Risk on the Run: Public Pensions, Migration Risk and the Pivot to Alternatives

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Motivation & Question

- Pension underfunding is now the largest off-balance-sheet liability of state and local governments $\approx$ \$5.1Tn in 2023; Remarkable dispersion Spatial Dispersion
- Closing shortfalls requires higher taxes, reduced services, or better investment performance

Core tension: households can move if local taxes rise or services worsen.

This paper asks: *how do local (pension) deficits sustain with a mobile tax base?*

- How does persistent underfunding pass through to household migration?
- Do states facing higher migration risk manage pensions differently?

Migration Pass-through - Empirical Design

A location-choice (Type-I EV) design maps to bilateral migration odds:

$$\ln \frac{P_{odt}}{P_{oot}} = \beta[\ln f_{dt} - \ln f_{ot}] + \alpha \ln \frac{w_{dt}}{w_{ot}} + \gamma \ln \frac{r_{dt}}{r_{ot}} + B_d - B_o - C_{od}$$

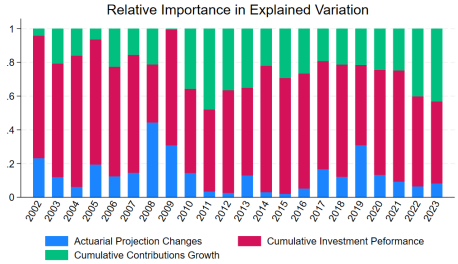
LHS: log-odds of migration; funding gap $\ln f$ proxies destination taxes & amenities.

Instrument. Synthetic excess return from *frozen* 2001 allocations:

$$\omega_{it} = \theta^{eq}_{i,2001} R^{S\&P}_t + \theta^{FI}_{i,2001} R^{Bond}_t - \bar{r}_{i,2001}$$

$$Z_{odt} = \sum_{t}^{\tau} \omega_{dt} - \omega_{ot}$$

Relative synthetic performance instruments the funding gap. **Exclusion:** proxies cumulative performance given 2001 allocations, orthogonal to bilateral migration drivers with FE + controls; Full derivation Funding → taxes/amenities



Investment performance explains most funding differences

Channel: $Z \Rightarrow$ Funding Gap $\Rightarrow$ Taxes/Amenities $\Rightarrow$ Households relocate
Data: Public Pensions Data + IRS Migration Data + Census and other public sources

Baseline: Funding Gaps predict Migration Odds

1 σ $\nearrow$ funding gap $\implies$ 10% higher odds or \$140 AGI loss/tax payer $\approx$ \$ 280 million for Cook County

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: IV - 1st St., Dep. Var:	Funding Gap						
Synthetic Investment Performance$_{ij}$	0.0704***	0.0838***	0.0731***	0.0936***	0.0789***	0.0742***	0.0943***
	(39.31)	(37.91)	(45.98)	(52.69)	(36.47)	(45.92)	(51.73)
Panel B: IV - 2nd St., Dep. Var:	Ln(Out Migrant Returns/Non-migrant Returns) Sample: 2001-2022						
Funding Gap	0.518***	0.372***	0.0626	0.466***	0.0782***	0.0726	0.497***
	(11.26)	(12.35)	(1.18)	(12.03)	(2.67)	(1.43)	(14.13)
Panel B: IV - 2nd St., Dep. Var:	Ln(Out Migrant Returns/Non-migrant Returns) Sample: 2001 - 2019						
Funding Gap	0.688***	0.607***	0.194***	0.379***	0.163***	0.189***	0.395***
	(11.97)	(14.44)	(3.03)	(7.21)	(3.87)	(3.07)	(8.03)
N	839892	818137	818137	818137	818136	809319	809353
Destination, Origin County-FE	Y						
Destination × Origin County-FE		Y	Y	Y	Y	Y	Y
Origin State × Year-FE			Y				
Destination State × Year				Y			
Dest. Reg. × Org. Reg. × Yr-FE					Y		
Origin County × Year-FE						Y	
Destination County × Year-FE							Y

t statistics in parentheses

Channels: Funding → CapEx, Taxes, Amenities

2nd-stage on the instrumented gap, $\ln(Y_{dt}/Y_{ot}) = \ln(\widehat{f_{dt}/f_{ot}}) + \gamma X_{odt} + \epsilon_{odt}$ (controls: debt/rev, political leaning, county GDP growth, rents, wages): 1 SD ↗ Funding Gap → ↗ 26–30% CapEx, 0.03–0.08 pp income- and 0.15–0.24 pp corporate-tax gaps. Fiscal dynamics Migration dynamics

