The Rise in Alternatives

Juliane Begenau
Stanford GSB & NBER & CEPR

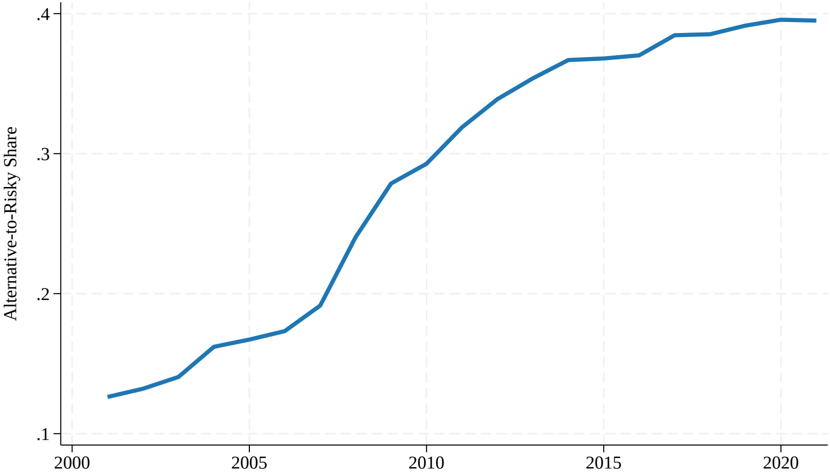
Pauline Liang
Stanford GSB

Emil Siriwardane
Harvard Business School & NBER

Introduction

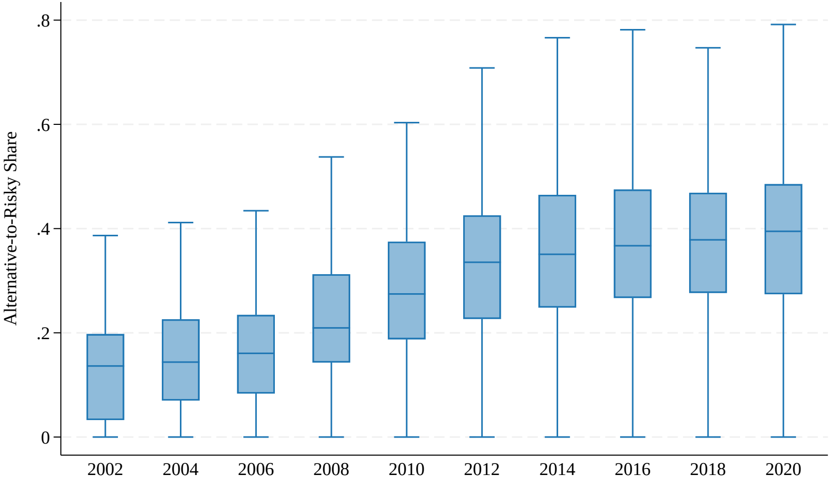
U.S. Public Pensions Have Changed the Way They Take Risk

Alts = private equity/credit + real assets + hedge funds   Risky share = 1 - (fixed income + cash share)



Since 2001: Each $1 out of fixed income → $2.95 into alts + $1.95 out of equities

Alternative Usage Varies Widely Across Pensions



Summary of Facts

1. The aggregate alternative and alternative-to-risky share has risen sharply in the US since the 2000s

2. The adoption of alternatives also varies widely across US pensions

This paper: Why?

Popular explanations

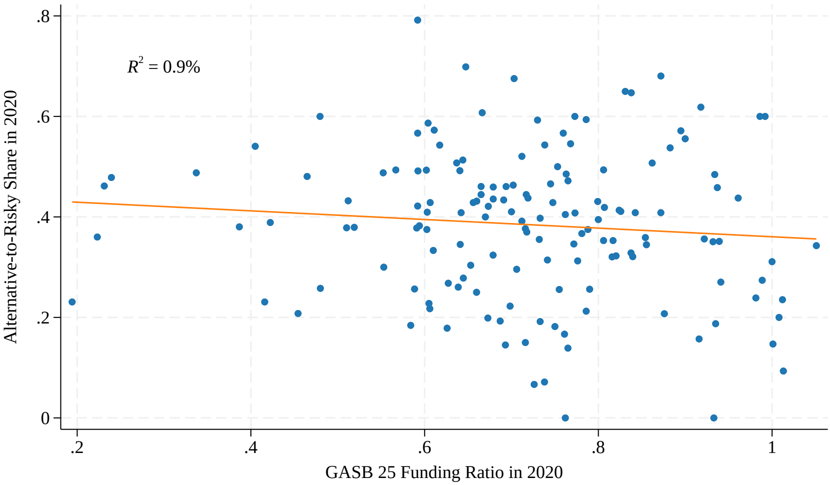
1. **Funding**:
   - Pensions are increasingly underfunded (Novy-Marx and Rauh, 2011)
   - Using risky + high-yielding assets like alternatives to close funding gaps (Lu et al., 2019; Pennacchi and Rastad, 2011; Gillers, 2021)

