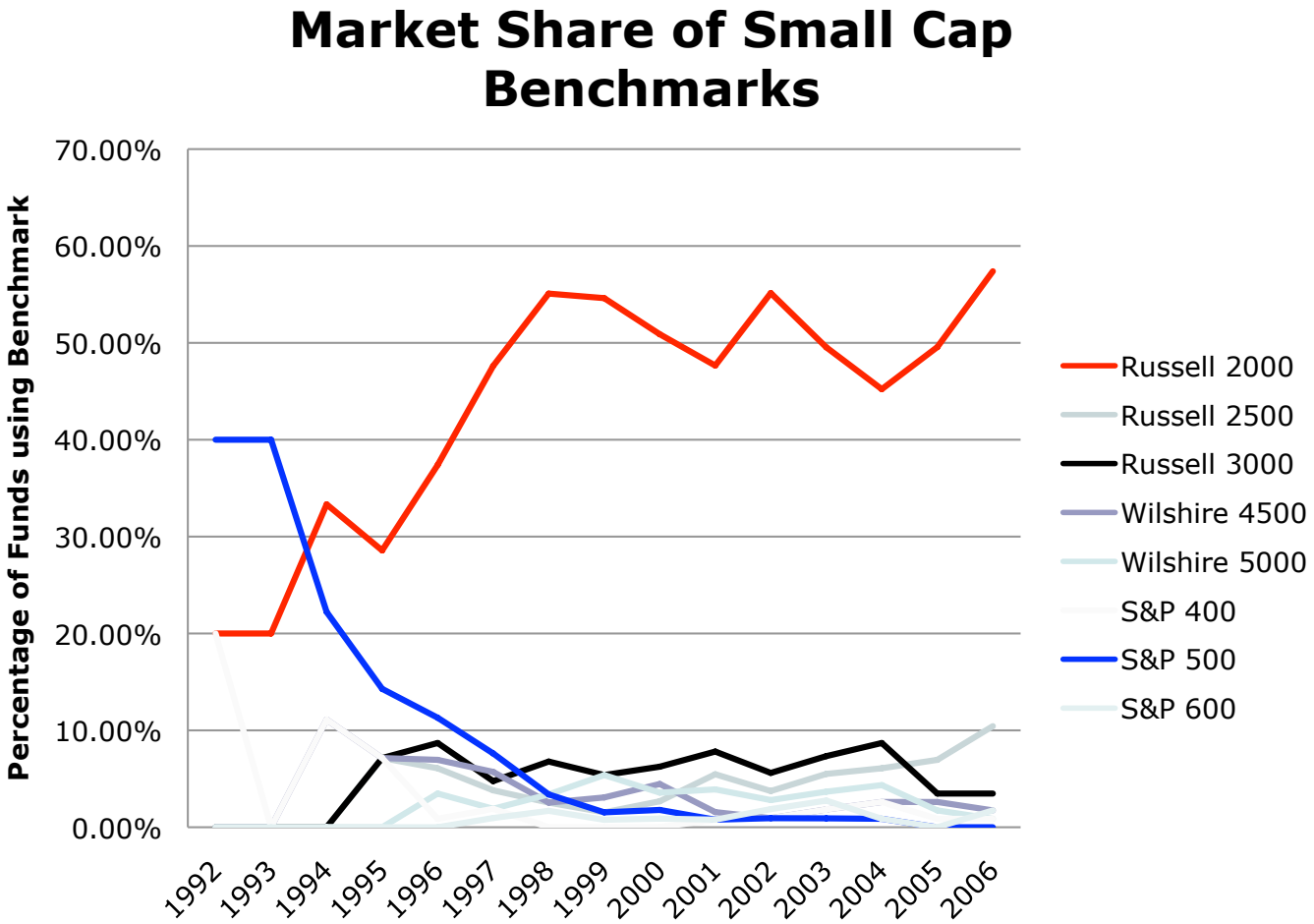

Analysis of Benchmarks

- Large cap portfolios: three benchmarks are competing (S&P 500, Russell 3000 and Russell 1000)
- For small cap portfolios the Russell 2000 is the dominant benchmark
- In performance measurement benchmarks matter, see Cremers, Petajisto and Zitzewitz (2009)

Risk-adjustment Procedure

Regress net excess returns on Fama-French Factors:

$$R_{it,e} = \alpha_i + \beta_i' FF_t + \eta_{it},$$

We assume that α and β are drawn independently from distributions with constant means and variances:

$$\alpha_i \sim \left(\alpha, \sigma_\alpha^2\right), \quad \beta_i \sim \left(\beta, \Omega_\beta\right), \qquad \eta_{it} \sim N\left(0, \sigma_{\eta,i}^2\right),$$