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel B: IV - 2nd St., Dep. Var:	Ln(CapEx Share$_d$/CapEx Share$_o$)						
Funding Gap	2.458***	2.346***	2.385***	1.871***	2.603***	2.426***	1.920***
	(30.03)	(28.81)	(35.59)	(43.88)	(27.69)	(35.58)	(43.53)
Panel C: IV - 2nd St., Dep. Var:	Ln(1-τ_d/1-τ_o)						
Funding Gap	0.0630***	0.0548***	0.0822***	0.0305***	0.0628***	0.0836***	0.0308***
	(14.61)	(12.83)	(17.27)	(9.89)	(15.15)	(17.02)	(9.59)
Panel D: IV - 2nd St., Dep. Var:	Ln(1-τ_d^{corp}/1-τ_o^{corp})						
Funding Gap	0.212***	0.197***	0.242***	0.155***	0.206***	0.243***	0.156***
	(25.81)	(24.46)	(28.58)	(31.10)	(25.16)	(28.10)	(30.27)
N	797297	777652	777652	777652	777651	769219	769495
Destination, Origin County-FE	Y						
Destination × Origin County-FE		Y	Y	Y	Y	Y	Y
Origin State × Year-FE			Y				
Destination State × Year				Y			
Dest. Reg. × Org. Reg. × Yr-FE					Y		
Origin County × Year-FE						Y	
Destination County × Year-FE							Y

Who moves? Heterogeneity by Age and AGI

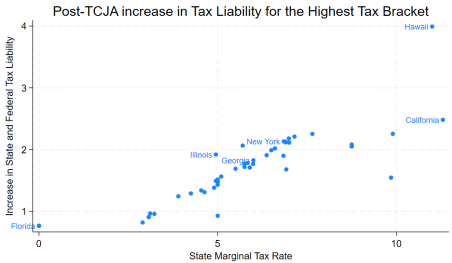
	(1)	(2)	(3)	(4)	(5)	(6)
	Net Out-migration rate					
	Ages<26	Ages 26-35	Ages 35-45	Ages 45-55	Ages 55-65	Age>65
Funding Ratio (FR)	0.00960	0.0163*	0.0121**	0.00518	0.00907**	0.00677**
	(0.72)	(2.08)	(2.81)	(1.70)	(2.96)	(2.82)
AGI 10k-25k × FR	0.00321	0.00120	0.00102	0.00131	0.00128	0.00166
	(0.49)	(0.25)	(0.31)	(0.47)	(0.49)	(0.76)
AGI 25k-50k × FR	-0.00922	-0.00144	0.00116	0.00306	0.00219	-0.000388
	(-1.44)	(-0.32)	(0.38)	(1.24)	(0.93)	(-0.22)
AGI 50k-75k × FR	-0.0155*	-0.00488	-0.000527	0.00211	-0.00213	-0.00402*
	(-2.37)	(-1.10)	(-0.17)	(0.87)	(-0.99)	(-2.50)
AGI 75k-100k × FR	-0.0178	-0.00757	-0.00288	0.000132	-0.00619**	-0.00752***
	(-1.91)	(-1.64)	(-0.91)	(0.05)	(-2.88)	(-4.62)
AGI 100k-200k × FR	-0.00300	-0.00927	-0.00635	-0.00420	-0.0156***	-0.0167***
	(-0.23)	(-1.70)	(-1.93)	(-1.65)	(-5.76)	(-7.87)
AGI > 200k × FR	0.00535	0.0208	-0.00268	-0.00851*	-0.0228***	-0.0219***
	(0.27)	(1.82)	(-0.54)	(-2.32)	(-4.68)	(-6.43)
N	3809	3815	3815	3815	3815	3815
Controls	Lagged Rents, Wages, Crime, Political Leaning, Property Taxes, Top-Income Tax					
Fixed Effects	State, AGI Slab and Year					

- Ages 55–65 / 65+ × AGI >$100k, >$200k more likely to move than young / low-AGI
- Selection drives the fiscal magnitude Details

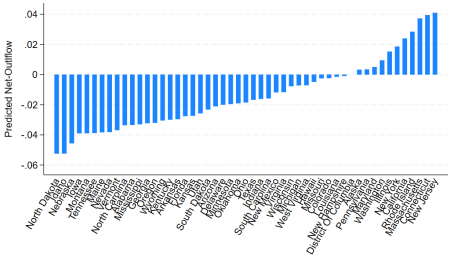
Migration Risk: Measurement & Sorting

Do states invest differently if their residents are flightier? Fully funding needs ↗ contributions/taxes ⇒ out-migration (state-wise Laffer). I measure migration risk three ways:

- (i) OLS net-outflow response to tax increases; (ii) Moretti–Wilson (2017)-type tax-gap elasticity; (iii) **post-SALT-cap predicted outflows**



(a) TCJA (2017) SALT-cap tax increase



(b) Resulting predicted net migration

- Above-median net-migration states = **"high-migration risk"**: they under-contribute and run larger underfunding Sorting Spatial

