Notional Defined Contribution Pensions in Aging Economies

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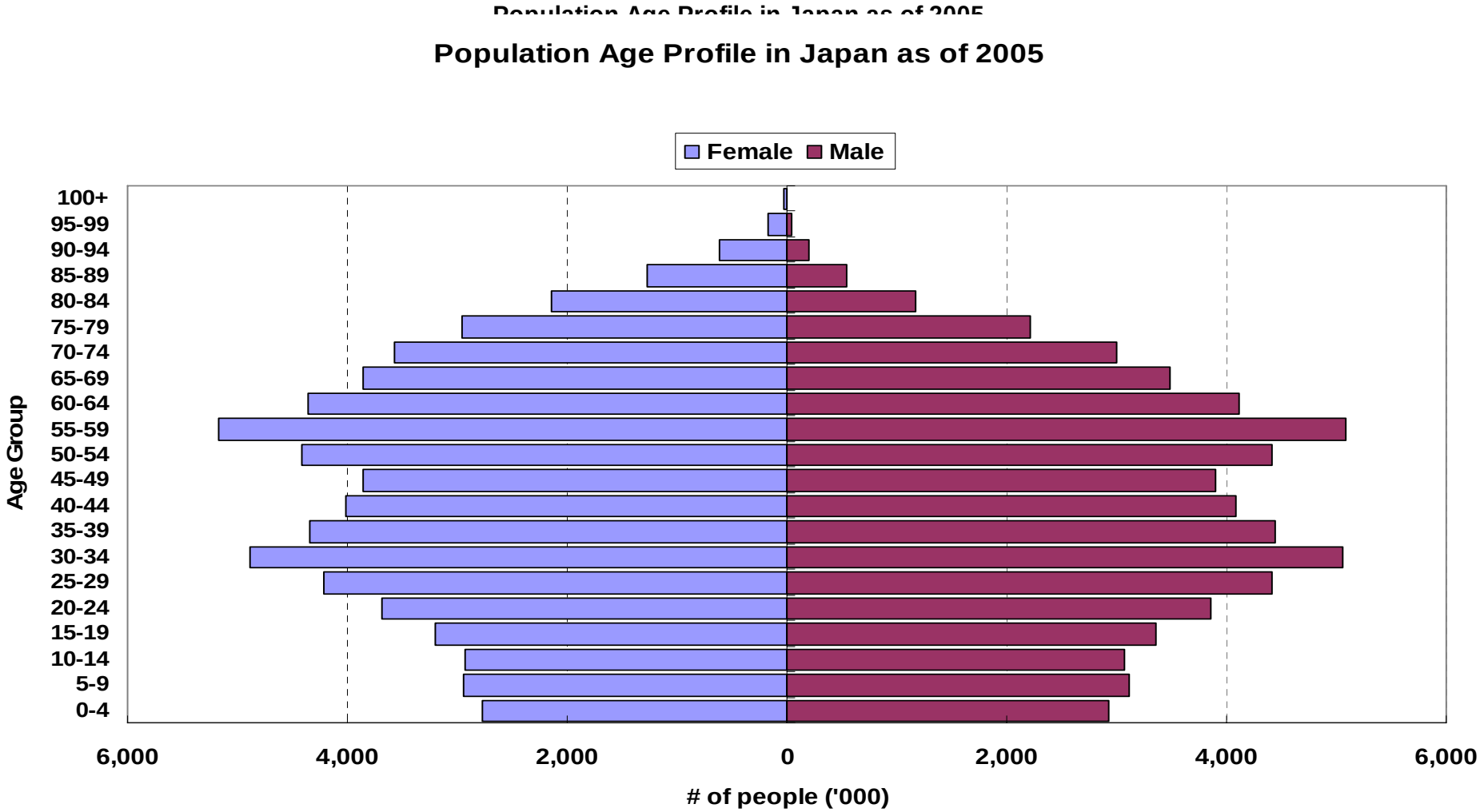
Introduction and Motivation

