P R O S T – Pension Reform Options Simulation Toolkit

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Why Modelling?

- Many factors have to be taken into account when assessing a real pension system, and its different reform options:
  - ✓ Demographic
  - ✓ Economic
  - ✓ Policy variables/pension system parameters
  - ✓ Individuals behavior
- Pension system analysis requires long-term projections
- Useful tool in pension system diagnosis and evaluation of reform options; a tool to organize thinking about pension systems

What is PROST?

- PROST – computer-based toolkit to simulate pension systems over a long timeframe
- Created to support World Bank pension policy dialogue in client countries
- User-friendly, input-output in Excel
- Regular updates with new features
- Individual country and cross-country studies (used in 90+ WB client countries and some cross-country studies)
- More details in "Modeling Pension Reform: The World Bank's Pension Reform Options Simulation Toolkit" (www.worldbank.org/pensions)

Key Features of PROST

- Deterministic cohort-based model: models single year cohorts, tracks them down over time
- Projects coverage, contributions, entitlements, financial flows
- Allows to look at pension system as a whole as well as at individuals
- Addresses all main pension policy dimensions, all policy variables exogenous
- Generic, flexible, easily adapted to various country circumstances
- Modeling reforms relatively fast and easy

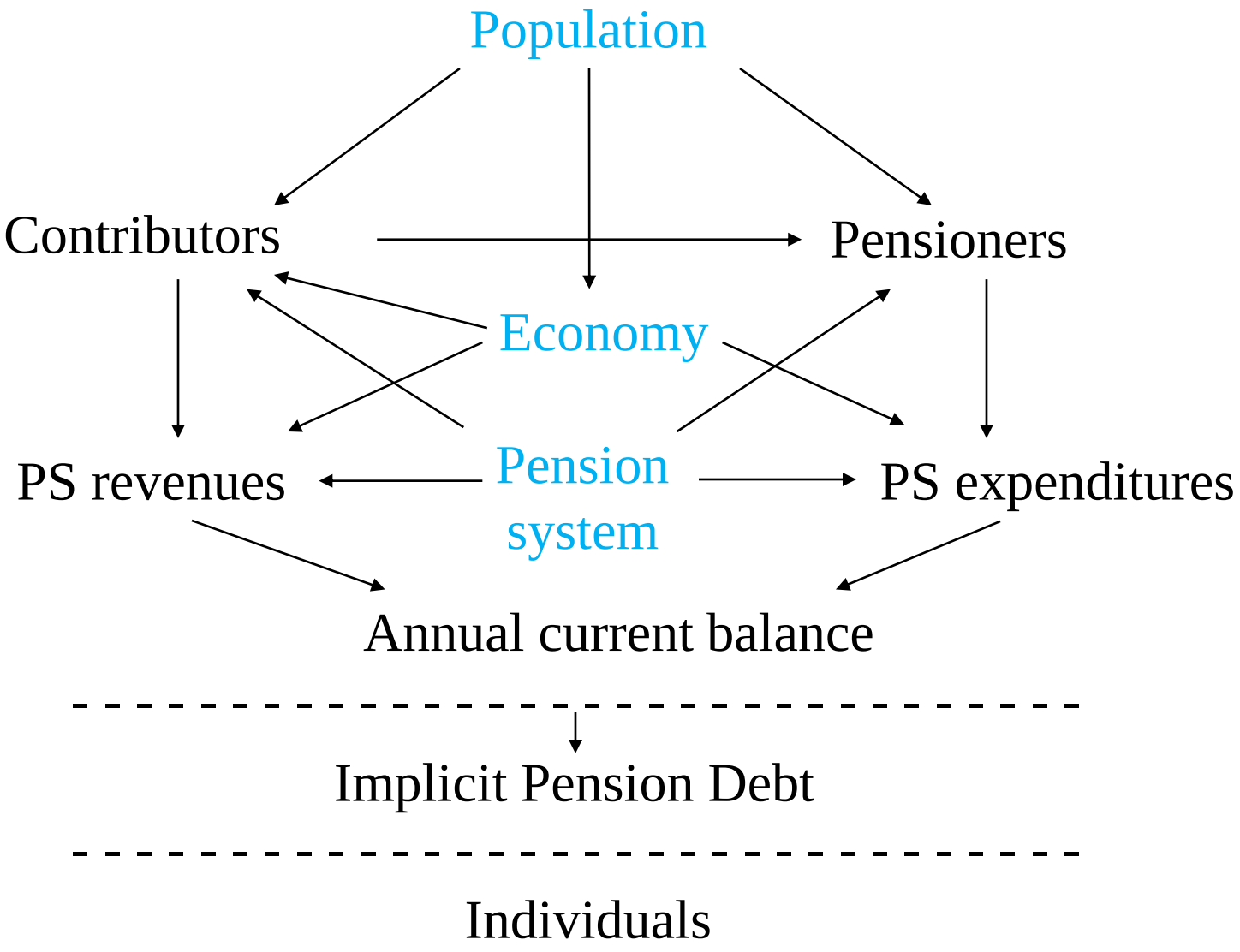
Input Data and Assumptions

- Demography
  - Population
  - Fertility
  - Mortality
  - Migration
- Economy
  - Macroeconomy (GDP, inflation, interest rates)
  - Labor market (LFPR, unemployment)
- Pension system
  - Pension system data (number of contributors, pensioners, wages, initial pensions)
  - Pension policy
  - Behavior of pension system members (contribution density, retirement pattern)

Input Data: policy variables

- PAYG, non-financial DC, fully funded DC
- Coverage
- Contribution rate, contribution ceiling
- Retirement age, early retirement
- Benefit formula in DB systems (accrual rate, max replacement rate, averaging period, valorization)
- Min, max pension
- Penalties for early retirement
- Pension commutation
- Pension indexation
- Notional interest rate
- Annuity factors

General Calculation Scheme

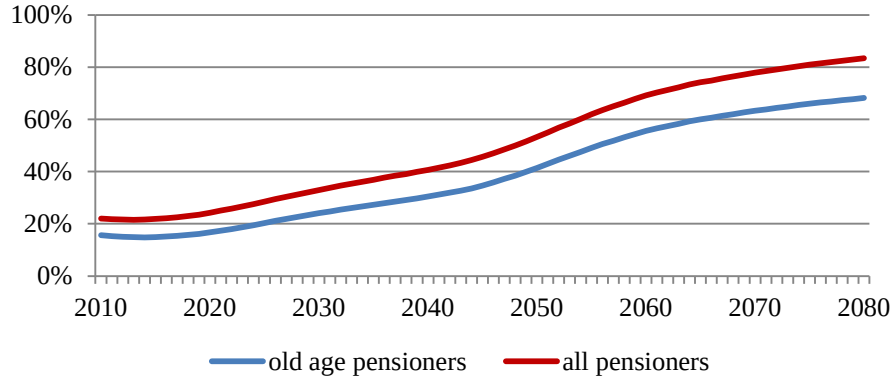


PROST Output

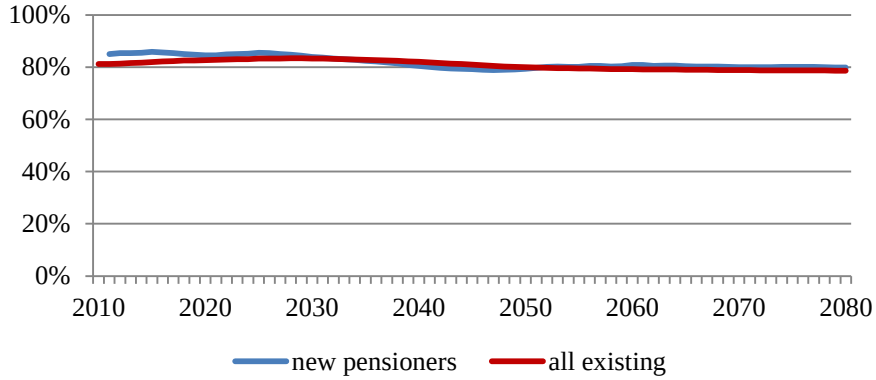
- Demographic projections
  - Population
  - Life expectancy
  - Population dependency ratios
- Pension system demographics
  - Number of contributors
  - Number of pensioners (by pensioner category)
  - System dependency rate
  - Coverage rate
- Pension system finances (PAYG DB, NDC, FFDC)
  - Wages, entitlements
  - Pension system revenues, expenditures, current balance, assets/debt
  - Implicit pension debt in PAYG
  - Equilibrium contribution rate for PAYG DB
- Output for individuals (contributions, benefits, NPV, IRR)