Portfolio Allocation: Reach for Yield

$$Y_{it} = \eta \times 1(\text{High Migration Risk}_s) \times \text{U}_{i,t-1} + \text{U}_{i,t-1} + \Gamma X_{it-1} + \theta_t + \kappa_i + \varepsilon_{it}$$

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Alternative Allocations			Fixed Income Allocation			Equity Allocations		
Underfunded Ratio (UR)	-0.0654***	-0.0916***	-0.113***	-0.0127	-0.0257	0.0584***	-0.0615*	-0.0313	0.0210
	(0.0234)	(0.0314)	(0.0253)	(0.0223)	(0.0296)	(0.0222)	(0.0356)	(0.0469)	(0.0390)
1(AM Beta Moretti-Wilson (2017)) × UR	0.0749**			0.0355			0.0601		
	(0.0301)			(0.0311)			(0.0516)		
1(AM Post SALT-Outmig) × UR		0.0996***			0.0480			0.000112	
		(0.0338)			(0.0328)			(0.0521)	
1(AM OLS Migration Beta)=1 × UR			0.141***			-0.0883***			-0.0866*
			(0.0295)			(0.0303)			(0.0516)
N	4251	4251	4251	4251	4251	4251	4251	4251	4251
R-Sq	0.728	0.728	0.730	0.577	0.577	0.578	0.602	0.601	0.602
Pension Plan and Year-FE	Y	Y	Y	Y	Y	Y	Y	Y	Y

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

- **Magnitude.** For a **10 pp** rise in underfunding, high-risk states raise alternatives by **75–141 bps** relative to low-risk states; equity/fixed-income flat-to-negative ⇒ tilt is specifically into alternatives Dynamic results

Two-Period Spatial Model

Households pick s maximizing $v_{s,t} = B_{s,t} w_{s,t} (1-\tau_{s,t}) r_{s,t}^{\alpha-1}$; type-1 EV preference shocks generate logit population shares across states

Politician maximizes re-election-weighted welfare; voters punish taxes ($p'(\tau) < 0$). The FOC adds an **electoral wedge**:

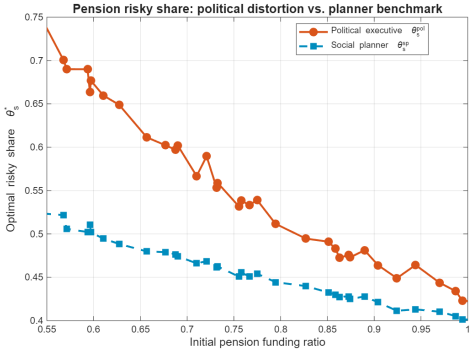
$$\underbrace{\beta\, p'(\tau_{s,1})\, \mathbb{E}[v_{s,2} N_{s,2}]}_{<0}$$

$\Rightarrow$ politician sets *lower* period-1 taxes / contributions than the planner. Exec FOC

Fiduciary (CARA) takes contributions $c_{s,1}$ as given:

$$\theta_s^* = \frac{\mu - r_f}{\gamma\, \kappa\, q_s\, \sigma_R^2}, \quad q_s = \frac{a_s + c_{s,1}}{\ell_s}$$

Lower legacy funding + under-contribution $\Rightarrow$ higher risky share. Fiduciary



Political executive runs higher risky share than planner

Consolidated Government: Optimal Benchmark

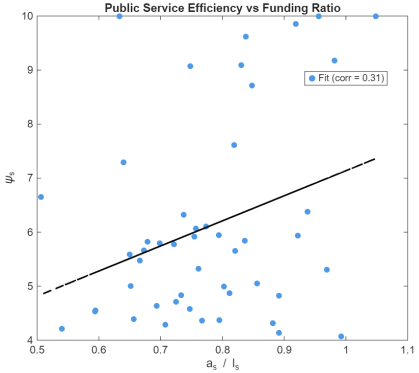
Re-election frictions + executive–fiduciary misalignment generate under-contribution and excess risk. To recover the optimum I solve a consolidated objective:

- $\max_{\{\theta_s, \tau_{s,1}, \tau_2\}} v_{s,1} N_{s,1} + \beta \mathbb{E}(v_{s,2} N_{s,2})$; contributions fixed to an actuarial benchmark, taxes pin (uncertain) expenditures
- Uncertain expenditures hit amenities $B_{s,t} = 1 - \exp(-\psi_s(\tau_{s,t} - c_s))$; $\psi_s =$ *public-service efficiency*, estimated via nested fixed point
- Optimal Risky Allocation:

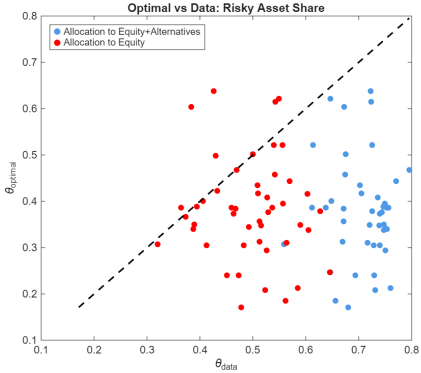
$$\theta_s = \frac{(\mu - r_f)(1 + g_{s,N})}{(f_s l_s + \bar{c})\, \psi_s\, \sigma^2}$$

  Risky allocation $\nearrow$ in population growth; $\searrow$ in funding status, contribution rate, and public-service efficiency.
- I calibrate model to 2023 taxes, funding status, growth and expenditures to track model implied allocations vs. data.