- NDC paradigm frequently suggested as a way forward for aging economies with pre-existing PAYG social security systems

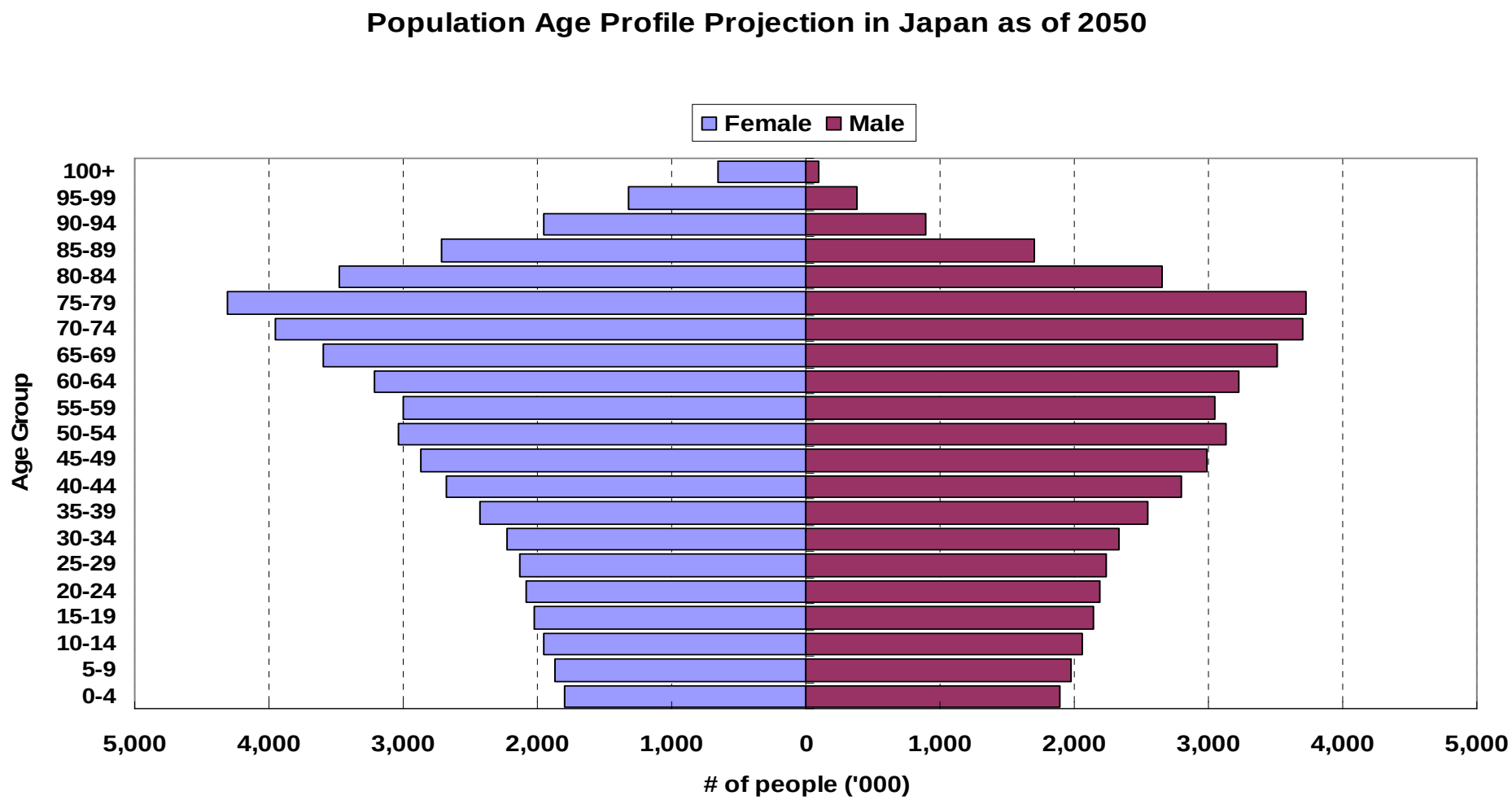
- This study takes one of the world's oldest and largest economies, and makes simple calculations to see how it would work there