2. **Nominal return targets**:
   - Harder to hit as safe interest rates have fallen
   - Yet are sticky b/c of liability discounting in the U.S. (Andonov et al., 2017)
   - High-yielding alternatives can help

3. **These forces may be amplified by a desire to conceal risk** (more later)

We explore variants of the first two hypotheses in the cross-section of pensions

Alternative-to-Risky Share vs Funding in 2020



Changes in the composition of risky investments: 2002 - 2020

$$\Delta a_p = c + \Delta X_p + \varepsilon_p$$

	ΔAlternative-to-Risky Share			
	(1)	(2)	(3)	(4)
Δ GASB 25 Funding Ratio	-0.19*			
	(-1.87)			
Δ BEA-Adjusted Funding Ratio		0.02		
		(0.06)		
Δ Liability Discount Rate			-1.97	
			(-0.49)	
Δ Fraction of Retired Members				0.18
				(1.09)
Aggregation	System	State	System	System
Total R^2	0.04	0.00	0.00	0.01
N	116	47	115	116

Economic magnitudes and R^2s are small

A Belief-Based Explanation for the Rise in Alternatives

Evidence suggests the perceived “alpha” of alts has risen, as has disagreement

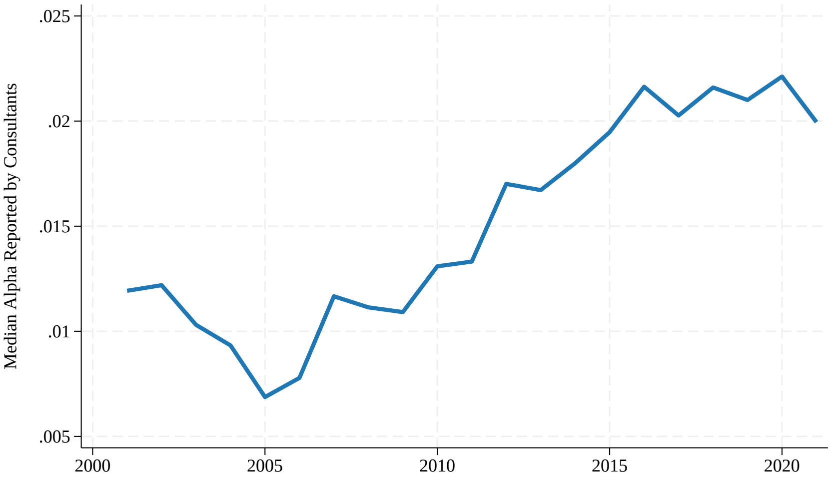
1. The behavior of other institutions
   - Alt-to-risky share has also risen in the US and UK private sectors
   - But widely diverging trends in the risky share

2. Consultants
   - Large FEs, even within sub-classes (e.g., PE vs HFs)
   - Appear to advise clients consistently, regardless of type
   - Reported beliefs about alpha have risen

3. Beliefs about alternatives shaped by pension experience in the 1990s

4. Relatively strong peer effects (distinct from herding)

Median Consultant Belief About Alpha of Alternatives



Is it really just beliefs?

A missing agency friction? What would it need to look like?

- Rise in alts is global → rules out governance, local regulation, etc.
- But rise in risky share is not→ rules out frictions affecting risk tolerance
- Friction must vary across pensions and be unrelated to funding, size, ...
- Some consultants must be more willing to say they believe in alts

Supply?