Optimal vs. Observed Allocation Wedge



(a) ψ_s vs. FR



(b) θ_{optim} vs. θ_{data}

- Most points below the 45° line ($\theta_{data} > \theta_{optim}$): **excess risk-taking (reach for yield)**
- Equity-only points closer to the line ⇒ tilt into alternatives is volatility smoothing (**reach for opacity**); option value

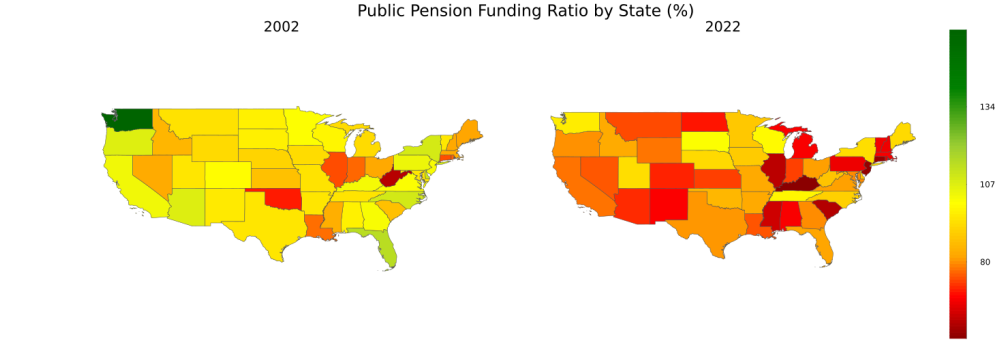
Conclusion

- Pension underfunding passes through to migration: households out-migrate from worse- to better-funded regions
- Older and richer taxpayers are more likely to move
- Higher-migration-risk states allocate more to alternative, presumably riskier or opaque assets
- **Insight:** migration risk is a non-trivial factor in pension performance and debt sustainability

Thank you!

Appendix

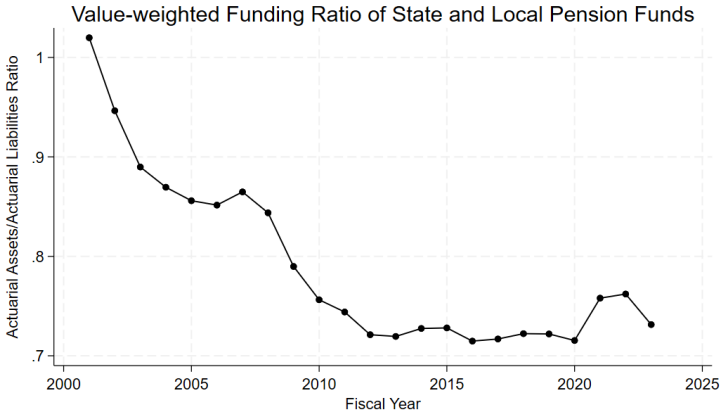
Spatial Dispersion in Public Pension Funding



Funding Status of Defined Benefit Public Pensions have worsened across states, but some states have performed worse than others

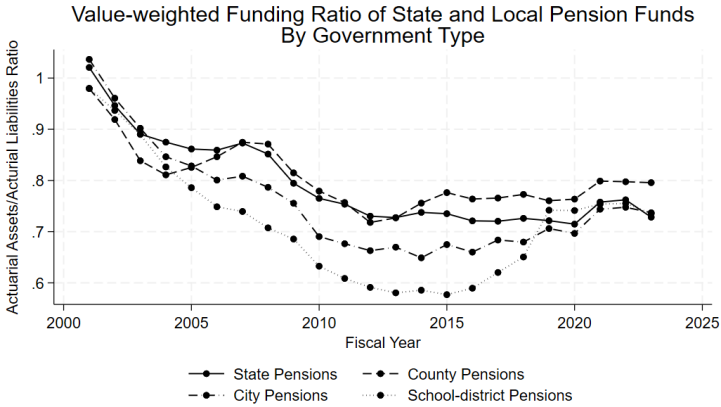
By Government Type | Value-weighted Aggregate | Back to Intro

Declining Funding Status of State and Local Public Pensions



Balanced-budget constraints tie pension shortfalls to taxes/services today and tomorrow