Japan's Aging Population



Source: United Nations Secretariat, World Population Prospects: The 2006 Revision

Japan's Aging Population



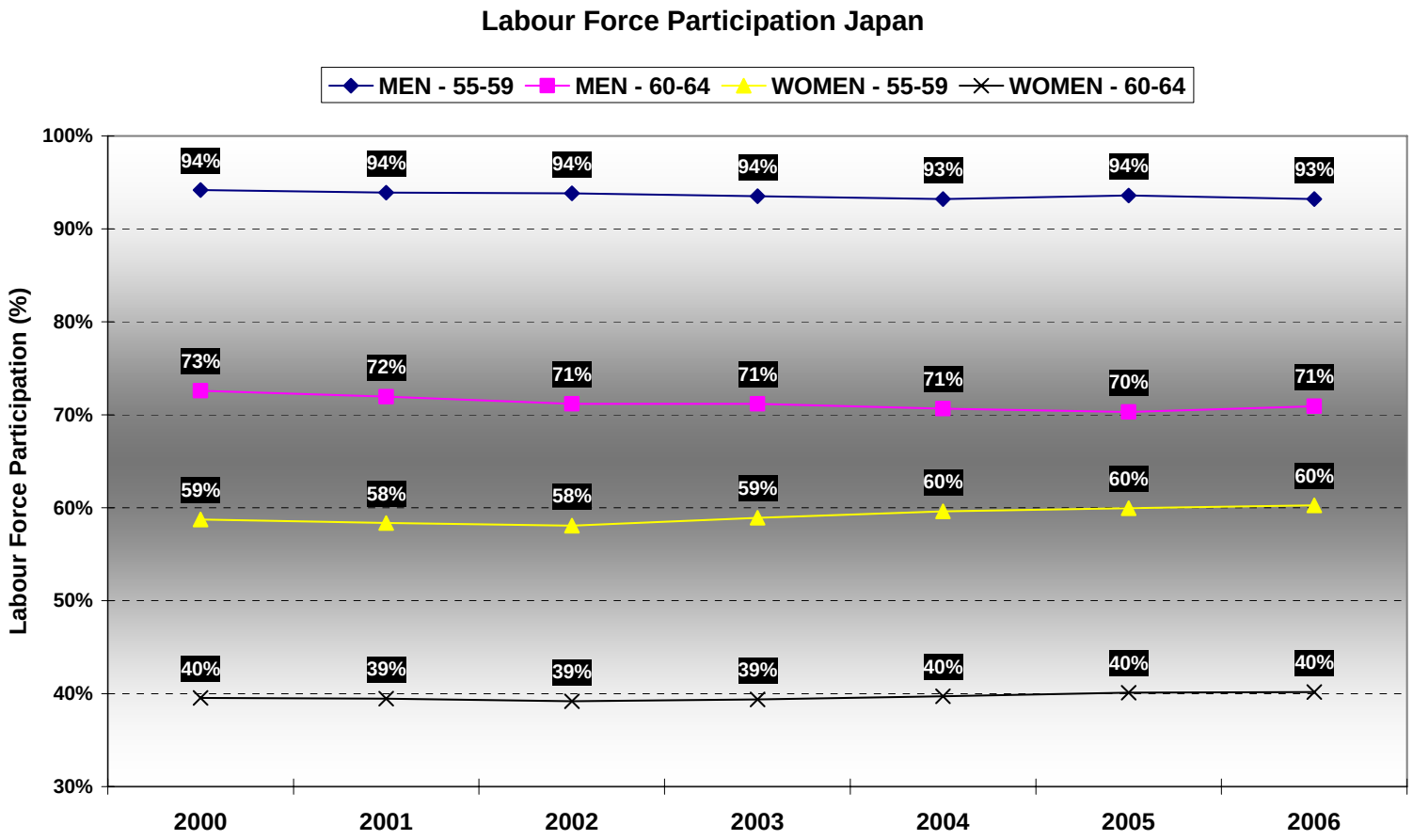
Japan's Social Security Structure

- Two main systems, 3 main "groups"
  - KN: redistributive, unfunded, financed partly from general tax revenue (NP)
  - KNH: income replacement, unfunded, financed from social security contributions (EP)
  - Group 1: Students, self-employed, unemployed (KN)
  - Group 2: Employees (KNH)
  - Group 3: Dependant spouse of Group 2 (KN with no contribution)

Japan’s Social Security Structure

- Encourages workers to work longer, emphasised in most recent reform
- Provides large subsidy for dependant spouses
- Built around a “benchmark couple”, one earner works for 40 years, dependant spouse
- Declared as unfunded

Japan: Labour force participation



Project Background

- Japan reviews and reforms its public (KN, KNH) pensions frequently
- Public trust is being eroded from successive downward revisions of benefits
  - Decreasing “group 1” enrolment in KN
- How can reforms be designed to be
  - Sustainable for the system?
  - Actuarially fair for individuals?

Alternative Pension Reform Paradigms

- Parametric reform
  - Change benefits,
  - Change contributions,
  - Flexible retirement age,
  - Change vesting period, etc

Alternative Pension Reform Paradigms

- Structural reform
  - Change basis of system design, e.g., unfunded to pre-funded
    - From PAYG to Defined contribution
- Add new pillar
  - Australia: Superannuation

Notional Defined Contribution

Some of parametric and structural:

- Change parameters in a consistent way
- Actuarially fair for individuals
- Automatic adjustment for sustainability
- Not pre-funded

- No inter- or intra-cohort risk sharing
  - Safety net needed

Japan's 2004 Pension Problem

→Projected cashflow shortfalls*

To maintain couples' replacement rate:

- EP contributions would have to rise from 13.58% → 25.9%
- NP contribution would have to rise from ¥13,300 (3.6%) to ¥29,500/mo
- More govt revenue required

→Enormous pension legacy costs**

~ ¥740 Trillion KNH + ¥50 Trillion KN

But note very large pension reserves (¥ 179 trillion)

*Sakamoto IAA/PBSS Nov 2004
**Takayama, personal communication

The 2004 Policy Response:

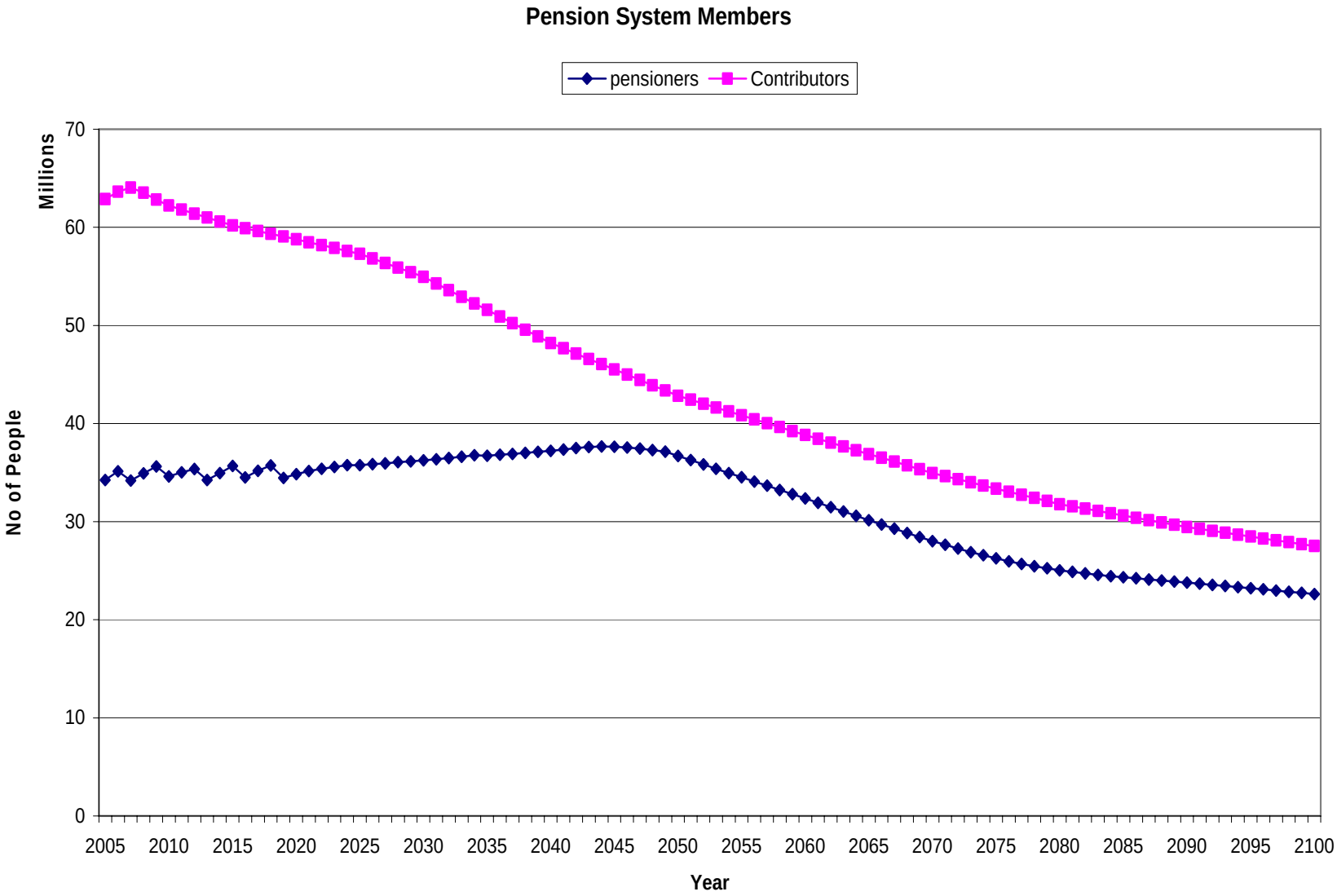
Boost Revenue:

- ✓ Raise EPS contributions to 18.30% (by 2017)
- ✓ Boost govt subsidy "from 1/3 to 1/2" by 2009
- ✓ Pension reserves to earn 2.2% real pa
- Reserves fall to 1-yr benefit flow by 2100

Benefit Cuts:

- ✓ Retirement age up
- ✓ Replacement rate for "stylized" married couple cut to 50% & CPI indexed by 2023
- ✓ Further changes: "macroeconomic slide"

Still, the future remains grim:



Our project:

- How does NDC interact with demographics?
- Evaluate potential role for Notional Defined Contribution (NDC) reform in Japan
  - Would actuarial fairness improve?
  - Would work incentives increase?

Also…

  - What role for public pension reserves?

Notional Defined Contribution (NDC)

Features

- ✓ Mandatory scheme with fixed individual contribution rate
- ✓ Individual notional accounts

- ✓ Crediting rate = f (productivity & LF growth, demographics)
- ✓ Benefit = g (notional accumulation, demographics)
- ✓ *Adjustment mechanisms*: Benefit changes, buffer fund

Methodology

Two Models

- **Illustrative OLG example**
  - Explores relationship between NDC and alternative demographic paths

- **Stylized Application to Japan**
  - Identifies impact of NDC design on benefit-cost outcomes with population decline
  - Relies on AV2004

Illustrative OLG Model

$$A_{\bar{S}}^{X} = \sum_{t}^{\bar{S}} \tau_{\bar{S}-t+1}^{X} \cdot E_{\bar{S}-t+1}^{X} \cdot \prod_{k=0}^{t} R_{\bar{S}-k}$$