- NAV Alts / (NAV Alts + Global Mkt. Cap): 2% → 8% since 2000
- Pensions are heavily overweight (~40%)
- Supply cannot explain cross-section

Beliefs are the simplest explanation of facts (especially experience)

Literature and Contribution

1. **The rise in alternatives**: (Ivashina and Lerner, 2018; Lerner et al., 2022)
    - Largely driven by a change in composition of risky portfolio
    - Yet risky share has diverged widely across institutions/countries
    - Cross-sectional facts that help distinguish between explanations

2. **Public pension investment behavior**: (Mohan and Zhang, 2014; Lu et al., 2019; Andonov et al., 2017; Lucas and Zeldes, 2009; Ivashina and Lerner, 2018)
    - Weak response to incentives created by underfunding
    - Beliefs outweigh institutional frictions (similar private-sector trends)

3. **Belief formation**: (Malmendier and Nagel, 2016; Andonov and Rauh, 2021; Bailey et al., 2018, 2022; Foerster et al., 2017)
    - Experience, peers, and consultants shape public pension beliefs

Data

Data Sources

- Public Plans Data (PPD), 2001–2021
  - Based on annual reports filed by each public pension
  - Plan assets often pooled into "systems", which are our unit of analysis

- US Census - annual and quarterly surveys of public pensions

- Consultant data
  - Pension-consultant matches based on annual reports and FOIAs
  - Registered locations from SEC Form IAPD and FINRA BrokerCheck
  - Marketing materials from eVestment

- Peer networks based on geographical distance

Basic Summary Statistics

	Subsample			
	2001-2005	2006-2010	2011-2015	2016-2021
Number of Systems	157	180	190	194
Members (mm)	21	24	25	27
Percent Retired	28	31	35	37
AUM ($ bn)	2,101	2,623	3,140	4,020
GASB 25 Funding (%)	91	81	73	72
Assumed Asset Return (%)	8.0	7.9	7.6	7.2
Annual Investment Return (%)	5.2	6.2	9.1	10.0
National Coverage (%)				
Public DB Pensions	86	90	91	91
All Private and Public Pensions	24	25	23	22
Portfolio Composition (%)				
Fixed Income	30	27	25	23
Public Equities	59	55	49	47
Alternatives	11	18	27	30

Organizing Model

Campbell and Viceira (2002)

- Three assets + myopic investor with CRRA preferences: $U = \max \frac{W_1^{1-\gamma}}{1-\gamma}$

- Log-normal returns, with distribution of excess log returns given by:

$$N\left(\begin{bmatrix}\mu_A \\ \mu_E\end{bmatrix}, \begin{bmatrix}\sigma_A^2 & \sigma_{AE} \\ \sigma_{AE} & \sigma_E^2\end{bmatrix}\right)$$

- Define α, β as regression coefficients: $r_A - r_f = \alpha + \beta(r_E - r_f) + \epsilon_A$

- Write distributional parameters as functions of α, β, and σ_ε^2:
  - $\mu_A = \alpha + \beta\mu_E$
  - $\sigma_A^2 = \beta^2\sigma_E^2 + \sigma_\varepsilon^2$
  - $\sigma_{AE} = \beta\sigma_E^2$

- Model better suited for positive, not normative analysis
  (Ang et al., 2014; Giommetti and Sorensen, 2021)

Optimal Asset Allocation

$$\omega_A = \frac{1}{\gamma} \times \left[\frac{\alpha}{\sigma_\epsilon^2} + \frac{1}{2}(\beta - 1)\beta \frac{\sigma_E^2}{\sigma_\epsilon^2} + \frac{1}{2}) \right], \tag{1}$$

$$\omega_E = \frac{1}{\gamma} \times \left[\frac{\mu_E}{\sigma_E^2} - \frac{\alpha\beta}{\sigma_\epsilon^2} + \frac{1}{2}(1 - \beta)(\beta^2 \frac{\sigma_E^2}{\sigma_\epsilon^2} + 1) \right], \tag{2}$$

$$\omega_f = 1 - \omega_A - \omega_E$$

- A decline in risk aversion can't generate facts. Why?
  - Risky composition $\omega_A^* = \omega_A / (1 - \omega_f)$ doesn't depend on γ (Tobin, 1958)
- A change in beliefs about α can:

$$\frac{\partial \omega_E + \omega_A}{\partial \alpha} = \frac{1}{\gamma} \frac{1}{\sigma_\epsilon^2} \left(1 - \beta\right) \qquad \frac{\partial \omega_A^*}{\partial \alpha} = \frac{\frac{1}{\sigma_\epsilon^2} \left(\beta \omega_A + \omega_E\right)}{(\omega_A + \omega_E)^2} > 0$$

Optimal Allocation Under Constraints

- Add a portfolio constraint on fixed income: $\omega_f \geq \omega_f^{min}$

- Resolve for optimum portfolio. Key result:

$$\frac{\partial \omega_A^*}{\partial \gamma} = -\frac{1}{\gamma^2} \frac{1}{1-\omega_f^{min}} K$$

  where K is a function of beliefs

- Implication: for some beliefs (K), a decline in risk aversion γ can generate an increase in the risky and alternative-to-risky share

Summary

The model highlights two potential explanations for the facts:

1. Risk aversion declined and portfolio constraints became binding
2. Beliefs about alternatives changed

Next, we evaluate both channels

Popular Explanations

What could drive declines in (effective) risk aversion?