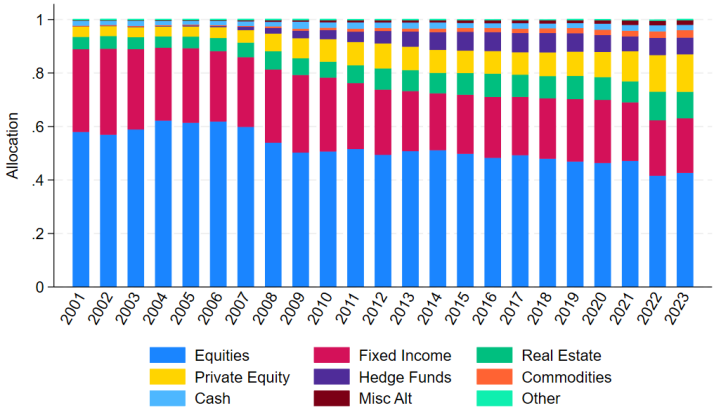
Declining Funding Status: Broad-based Decline



Balanced-budget constraints tie pension shortfalls to taxes/services today and tomorrow

Back to Aggregate Back to Spatial Dispersion

Asset Allocation Trends: Pivot toward Alternatives



Trends in Allocation Trends: What explains move towards alternatives?

How much do states lose?: Net Migration

Measure county-level *net* out-migration to quantify loss, modify instrument to:
$\tilde{Z}_r = \sum_{h=0}^{t}(r_h - r^a_{2001})$

	(1)	(2)	(3)	(4)	(5)
	Funding Ratio	$\frac{\text{Net Out Migrant Returns}}{\text{Non-Migrant Returns}}$		$\frac{\text{Net Out Migrant AGI}}{\text{Non-Migrant Returns}}$	
	First-Stage	OLS	IV	OLS	IV
$\tilde{Z}_r$	0.0607***				
	(10.22)				
Funding Ratio$_{t-1}$		-0.000468	-0.0205**	0.105	-1.896**
		(-0.39)	(-2.07)	(1.31)	(-2.45)
N	59403	56312	56312	56312	56312
R-Sq	0.812	0.269	-	0.425	-
F-Stat	208.3				
FE	County and Year				
Controls	Rents, Wages, S&L Taxes, Debt/Rev, County-growth, Crime, Political				

1 $\sigma \searrow$ in funding $\implies$ 29bps net return outflow, \$540mn AGI loss for Cook County

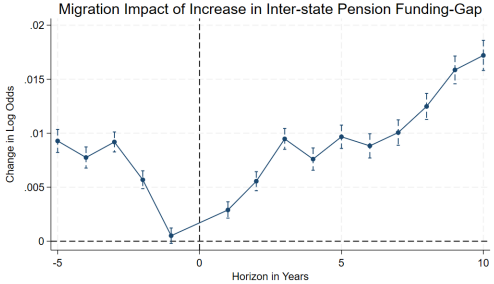
When do people leave?: Migration Dynamics

Regress:

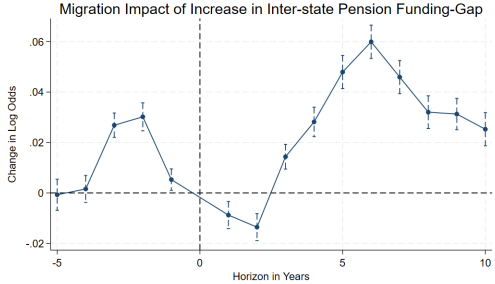
$$\ln\left(\frac{Y_{od,t+h}}{P_{oo,t+h}}\right) - \ln\left(\frac{Y_{od,t}}{P_{oo,t}}\right) = \eta_h D_{odh} + \gamma X_{odt} + F_{odt} + \epsilon_{od,t+h}$$

Instrument:

$$Z'_{odt} = (r_{dt} - r^a_{d,2001}) - (r_{ot} - r^a_{o,2001})$$



(a) OLS: Log Odds

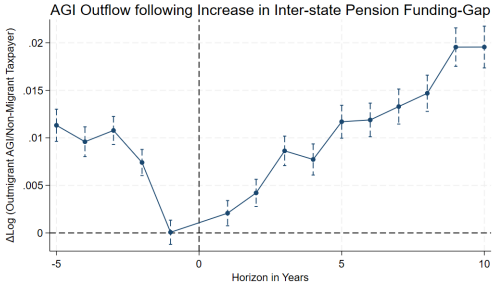


(b) 2-SLS: Log Odds

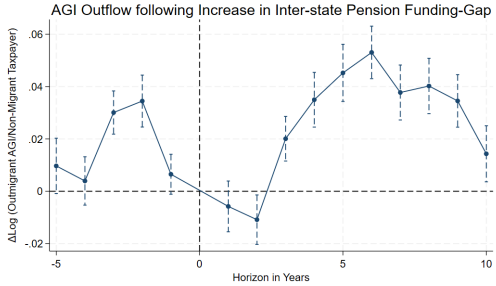
Funding-gap increases predict migration odds peaking in 6 years and then tapering

