Pension Reform and Asset Allocation: Evidence from Annuity Cuts to Retired Civil Servants in Taiwan

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Abstract

How do households reallocate assets when faced with a sudden decrease in lifetime income? We examine retired civil servants' asset allocation in response to a retroactive pension cut in Taiwan. Using administrative tax data, we show that these retirees increased their stock-to-wealth ratios by 10%, stock holdings by 7%, but not risk exposures to market following the annuity cuts. Moreover, they exhibited a heightened disposition effect, reduced their bank deposits and total wealth, and were more likely to re-enter the labor market. Our large-scale evidence suggests that, consistent with prospect theory, retirees pursued riskier assets under annuity cuts.

Introduction

- **Research Question:** *How do permanent income reductions caused by pension reform affect retirees' asset allocation decisions?*
- Pension reforming is perhaps the most pressing economic issue in an aging society (Lindbeck and Persson, 2003; OECD, 2019, 2021, 2023).
- We employed an retroactive pension reform that cut pensions by approximately 30%-45% over a 10-year span.
- We use the administrative tax data that includes 6 type of assets: deposits, bonds, stocks, housing, land, and car ownership.
- The causal effects are identified by a Difference-in-Differences design.
- In comparison with households in the private sector, the households of retired civil servants revealed the following patterns:
  - stock-to-wealth ratio ↑by 10%; stock holdings ↑by 7%
  - the effect ↑ with the number of children
  - disposition effect ↑
  - deposit-to-wealth ratio and wealth ↓by 22% and 3.67%
  - probability of finding post-retirement job ↑by 4 ppt
- **We challenge prior literature on households' de-risking upon wealth loss/income reduction.**

Institutional Change

Table 1: Income Replacement Ratio (Annuity/Working Income before Retirement) Before and After the Pension Reform

Tenure	40	35	30	25	20	15
(A)	95%	95%	85%	75%	75%	75%
(B)	90%	90%	90%	85%	80%	75%
July, 2018	77.5%	75.0%	67.5%	60.0%	52.5%	45.0%
2029	62.5%	60%	52.5%	45%	37.5%	30%

- Two possible schemes pre-reform (A/B).
- Legislation passed in 2017.
- Pension cut starting from July 2018.
- Additional 1.5% decrease every year until 2029.

Empirical Specification

$$\text{AssetAllocation}_{it} = b\ \text{CivilServant}_i \times \text{Post}_t + \mathbf{X}_{it}\Gamma + \mu_i + \delta_t \text{ or } \sigma_{ct} + \varepsilon_{it}.$$

- Household-year level panel data from 2013-2021.
- Identification Design: Difference-in-Differences.
- Control Variables: # of children ≤24 yrs old, ln(1 + mortgage), and fixed effects for the husband's age.