- Common mechanisms revolve around falling rates:
  - Underfunding (Mohan and Zhang, 2014; Lu et al., 2019)
  - Hurdle rates (Pennacchi and Rastad, 2011; Andonov et al., 2017)

- Simple cross-sectional tests:
  - Are changes in funding correlated with changes in portfolio structure?
  - Does initial funding predict changes?
  - Do more underfunded pensions take more risk or invest in alts?
  - Do hurdle rates explain pension behavior?

Changes in Portfolio Composition: 2002 - 2020

	ΔAlternative-to-Risky Share			
	(1)	(2)	(3)	(4)
Δ GASB 25 Funding Ratio	-0.19*			
	(-1.87)			
Δ BEA-Adjusted Funding Ratio		0.02		
		(0.06)		
Δ Liability Discount Rate			-1.97	
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Δ Fraction of Retired Members				0.18
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Aggregation	System	State	System	System
Total R^2	0.04	0.00	0.00	0.01
N	116	47	115	116

- Economic magnitudes and R^2s are small
- Not driven by non-linearities
- Results marginally stronger for the risky share

Additional Results

- Change in alt-to-risky from 2002 to 2020 unrelated to:
  - Initial level of funding in 2002
  - Previous ability to make required contributions
  - Size
- Similar conclusions when studying levels, both in a panel and for recent data
- Lots of unexplained variation in the risky share too

Portfolio Constraints: Measurement

- Binding portfolio constraints can cause risky composition to change

- But how to measure? Our approach:

$$l_{pt} = \text{Actual - Target Risky Share}_{pt}$$

- Intuition:
  - Suppose pension constrained from taking risk
  - Will try to go as far above target as allowed
  - Positive and persistent l_{pt} → portfolio constraints are binding
  - Need to account for market fluctuations

- Standard model: constrained pensions should have higher alt-to-risky share

Portfolio Constraints: Results

	Alternative-to-Risky Share					
	(1)	(2)	(3)	(4)	(5)	(6)
Actual-Minus-Target Risky Share	-0.22	-0.26*				
	(-1.54)	(-1.99)				
Above-Median Actual-Minus-Target Risky Share			-0.02**	-0.01**		
			(-3.25)	(-2.71)		
Actual-Minus-Target, MA3					-0.31*	-0.39**
					(-1.83)	(-2.15)
One-Year Return	-0.06	-0.05**	-0.05	-0.05**	-0.08	-0.07**
	(-1.43)	(-3.14)	(-1.23)	(-4.15)	(-1.70)	(-4.53)
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Pension Fixed Effect		Yes		Yes		Yes
Within-R^2	0.01	0.02	0.01	0.01	0.01	0.02
Total R^2	0.32	0.77	0.33	0.76	0.33	0.77
N	2,961	2,961	2,961	2,961	2,961	2,961

- The negative sign goes the wrong way
- These are effectively precisely estimated zeros

Simulation Evidence

- Concern: mismeasuring reach-for-yield incentives or portfolio constraints
- Mismeasurement will attenuate measured correlations
- Compliment our reduced form evidence by simulating the model
- Simulate a decline in γ + binding portfolio constraints:
    - Match national trends
    - Is the implied $\Delta\gamma$ reasonable?

Simulation Details

- In 2001:
  - Draw a random set of beliefs about risk-return
  - Pick idiosyncratic volatility of alts to match risky portfolio composition
  - Pick risk aversion γ_{2001} to match risky share
- Fast forward to 2020:
  - Hold initial beliefs fixed + assume constraint is binding ($\omega_f^{min} = \omega_{f,2001}$)
  - Infer new risk aversion γ_{2020} to match risky portfolio composition
- Check:
  - Is it actually possible to match the portfolio shift (impose $\gamma_{2020} > 1$)?
  - If so, then compute shadow cost of the constraint

