Long-term projections in Sweden purpose, methods and results

Seminar on long-term projections for assessing fiscal sustainability

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Outline of presentation

- **Sustainability analysis at the Ministry of Finance**
- **Sustainability analysis at the National Institute**
- **MIMER**

Long term analysis

- Long term calculation and sustainability analyses started in the late 1990:ies
- Spring Budget Bill, Sweden's Convergence Programme, Long Term Surveys, AWG
- 3 – 4 people involved at the ministry, part time
- Gradual development of models, assessment methods and thinking

Purpose of the exercise

- Asses long run consequences of present policy
- Identify where and when potential problems will arise
- Sensitivity analysis, what kind of developments will make things better or worse?

Modeling – keep it simple

- **Swedish Ministry of Finance approach is to use relatively simple models which combine demographic forecast data and present behavioral/user patterns**

- **A central public finances model with input from sub-models for labour supply, pensions, public consumption, etc.**

- **Agents adoption to new rules, etc. assessed outside model**

Unchanged policy

- **Tax financed transfers; all transfers are indexed to income regardless of present rules**

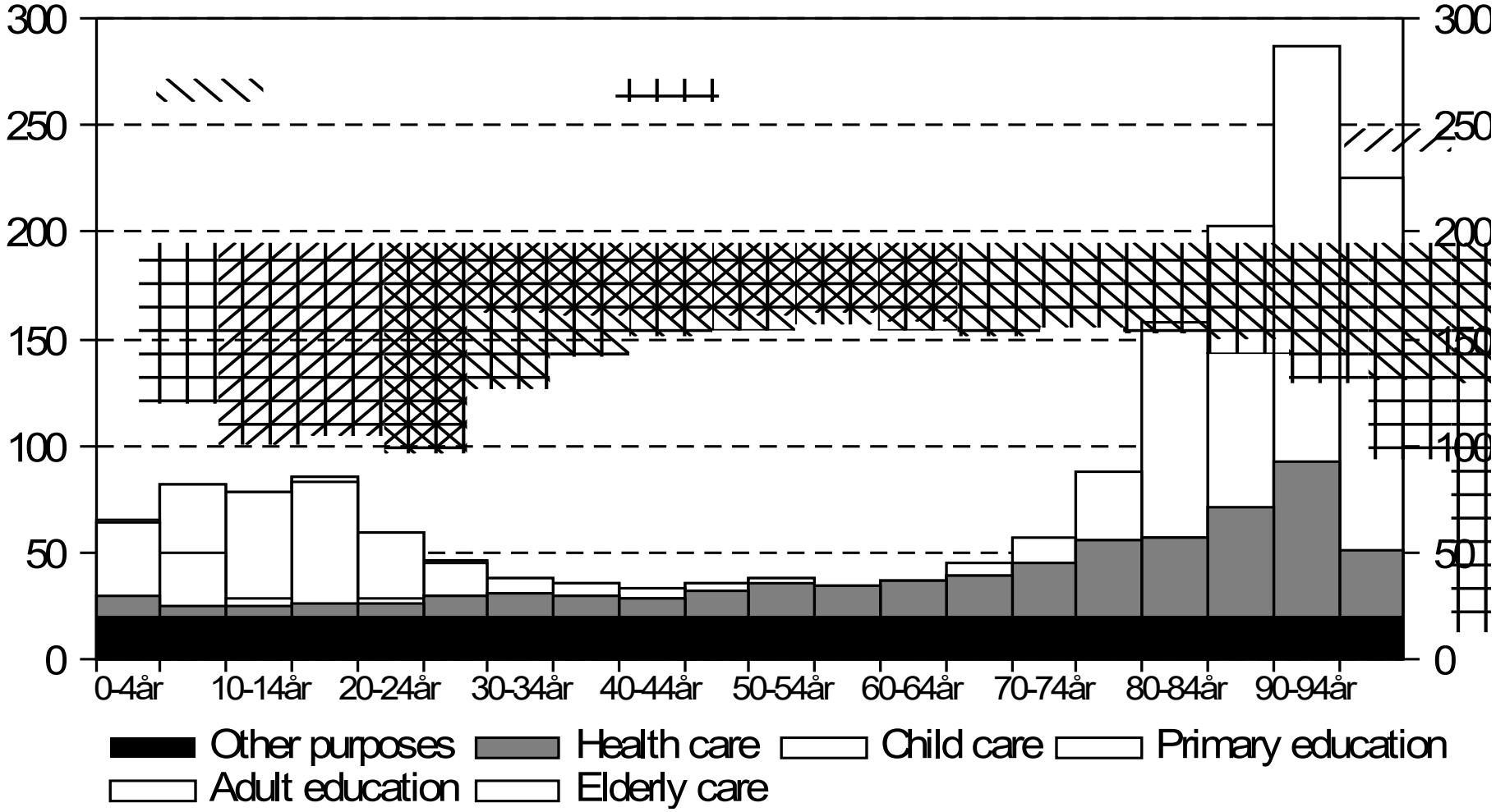
- **Tax financed services; future generations should be given the same number of hours worked in health care, education, etc. as present generations**