Results

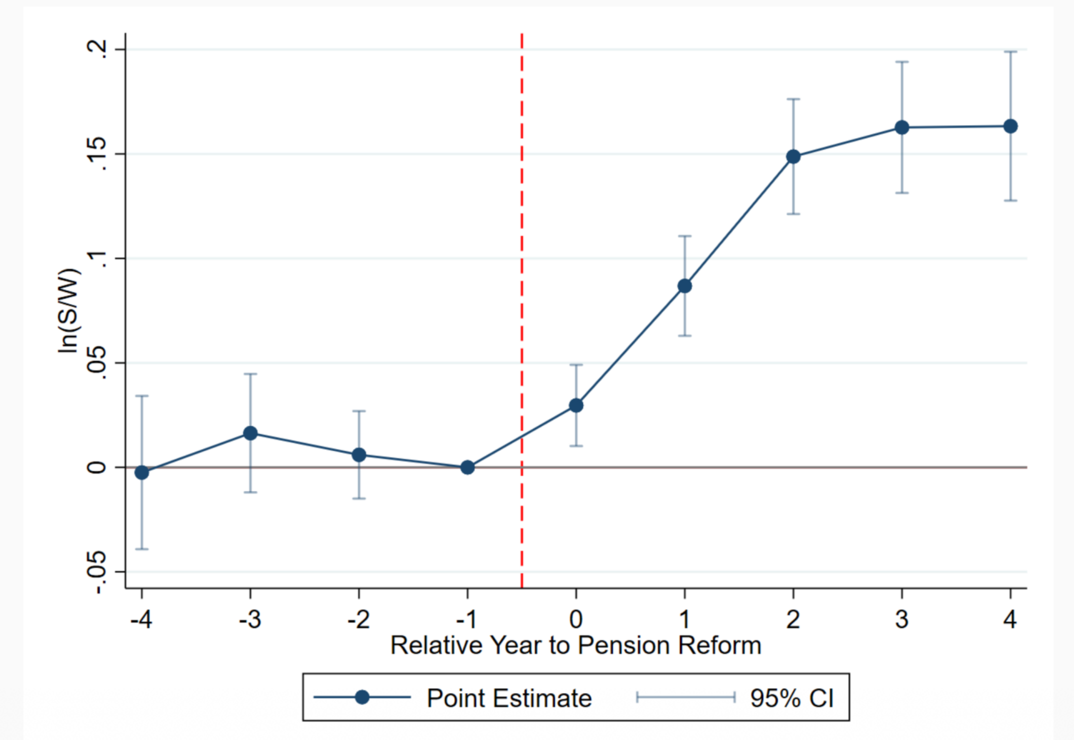

Figure 1: Logarithm of stock-to-wealth ratio in different years

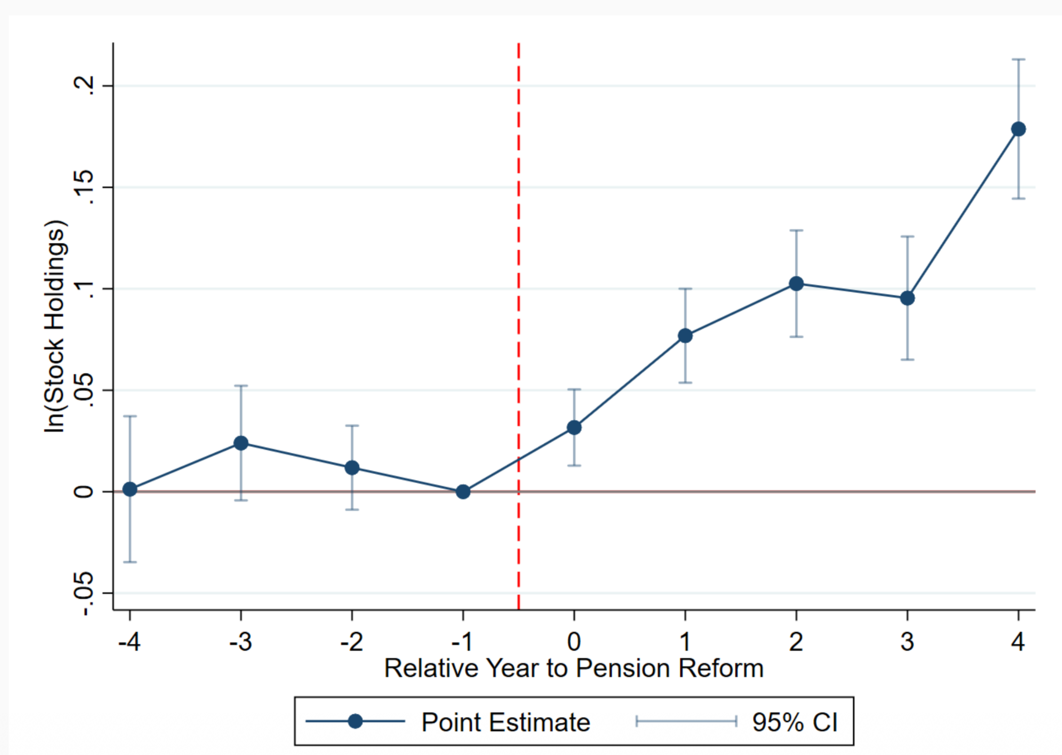

Figure 2: Logarithm of stock holdings in different years

Testing Mechanism

A rational asset allocation adjustment?