Simulation Parameters

1. Draw beliefs from the following distribution:
   - Excess equity returns: $\mu_E \sim U(0.02, 0.08)$ and $\sigma_E^2 \sim U(0.02, 0.09)$
   - Excess alternative returns:
     - Risk-reward relative to equities: $r_A - r_f = \alpha + \beta(r_E - r_f) + \varepsilon$
     - Beta and “alpha”: $\beta \sim U(0, 1.5)$ and $\alpha \sim U(0, 0.05)$
     - Idiosyncratic risk inferred to match $\omega_{A,2001}$

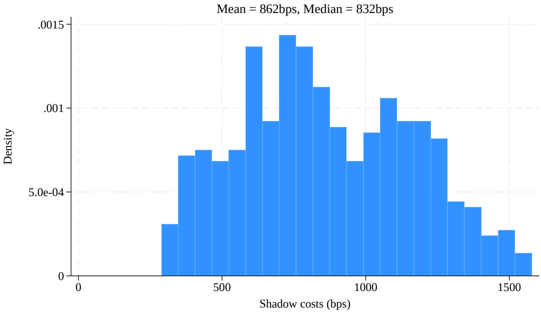
2. Retain reasonable simulations that match initial beliefs (e.g., $\sigma_\varepsilon < 0$)

3. Fast forward to 2020 and infer new risk aversion

Simulation Results

1. In **99.5%** of simulations, it is **not possible** to rationalize shift via risk aversion
   - Intuition: equities were dominant/attractive in 2001 → when portfolio constraints bind, pensions want to shift to equities over alts

2. Shadow cost of constraint in remaining 0.5% of simulations:

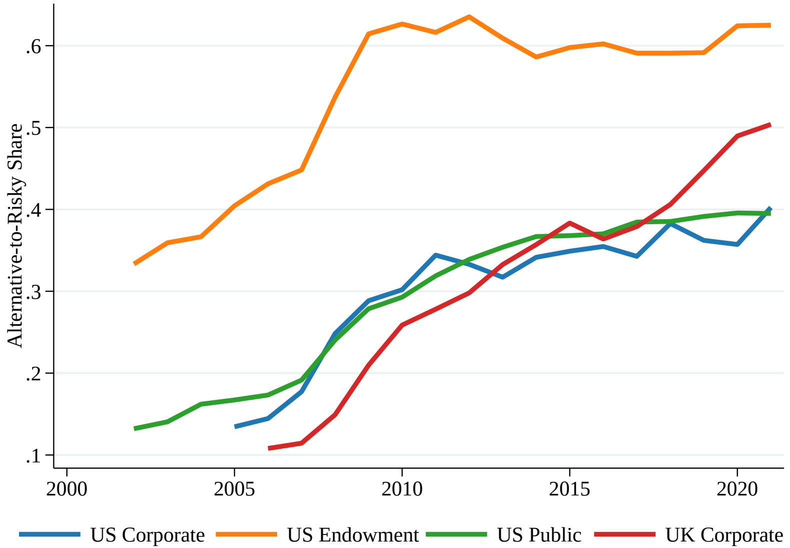


The Role of Beliefs

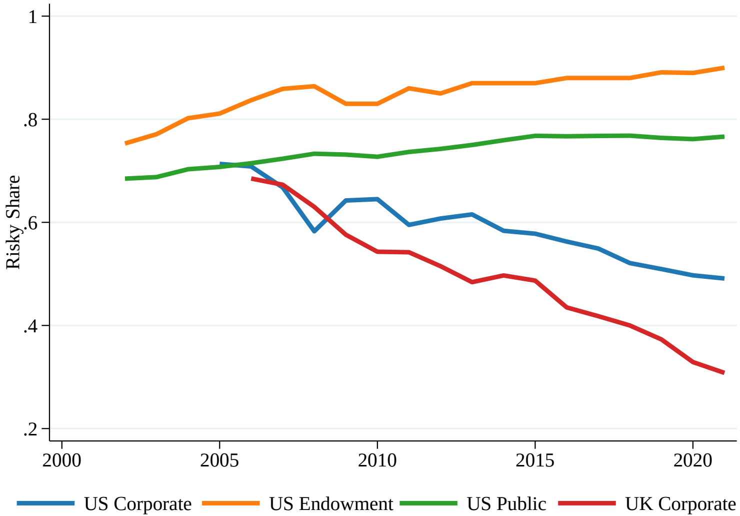
A different mechanism

- Beliefs about the risk-return properties of alternatives have changed
- Increased cross-sectional heterogeneity in the alternative-to-risky share driven by widening disagreement in beliefs
  - Reasonable given the opacity of alternatives
  - E.g., still no consensus about the beta of PE
- We now present several pieces of evidence consistent with this story