Accumulation

$$R_{y} = \frac{\sum_{x=1}^{\bar{T}} N_{y-x+1}^{x} \cdot E_{y-x+1}^{x}}{\sum_{x=1}^{\bar{T}} N_{y-x}^{x} \cdot E_{y-x}^{x}}$$

Crediting rate

NDC Payout formula

$$\beta^X = A_{\bar{S}}^X \Big/ \sum_{t=66}^{\bar{T}} {}_t p_{65}^x \frac{1}{R_{X+\bar{S}}{}^t}$$

Note: NDC accumulation annuitized at retirement age S

→Typically cohort-specific *p* and *R*

Findings re NDC and demographics:

- NDC works well if population growing:
  - High crediting rate due to high wage bill growth
- If population declining, NDC success depends on:
  - Having investment reserves
  - Earning strong returns on investments

Extension to “Japanese Case”

- Stylized example
- Assume (as per AV2004)
  - Labor force falls 0.6%
  - Real wage growth 2.1%
  - CPI 1%
  - Run down reserves of ¥179 trillion (~ 35% GDP) to one year’s benefit value in 2100
  - Nominal investment return on reserves 3.2%
  - Government subsidy “from 1/3 to 1/2” of NP

Comparing Current Policy *vs* NDC Reform

- Both have retirement replacement rate for benchmark couple 50% of average net earnings (by 2020)

- NDC simulation gives all contributors an account:
  - Single contributes 9.15%; couple pays 18.3%
  - Replacement at retirement for average earner: 25%
  - "Groups" eliminated – no basic pension paid*
  - Alternative investment return scenarios

*Grp 1: self empl., students, unempl; Grp 2: KNH ees; Grp 3: spouses of Grp 2

2004 Reform and NDC Parameters

	2004 Reform		NDC Simulation	
	Contribution rate	**Replacement rate**	**Contribution rate**	**Replacement rate**
Single	18.3%	36.4%	9.15%	25%
Benchmark couple	18.3%	50%	18.3%	50%

→Current system heavily subsidizes nonworking spouses
→NDC cuts cross-subsidies so singles' benefit-cost ratio rises

NDC Replacement Rates (RR) for Alternative Investment Returns

Assumed Investment Return	2%	**3.20%***	6%
RR for Single Retiree in 2050	23%	**25%**	29%
NDC Crediting Rate	2.0%	**2.41%**	2.8%

Investment Return Required
for Alternative Reserve Ratios or Subsidy Levels Under NDC Policy

	Investment Return Needed
• Reserve rundown as per 2004 Reform:	2.85%
• Maintain current Reserve Ratio (4.7):	3.25%
• Eliminate Subsidy :	8.77%