- CRRA/DRRA: permanent income reduction ⇒ lower risky asset holdings as households aim to stabilize consumption.
- However, we found more stock holdings (i.e., risky assets) after annuity cut
- Retired civil servants increased their holdings in "safer stocks"; nevertheless, we do not find higher stock returns or betas.

Prospect Theory Interpretation:

- Individuals evaluate outcomes relative to a reference point and exhibit asymmetric risk preferences (Kahneman and Tversky, 1979).
- The pre-reform pension served as a salient reference point.
- The reform generated a perceived loss.
- In the loss domain, civil servants became risk-seeking.
- Psychologically appealing for the chance to "break even."

- We implement two tests to assess the role of perceived losses:
  1. Whether the perceived loss is larger in households with **more children**.
  2. Whether a **reference point** is present, using evidence from the **disposition effect**.

Table 2: Dividng the sample into subgroups by # of children.

	(1)	(2)	(3)
# Children	0	1	≥2
VARIABLES	ln(Stock/Wealth)	ln(Stock/Wealth)	ln(Stock/Wealth)
Panel A: ln(Stock/Wealth)			
Civil Servant × Post	0.0900***	0.1467***	0.1844***
	(0.0126)	(0.0361)	(0.0657)
Child Dependency			0.0079
			(0.0214)
ln(1+mortgage)	0.0216***	0.0240***	0.0225***
	(0.0005)	(0.0014)	(0.0019)
Observations	636,962	110,062	52,882
	(4)	(5)	(6)
# Children	0	1	≥2
VARIABLES	ln(Stock Holdings)	ln(Stock Holdings)	ln(Stock Holdings)
Panel B: ln(Stock Holdings)			
Civil Servant × Post	0.0760***	0.1256***	0.1260**
	(0.0121)	(0.0351)	(0.0621)
Child Dependency			-0.0043
			(0.0203)
ln(1+mortgage)	-0.0005	0.0003	-0.0006
	(0.0005)	(0.0013)	(0.0017)
Observations	639,881	110,561	53,116

Table 3: Effect of Pension Reform on realized gains and losses (from stocks sold)

	(1)	(2)	(3)
VARIABLES	ln(1+Realized Gains)	ln(1+Realized Gains)	ln(1+Realized Gains)
Panel A: Realized Gains			
Civil Servant × Post	0.2455***	0.2750***	0.2782***
	(0.0356)	(0.0353)	(0.0354)
Child Dependency		-0.1047***	-0.1079***
		(0.0185)	(0.0185)
ln(1+mortgage)		0.0020	0.0019
		(0.0015)	(0.0015)
	(1)	(2)	(3)
VARIABLES	ln(1+Realized Losses)	ln(1+Realized Losses)	ln(1+Realized Losses)
Panel B: Realized Losses			
Civil Servant × Post	0.1139***	0.1351***	0.1342***
	(0.0303)	(0.0300)	(0.0302)
Child Dependency		-0.0388**	-0.0418***
		(0.0153)	(0.0153)
ln(1+mortgage)		-0.0017	-0.0017
		(0.0014)	(0.0014)
Husband Age FE	-	Y	Y
Household FE	Y	Y	Y
Year FE	Y	Y	-
City-Year FE	-	-	Y
Observations	803,558	803,558	803,558

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

Standard errors clustered at the household level.

Conclution

- We examine how retired civil servants change their asset allocation upon unexpected annuity cut.
- Retired civil servants increased their stock-to-wealth ratios by over 10%, their stock holdings by over 7%.
- Our study provides novel evidence on the portfolio choice of permanent income reduction.
- Consistent with prospect theory (a strong effect for families with more children; a stronger disposition effect).
- Policy implications: (1) household investment risk and social security; (2) labor supply of senior citizens; (3) disincentivize for service in the public sector.

Link to paper

(Updated version will be available soon.)

Contact

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