All Institutions Have Reshaped Risky Investments



But Not All Have Increased the Risky Share



Consultants and Risky Portfolio Composition

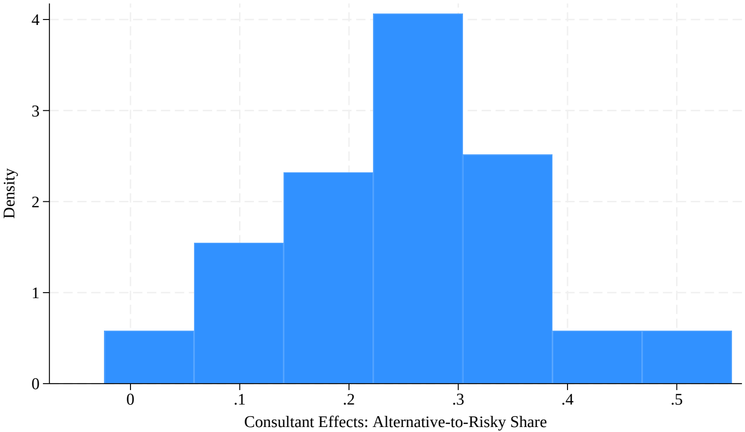
$$\underbrace{y_{p,c,t}}_{\text{Share of Risky Inv.}} = \underbrace{\alpha_t}_{\text{Time FE}} + \underbrace{\sum_k \beta_t^k X_{p,c,t}^k}_{\text{Pension attributes}} + \underbrace{\lambda_c}_{\text{Consultant FE}} + \varepsilon_{p,c,t}$$

	$y_{p,c,t}$	Controls	Fixed Effects: Time	Fixed Effects: Cons.	F	p	Adj. R^2	C	N
(1)	Alts		x				0.32		2,961
(2)	Alts	x	x				0.33		2,914
(3)	Alts	x	x	x	13.74	0.00	0.49	69	2,914

- Pension attributes add little explanatory power
- Easily reject null of equal consultant FEs

Consultant identity strongly

p5 to p95 consultant: Alt-to-risky goes from 7% to



45%

Natural interpretation: Portfolios reflect consultants' (varying) beliefs about α

Comparison Across Client Types

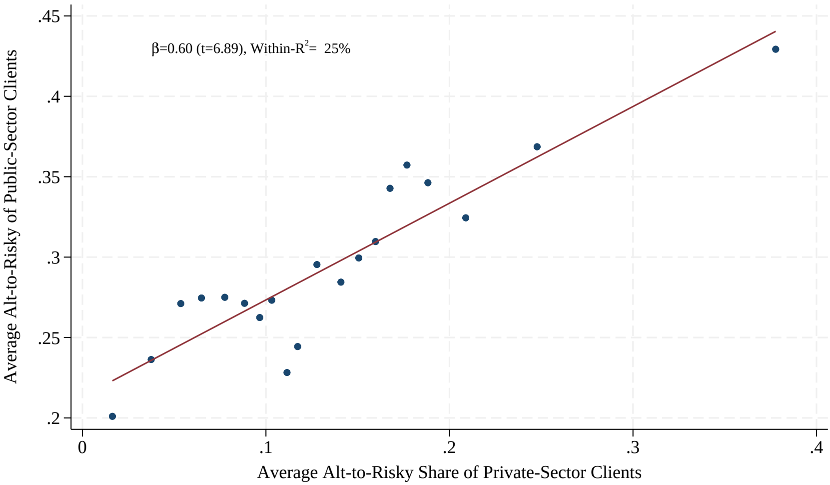
- Interpretation of consultant effects is not clear
  - Beliefs vs agency + selection vs causality

- Study behavior of private-sector clients to help

- Compute for each consultant c in year t:
  - Avg. alt-to-risky share of private and public sector clients
  - Avg. risky share of of private and public sector clients

- Data from on S&P's Money Market Directory (2004-2021)

Public and private-sector clients have similar alt-to-risky shares



But Not True for Overall Amount of Risk

Selection vs. Causality

- Discussion of consultant beliefs has implicitly assumed causality

- But clients could match with consultants based on beliefs

- Three pieces of evidence suggest at least *some* causal effect:
    1. Consultant FEs survive inclusion of pension FEs
    2. Consultant FEs exist but are weakly correlated for subcategories of alts
    3. IV based on selection on distance (not preference for alts)

- Either way, beliefs are an important source of consultant effects
    - Next: how have consultant beliefs changed over time?