Findings re NDC in Japan

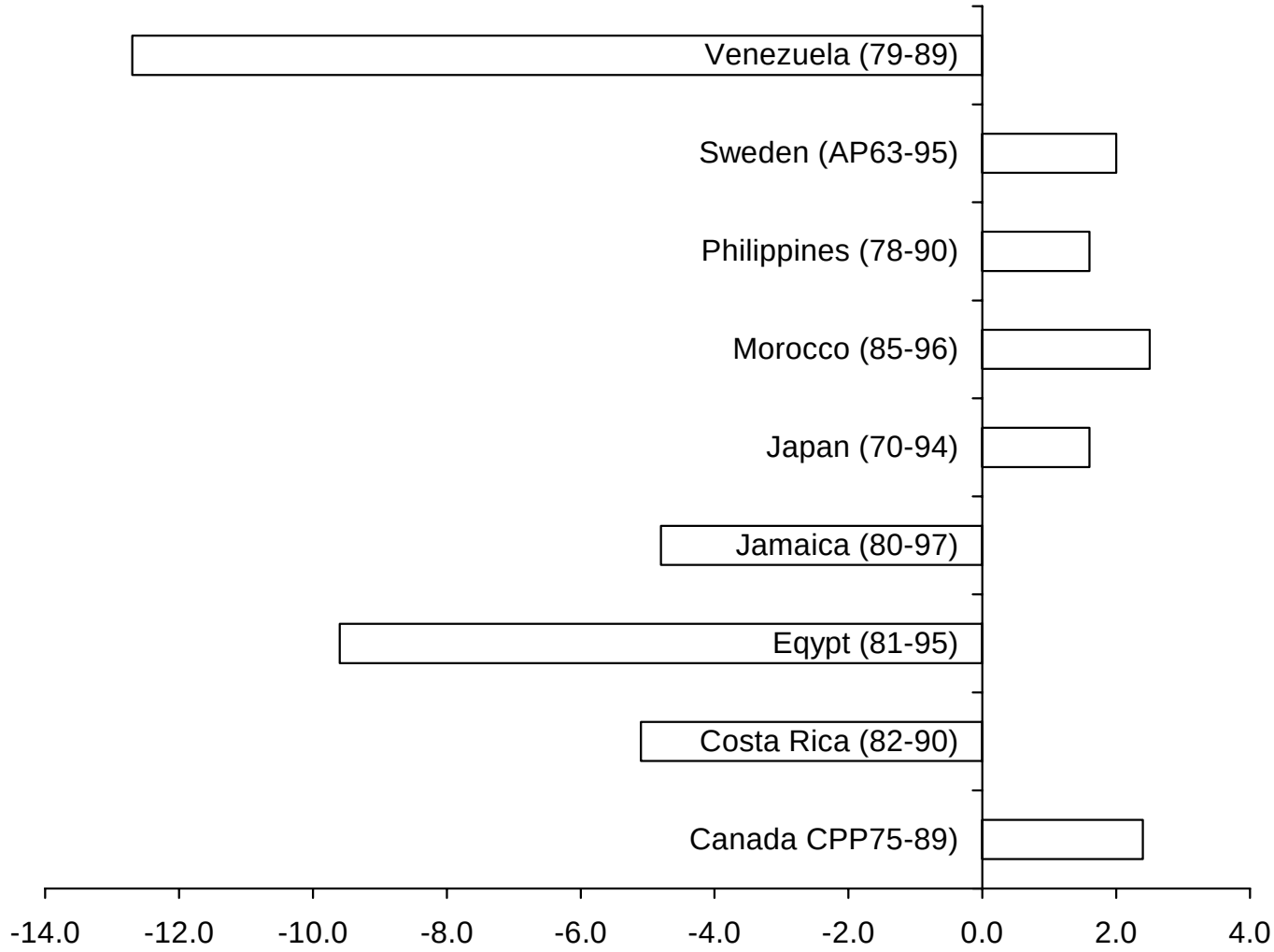
→*NOTE: A Stylized Example, based on the 2004 "Actuarial Valuation"*

- Reserves and investment returns key to NDC sustainability
- Actuarial fairness can improve:
  - Singles' benefit-cost ratio enhanced
  - Benefit-cost ratio less for KN beneficiaries
- Work incentives can increase

Caution on Reserves

- When implementing NDC, buffer or reserve fund can help boost replacement rates
- Strong investment returns are key
- Managing reserves is challenging

All public pension reserves do not earn good investment returns! Annual real returns, public pensions



Iglesias and Palacios (1999)

Policy Relevance for Japan

- NDC reform feasible for Japan *(preliminary findings).*
- NDC policy advantages:
  - Pre-commitments can be useful
  - Actuarial fairness can improve
  - Work incentives can increase

BUT…

- Reallocates, but does not eliminate, past system shortfalls.
- Limited inter/intra-cohort risk-sharing.

Future Research

- Impact on low-income groups and role of safety net – requires micro data.
- Financial management of reserves
- Integration of other pension plans including civil servants

Thank you!

For more information:

- Australian Institute of Population Ageing Research

http://www.aipar.unsw.edu.au/

- The Pension Research Council:

http://prc.wharton.upenn.edu/prc/prc.html