AGI-Weighted Dynamics

Migration Dynamics - AGI Weighted



(c) OLS: Log Odds

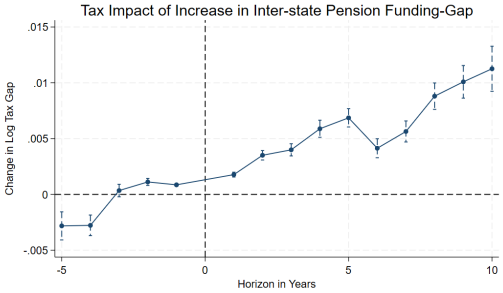


(d) 2-SLS: Log Odds

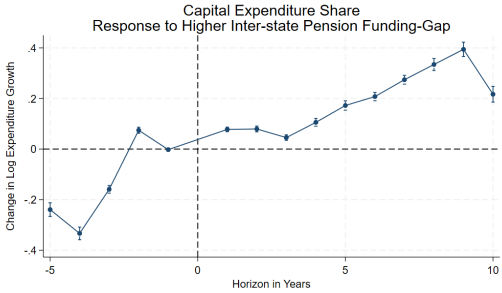
Back to Odds

Explaining Dynamics: ΔFunding Gaps predict ΔFiscal Outcomes

Regress: $\ln\left(\frac{Y_{d,t+h}}{Y_{o,t+h}}\right) - \ln\left(\frac{Y_{d,t}}{Y_{o,t}}\right) = \beta_h D_{odt} + \gamma X_{odt} + F_{odt} + \epsilon_{od,t+h}$; where D_{odt} is a dummy for change in funding gap, instrumented by change in synthetic portfolio performance

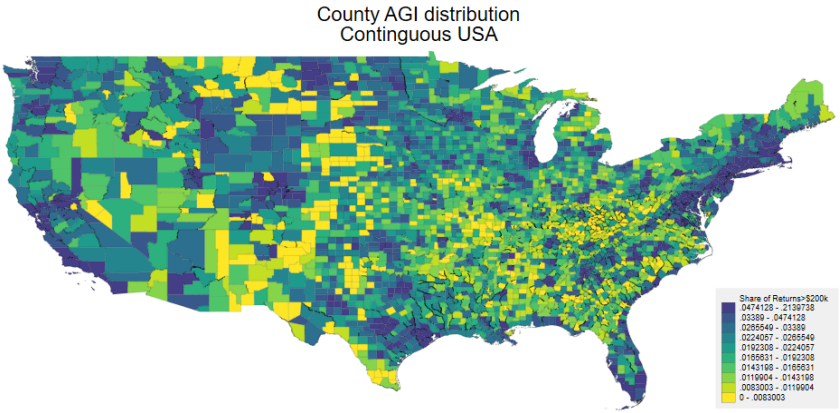


(e) Gap in Net-of-State Income Tax



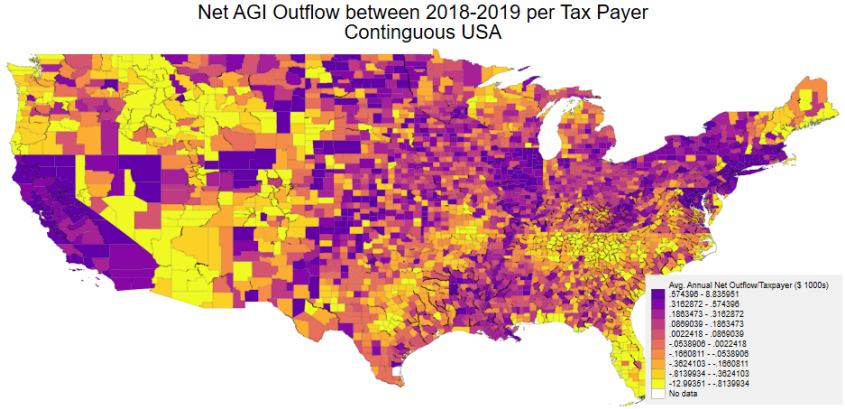
(f) Gap in Capital Expenditure Share of State Budget

Spatial Distribution: Top AGI Returns in 2017



Exposure to SALT Deduction: (Bluer = Richer)

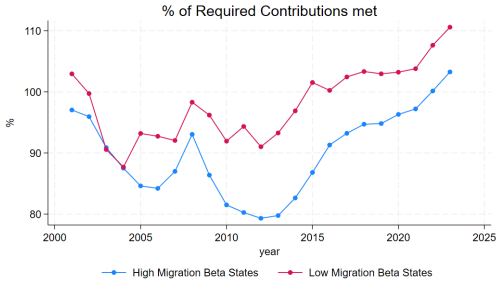
Spatial Distribution: Net Migration



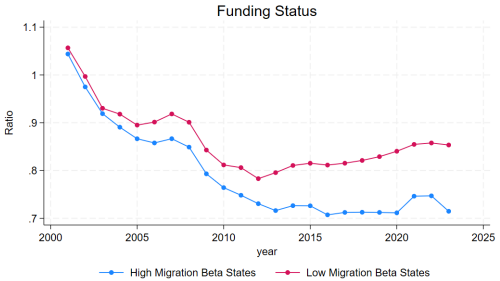
Net Outflows (Purple = Net Out, Yellow = Net In)

Back to Main

How does migration risk sort states?