Ω_β is a diagonal matrix and β a vector with factor loadings to Fama-French factors. In addition we regress:

$$R_{it} - BMR_{it} = \alpha_i + \beta_i' FF_t + \nu_{it},$$

Benchmarks Matter

	α	β_{R_m}	β_{SMB}	β_{BTM}	β_{MOM}
FF	0.0103	0.9289	-0.0165	0.0039	-0.0727
(p-value)	(0.000)	(0.000)	(0.542)	(0.861)	(0.001)
Russell 3000	0.0048	0.9456	0.0522	-0.0108	-0.0199
(p-value)	(0.084)	(0.000)	(0.052)	(0.617)	(0.337)
S&P 500	0.0041	0.9358	0.1259	-0.0098	-0.0274
(p-value)	(0.194)	(0.000)	(0.000)	(0.685)	(0.230)

Choice of benchmark matters, consistent with Cremers, Petajisto and Zitzewitz (2009)

S&P 500 is most conservative choice

Risk-adjusted Net Performance DB

Bold = statistically significant	**α (benchmark-adjusted net returns)**	**α (net returns)**
Total	0.43%	0.41%
Large Cap	0.18%	-0.07%
Small Cap	**3.43%**	**5.09%**
Active	0.45%	0.64%
Passive	**0.43%**	0.10%
Internal	1.56%	1.22%
External	0.45%	0.53%

Analysis of Results

- **Risk-adjusted returns for DB fund domestic equity performance at total plan level on average are zero after costs**

- **Exception is small cap segment, but the interpretation of this result might be influenced by the choice of the market factor**

- **DC analysis provides similar results: all risk-adjusted returns are zero after costs**

Cross-sectional Analysis

- Inspired by Brennan et al. (1998):
  - First: risk correction per fund (times series)
  - Then: cross-sectional regression of alpha's on constant and characteristics
  - Times series regression constant and characteristics of stage 2 on constant ("c") and FF-factors
- Characteristics: Log (Size), % Internal (more to follow)

Cross-sectional Analysis Results (DB) I

	Constant (without characteristics)
Total	0.35%
Large Cap	0.76%
Small Cap	**4.00%**
Active	1.39%
Passive	1.21%
External	1.44%
Internal	0.61%

Impact Characteristics on Alpha (DB) I

	Constant	Log (Size)	% Internal
Total	**13.88**	**-1.22**	**1.88**
Large Cap	**10.10**	**-1.06**	**2.89**
Small Cap	**1.31**	**-15.70**	**29.73**
Active	3.40	**-1.34**	**1.59**
Passive	5.06	**-0.63**	1.89
External	2.54	**-0.73**	-
Internal	55.19	**-1.30**	-

Analysis of Cross-sectional Results

- Constant can be interpreted as alpha: alphas are robust with previous risk-adjustment procedure
- Size does lead to lower alphas in all categories, especially small cap (diseconomies of scale?)
- Size results imply that selection bias of CEM data base is less relevant
- % Internal management is positively related to alpha

Discussion (I)

- **Why do pension funds have zero returns after costs?**
- **The majority of funds outsources asset management to the financial services industry that also provides similar (mutual) funds to individual investors**
- **Are reduced agency costs a driving force behind the relative outperformance of (not-for-profit) pension funds versus mutual funds?**
- **Difficult hypothesis to test directly (TBC)**

Discussion (II)

- **Pension funds (boards) can**
  - Demand separate accounts with clear and client-oriented investment guidelines
  - Monitor external managers with more capacity than individuals
  - Negotiate costs in a more stringent way
  - Transfer benefits directly to plan participants

- **The larger the fund size, the lower the cost levels**

- **However, some evidence of diseconomies of scale (e.g. in small cap segment)**

Discussion (III)

- Organizational structure of pension funds is distinct from the mutual fund industry

- In a corporate pension fund, the employees of a corporation delegate investment choices to a corporate treasurer

- Our results provide evidence that the agency costs in the pension fund industry linked to this additional layer of delegation are less material than shown by Lakonishok et al. (1992)

Keith Ambachtsheer (2005, FAJ)

“In a world where the clients of (….) financial services organizations are millions of remote, faceless individuals, will the boards and managers (….) they hire serve the financial interests of the beneficiaries? Or will they use their power to serve their own interests? ”

Concluding Comments

- Pension fund domestic equity performance at total plan level is zero after costs in most cases or positive in some (small cap)
- Cost levels in the pension fund industry are significantly lower than in the mutual fund industry
- Apparently, these cost advantages are transferred directly to end-consumers (beneficiaries): reduced agency costs outweigh possible agency costs in the pension industry
- Evidence of diseconomies of scale