Example: pension system diagnosis

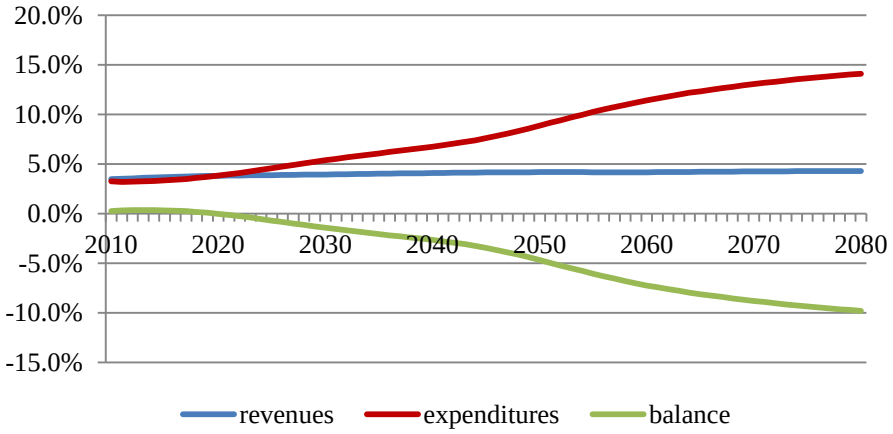
No Reform: System Dependency Rate
(number of pensioners/number of contributors)



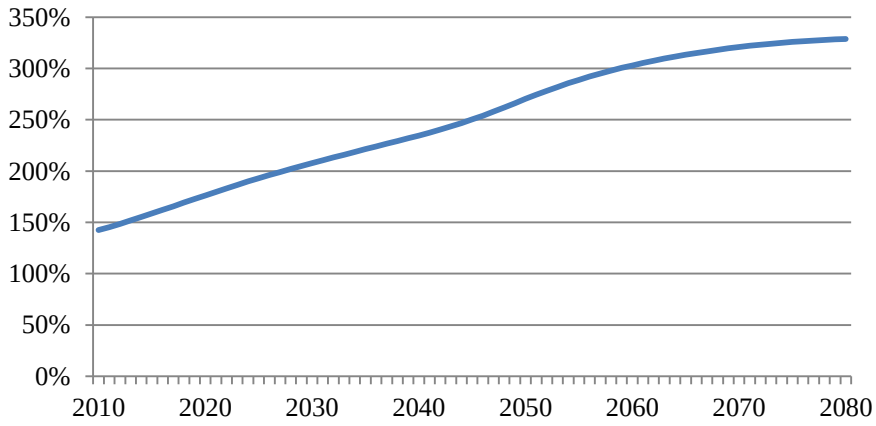
No Reform: Average Pension for Old Age Pensioners
(% of average wage of contributors)