(a) High-Risk States Under-contribute



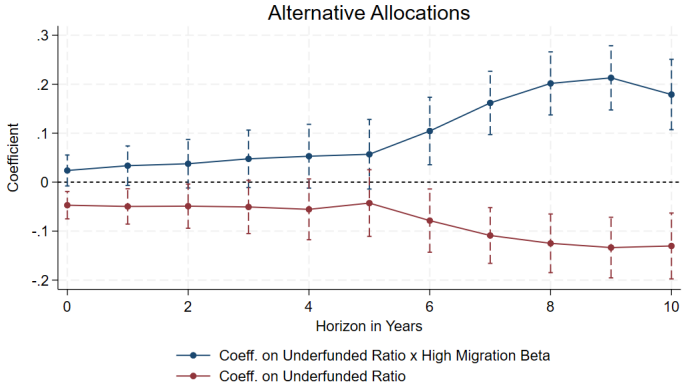
(b) Funding Status diverges

High-risk states (above-median migration risk):

- Under-contribute relative to actuarially required levels
- Run persistently lower funding levels

Dynamic Effects

$$Y_{it+h} = \eta_h \times 1(\text{High Migration Risk}) \times \mathsf{U}_{i,t} + \mathsf{U}_{i,t} + \Gamma X_{it} + \theta_t + \kappa_i + \varepsilon_{it+h}$$



Location Choice Empirical Design (Full)

I motivate a location-choice design:

- Indirect utility for household i migrating from origin o to destination d:

$$V_{iodt} = \underbrace{\alpha \ln(1-\tau_{dt})}_{\text{Dest. Taxes}} + \overbrace{\alpha \ln w_{dt} + \gamma \ln r_{dt}}^{\text{Wages \& Rents}} + \underbrace{B_d + \vartheta B_{dt}}_{\text{Amenities}} + e_{iodt} - \overbrace{C_{od}}^{\text{Migration Cost}}$$

- *Claim:* Funding proxies local public finances $\rightarrow$ replace $(1-\tau_{jt})$ and B_{jt} with funding status
- Utility gain from migrating versus staying:

$$V_{iodt} - V_{ioot} = \beta[\ln f_{dt} - \ln f_{ot}] + \alpha \ln(w_{dt}/w_{ot}) + \gamma \ln(r_{dt}/r_{ot}) + B_d - B_o - C_{od} + e_{iodt} - e_{ioot}$$

- Assume Type-1 EV errors and map to Data:

$$\ln(P_{odt}/P_{oot}) = \beta[\ln f_{dt} - \ln f_{ot}] + \alpha \ln(w_{dt}/w_{ot}) + \gamma \ln(r_{dt}/r_{ot}) + B_d - B_o - C_{od}$$

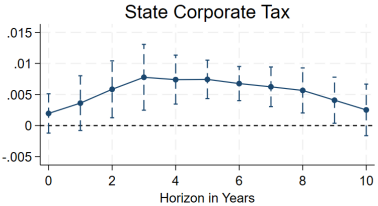
- **Data:** Center for Retirement Research + IRS Migration Files + Census State/Local Government Finances

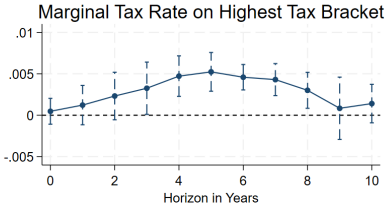
Challenge: underfunding may correlate with omitted local variation

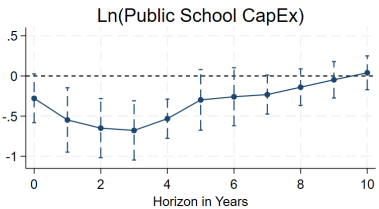
Back to main

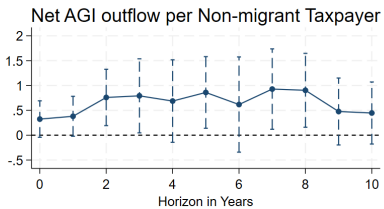
What reflects underfunding & What underfunding reflects

- Funding → Taxes and Amenities









Includes time-varying state-level controls, state and year fixed-effects

Political Executive's Problem (Full)