Consultant Effects by Type of Alternative

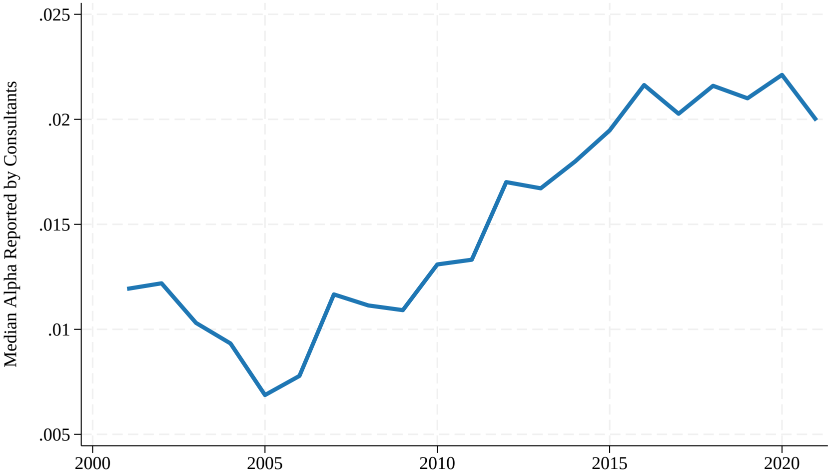
	$y_{p,c,t}$	Controls	Fixed Effects: Time	Fixed Effects: Cons.	F	p	Adj. R^2	C	N
(4)	PE		x				0.09		2,961
(5)	PE	x	x				0.17		2,914
(6)	**PE**	**x**	**x**	**x**	11.78	0.00	0.35	69	2,914
(7)	HF		x				0.13		2,961
(8)	HF	x	x				0.13		2,914
(9)	**HF**	**x**	**x**	**x**	7.81	0.00	0.26	69	2,914
(10)	RA		x				0.15		2,961
(11)	RA	x	x				0.16		2,914
(12)	**RA**	**x**	**x**	**x**	11.54	0.00	0.34	69	2,914

- Agency friction would need to cause preference for specific type of alts
- Or consultants/pensions just differ in beliefs

Selection vs Causality

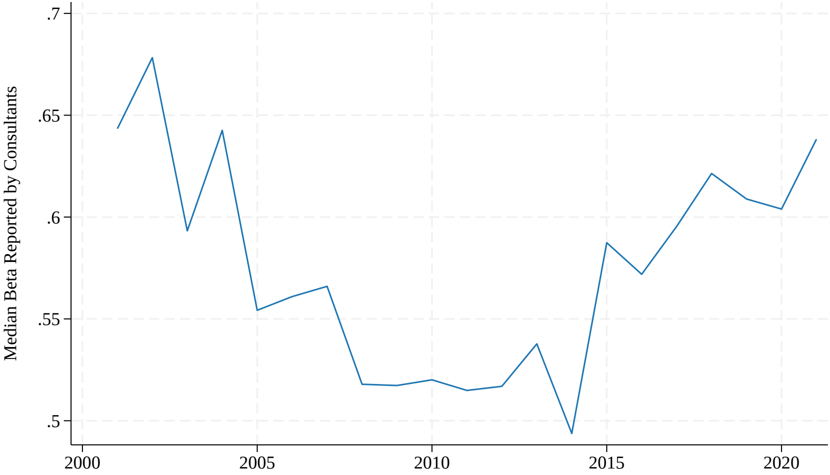
- Discussion of consultant beliefs has implicitly assumed causality
- But clients could match with consultants based on beliefs
- Two pieces of evidence suggest at least some causal effect:
  1. Consultant FEs survive inclusion of pension FEs
  2. IV based on selection on distance (not preference for alts)
- Broader point: beliefs are an important source of consultant effects
  - Next: how have consultant beliefs changed over time?

