



WORLD BANK GROUP
Social Protection & Labor

PROST – Pension Reform Options Simulation Toolkit

Tatyana Bogomolova
World Bank

Why modelling?

- Many factors have to be taken into account when assessing a pension system and its reform options:
 - ✓ Demographic
 - ✓ Economic
 - ✓ Policy choices/pension system parameters
 - ✓ Individuals' behavior
- Pension system analysis requires long-term projections (75-10 years)
- Models proved to be a 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, programmed in Visual Basic
- Regular updates with new features
- Individual country and cross-country studies (used in about 100 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

- Generic, flexible, easily adapted to various country circumstances
- Flexible projection period, annual steps
- Allows to vary assumptions by year
- Deterministic, cohort-based (models single year cohorts, tracks them over time)
- Projects coverage, contributions, pensions, 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
- Modeling reforms relatively fast and easy

Inputs: data and assumptions

- **Demography**
 - Population
 - Fertility
 - Mortality
 - Migration
- **Economy**
 - Macroeconomy (GDP, inflation, interest rates)
 - Labor market (labor force participation, unemployment)
- **Pension system**
 - Pension system indicators (number of contributors and pensioners, wages, pensions)
 - Pension policy
 - Behavior of pension system members (contribution density, retirement pattern)

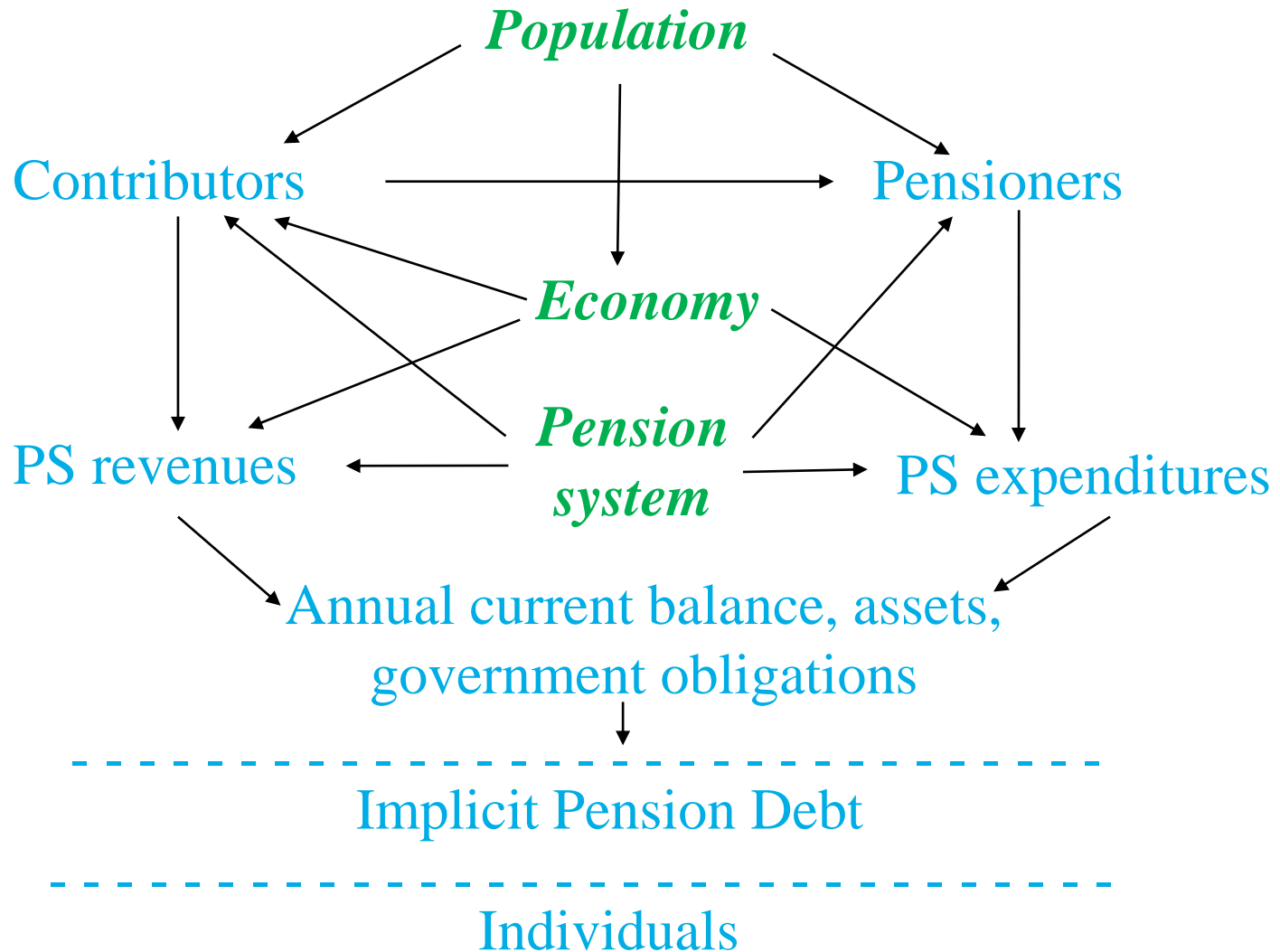


Inputs: policy variables

- Coverage
- Contribution rate, contribution ceiling
- Retirement age, early retirement arrangements
- Flat benefit
- Benefit formula for earnings-related systems (accrual rate, max replacement rate, averaging period, valorization)
- Benefit formula in NDC systems (contribution rate credited to NDC accounts, notional interest rate, annuity factors)
- Min, max pension
- Penalties for early retirement, rewards for late retirement
- Pension commutation
- Post-retirement pension indexation



General calculation scheme



PROST output

- Demographic projections
 - ❖ Population
 - ❖ Life expectancies, by age and gender
 - ❖ Population dependency ratios
- Pension system demographics
 - ❖ Number of contributors
 - ❖ Number of pensioners (by pensioner category)
 - ❖ System dependency rate
 - ❖ Coverage rate (for working age and old age)



PROST output (cont.)

- Pension system finances (DB, NDC, FFDC)
 - ❖ Wages, pensions (at retirement and post-retirement)
 - ❖ Pension system revenues, expenditures, current balance, assets/debt, government obligations
 - ❖ Implicit pension debt
 - ❖ Equilibrium contribution rate for DB
- Output for individuals
 - ❖ Stream of contributions
 - ❖ Stream of benefits
 - ❖ NPV of contributions & benefits
 - ❖ Internal rate of return

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

- Impact of reforms on pension system finances and benefits, transition costs
- Types of pension reform
 - “Parametric” reforms (changing contribution rates, retirement age, benefit formula, indexation, etc.)
 - Systemic reforms (fully funded DC, notional DC schemes, any combination of DB, FF DC and NDC)
- Different transition paths
 - Switching pattern
 - Accrued rights





WORLD BANK GROUP

Social Protection & Labor

Thank you!

www.worldbank.org/sp

World Bank Group
Social Protection and Labor Global Practice
1818 H Street NW
Washington DC 20433
USA