Maximize population-weighted period-1 utility plus discounted, re-election-weighted continuation welfare:

$$\max_{\{\tau_{s,1},\tau_{s,2},c_{s,1},c_{s,2}\}} \; v_{s,1}\, N_{s,1} + \beta\, p(\tau_{s,1})\, \mathbb{E}\big[\, v_{s,2}\, N_{s,2}\,\big]$$

$$\text{s.t. Budget Balance:} \quad \tau_{s,1} = x_{s,1} + c_{s,1}, \quad \tau_{s,2} = x_{s,2} + c_{s,2},$$

$$\text{Pension Contributions:} \quad c_{s,2}(1+g_s) + (a_s + c_{s,1})\, R_s = \ell_s,$$

$$\text{Pension Returns:} \quad R_s = 1 + r_f + \theta_s(\mu - r_f) + \theta_s\, \sigma_R\, \epsilon, \quad \epsilon \sim \mathcal{N}(0,1).$$

Distortion: voters punish higher taxes $p'(\tau_{s,1}) < 0$. FOC

First-Order Condition (Full)

$$\underbrace{\frac{\partial v_{s,1}}{\partial \tau_{s,1}} N_{s,1}}_{\text{static welfare loss}} + \underbrace{\beta\, p(\tau_{s,1})\, \mathbb{E}\Big[\frac{\partial v_{s,2}}{\partial \tau_{s,1}} N_{s,2} + v_{s,2} \Phi_s (1-\Phi_s) \sigma_v^{-1} \frac{\partial v_{s,1}}{\partial \tau_{s,1}}\Big]}_{\text{intertemporal welfare incl. migration}}$$

$$+ \underbrace{\beta\, p'(\tau_{s,1})\, \mathbb{E}\big[v_{s,2}\, N_{s,2}\big]}_{\text{electoral wedge}} \;=\; 0.$$

Planner ($p \equiv 1, p' \equiv 0$):

$$\frac{\partial v_{s,1}}{\partial \tau_{s,1}} N_{s,1} + \beta\, \mathbb{E}\Big[\frac{\partial v_{s,2}}{\partial \tau_{s,1}} N_{s,2} + v_{s,2}\, \Phi_s (1-\Phi_s)\, \sigma_v^{-1}\, \frac{\partial v_{s,1}}{\partial \tau_{s,1}}\Big] = 0.$$

The political wedge $\beta p'(\tau_{s,1}) \mathbb{E}[v_{s,2} N_{s,2}] < 0$ pulls toward lower period-1 taxes.

State Pension Fiduciary (Full)

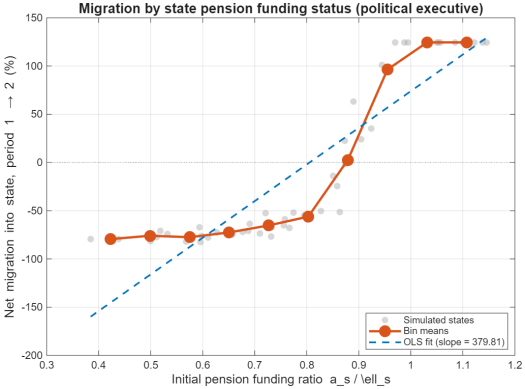
- Boards take contribution $c_{s,1}$ as given, choose risky share θ_s
- End-of-period funding ratio:

$$f_{s,2} = \underbrace{\frac{a_s + c_{s,1}}{\ell_s}}_{\equiv q_s}\Big[\,1 + r_f + \overbrace{\theta_s(\mu - r_f) + \theta_s\,\sigma_R\,\epsilon}^{\text{Risky Return}}\Big]$$

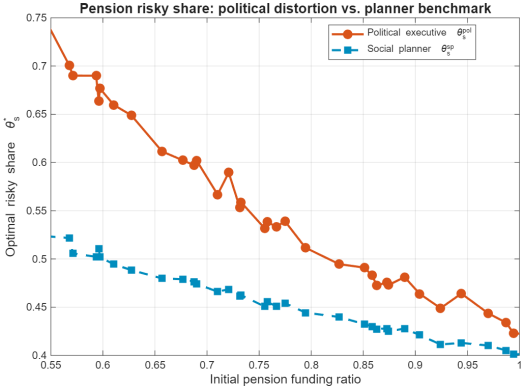
- CARA utility $\Pi(f_{s,2}) = k + \kappa f_{s,2}$: $\max_{\theta_s} \mathbb{E}[-\exp(-\gamma(k + \kappa f_{s,2}))]$
- Optimal share $\boxed{\theta_s^* = \dfrac{\mu - r_f}{\gamma\,\kappa\,q_s\,\sigma_R^2}}$

Legacy funding and contribution set the risky share.

Funding Status and Migration



(c) Prop 2: Funding and Migration



(d) Prop 3: Political Risk-Shifting