The median consultant’s reported alpha has risen

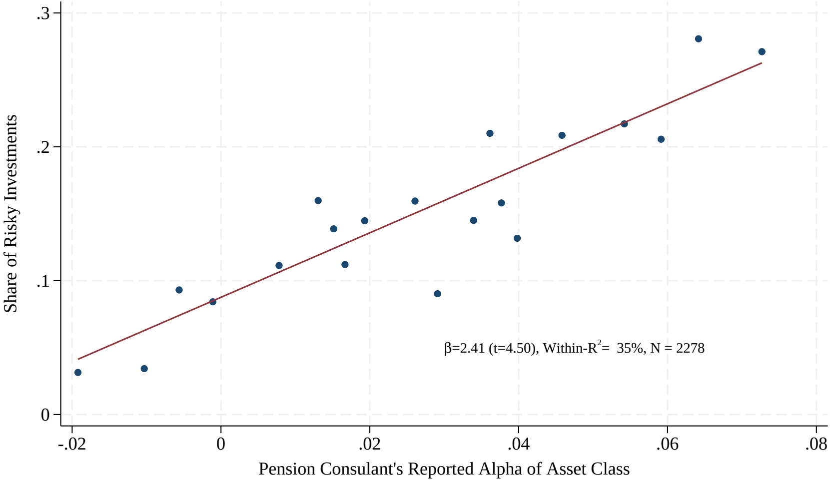


In the model, $\Delta\alpha \approx 80$ bps can generate aggregate portfolio trends

Median Consultant's Beta of Alternatives Has Stayed Steady



Consultant Beliefs in the Cross-Section



True for private equity vs real assets (both hide risk)

Peers, Beliefs, and Portfolio Composition

- Household finance: social networks shape beliefs about asset prices and product selection (Bailey et al., 2018, 2022)

- Begs the question of whether pension beliefs are shaped by peers

- Peers' alt-to-risky share: $a_{pt}^{Peer} \equiv \sum_{j \neq p} w_{p,j} a_{pt}$, where weights $w_{p,j}$ distance

- Run regression of alt-to-risky share on peers' share:

$$a_{pt} = \alpha_{cdt} + \sum_i \kappa_i X_{p,t}^i + \beta a_{pt}^{Peer}$$

where α_t is a time-by-consultant-by-census division FE and X_{pt}^i are controls

Peer Effects

	Alternative-to-Risky Share				
	(1)	(2)	(3)	(4)	(5)
Peers' Alt-to-Risky Share	0.68**	0.55**	0.70**	0.69**	
	(3.22)	(3.26)	(3.22)	(3.27)	
× Established-CIO		0.25			
		(1.43)			
× Well-Funded			-0.20		
			(-1.45)		
× High-Performing				-0.15	
				(-1.35)	
Lagged Peers' Alt-to-Risky Share					0.71**
					(3.27)
Consultant× Year × Division FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes
Within-R^2	0.13	0.17	0.14	0.14	0.13
Total R^2	0.68	0.62	0.68	0.68	0.68
N	1,910	867	1,910	1,910	1,788

- Peer effects much larger than effects of agency-based factors
- Exist for pensions with low herding incentives (cols 2-4), rules in learning

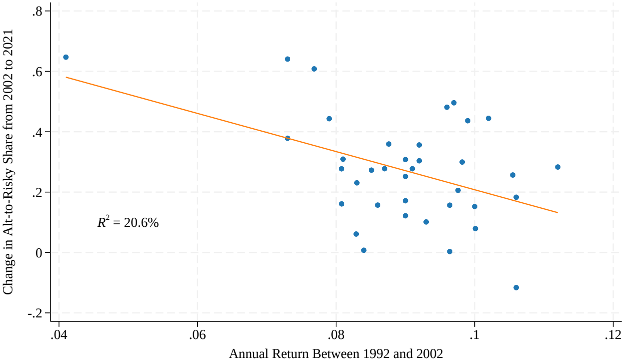
Final Thoughts

Experience (in progress)

- Experience shapes household and pension expectations

  (Malmendier and Nagel, 2016; Andonov and Rauh, 2021)

- Hypothesis: 1990s experience impacted view of optimal risky composition, as this was the first time many pensions were heavy in public equities



Conclusion

Other potential interpretations

Cannot rule out an agency friction that:

- Affects private and public-sector institutions in different geographies
- Varies in the cross-section but is unrelated to funding, size, age, ...
- Generates investment in alternatives, but not risky assets more generally
- Leads some private/public investors to pick consultants who report high α's

Supply-side explanations:

- NAV Alts / (NAV Alts + Global Mkt. Cap): 2% → 8% since 2000
- U.S. public pensions are heavily overweight (~40%)
- Supply cannot explain cross-section

Beliefs offer a simpler explanation of behavior, especially in the cross-section

Conclusion

- The ***way*** U.S. pensions take risk has fundamentally changed
- Popular agency-based explanations are not sufficient on their own
- Beliefs are a necessary ingredient for understanding the rise of alternatives
    - Shaped by consultants, peers, and past experience (suggestive)
- Open question: are beliefs about the alpha of alternatives rational?

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