No Reform: System Finances, % of GDP

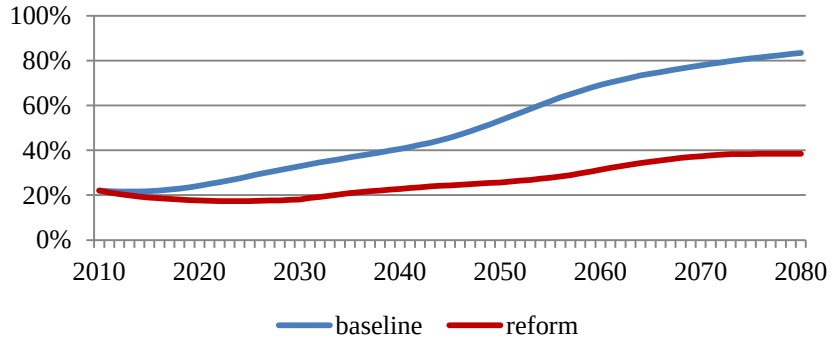


No Reform: Implicit Pension Debt, % of GDP

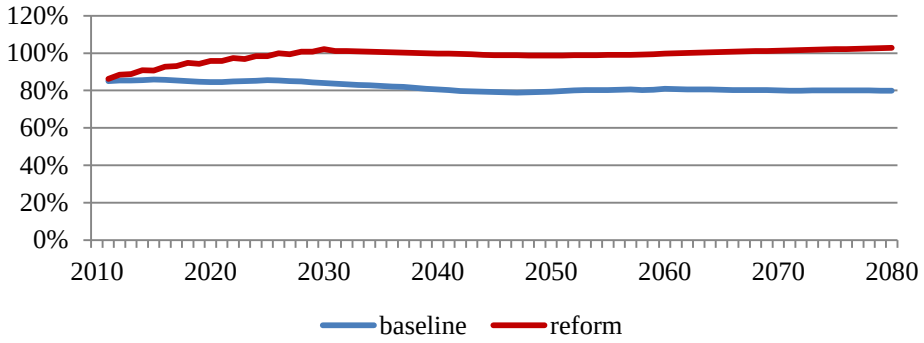


Example: impact of raising retirement age

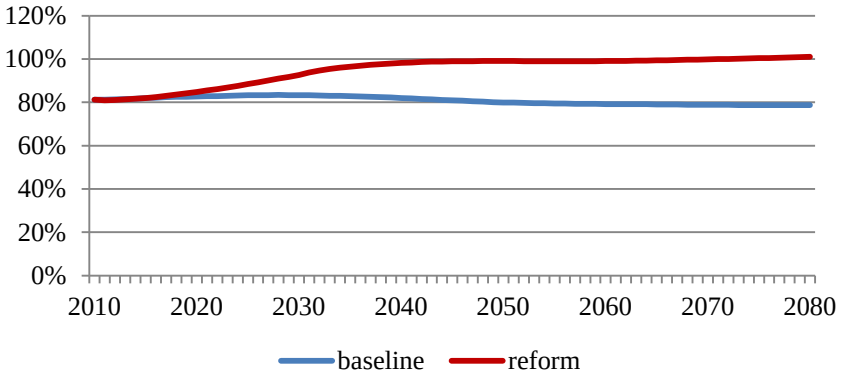
Raising Retirement Age
System Dependency Rate
(number of all pensioners/number of contributors)



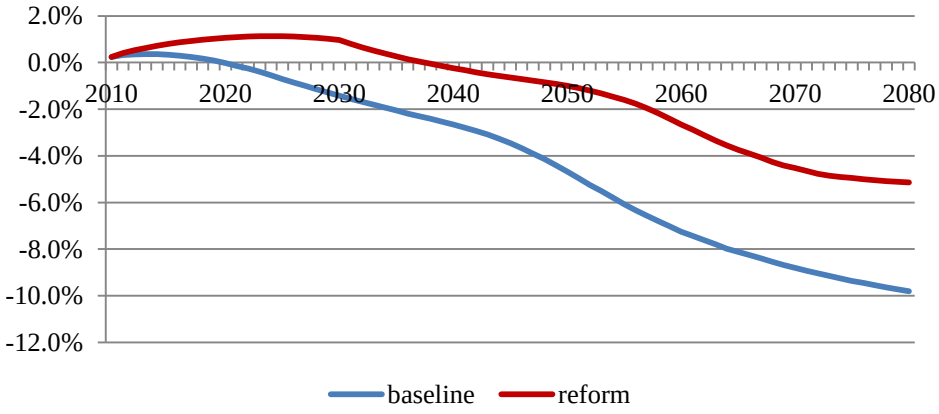
Raising Retirement Age
Average Pension for New Old Age Pensioners
(% of average wage of contributors)



Raising Retirement Age
Average Pension for Existing Old Age Pensioners
(% of average wage of contributors)



Raising Retirement Age
Annual Current Balance, % of GDP



Example: individual perspective

Profile : input	No reform	Raising retirement age	Contribution gaps (age)
Gender	Male	Male	22
Starts Working at Age	18	18	23
Plans to Retire at Age	60	65	24
Mortality Multiplier	1	1	25
Starting Wage as % of Cohort Avg.	80%	80%	26
Productivity Growth Multiplier	0.8	0.8	34

Output	**No reform**	**Raising retirement age**
Initial Replacement Rate in Terms of Average Wage	45.1%	45.9%
Initial Replacement Rate in Terms of Individual's Last Wage	74.8%	85.8%
Replacement Rate at Death in Terms of Average Wage	45.1%	45.9%
Internal Rate of Return	5.5%	4.8%
Net Present Value of Being Covered in Terms of Average Wage	1.2	0.6

Pension System Diagnosis: policy questions

- Financial sustainability of PAYG systems (financial flows, government liabilities, implicit pension debt, financing gap)
- Adequacy of expected benefits (at retirement, post-retirement, by pensioner category)
- Intra- and intergenerational distributional effects and equity issues

Assessment of Pension Reform Options with PROST

- Impact of reforms on pension system finances and benefits, transition costs
- Types of pension reform
  - PAYG "parametric" reforms (changing contribution rates, retirement age, benefit formula, indexation, etc.)
  - Systemic reforms (fully funded DC, notional DC schemes, any combination of PAYG DB, FF DC and NDC)
- Different transition paths
  - Switching pattern
  - Accrued rights
- Allows to model on-going DC/multipillar schemes


Thank You!