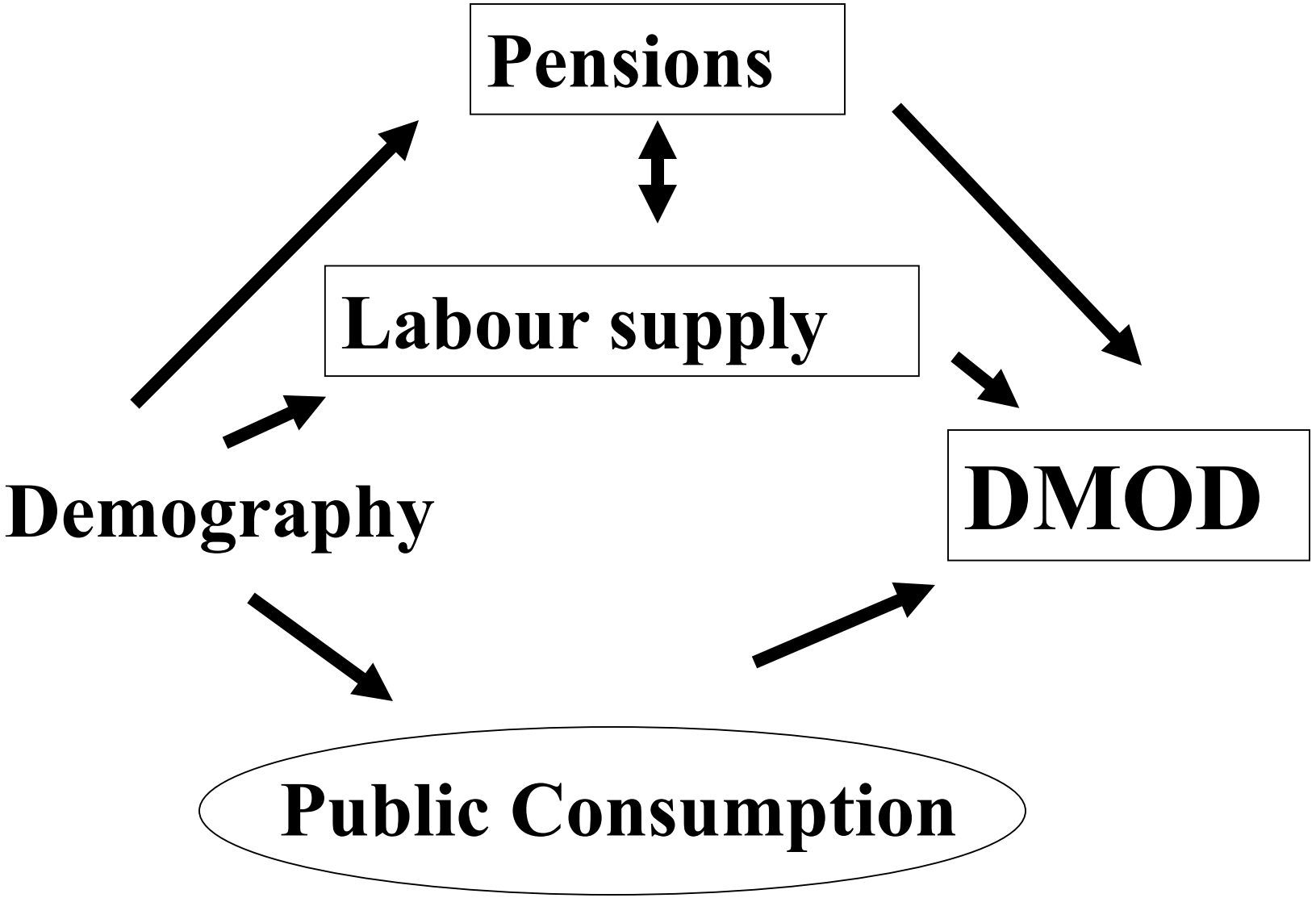
Macro scenario for projection of public sector income and expenditure

- Productivity growth in business sector 2.2 %
- Labour supply and productivity generate GDP
- Volume and price assumptions on private consumption, investment, external trade
- CPI in line with inflation target 2.0 %
- Hourly wages in line with CPI and productivity
- GDP deflator depends on price assumptions for investment and external trade
- Interest rate = nominal GDP growth + 0.5

Public Consumption Expenditure per Capita

Thousands of SEK




Pensions
Labour supply
Demography
DMOD
Public Consumption

DMOD

- **Simple two sector GDP accounting**
- **Disaggregated income- and expenditure structure**
- **Net lending in six sectors, debt dynamics**
- **Used in long run projections and sensitivity analysis**

DMOD

Typical projection equation

$$\text{Child allowance} = zCA * Pop_{0\text{-}19}$$

where $Pop_{0\text{-}19}$ is the number of 0-19 year olds (volume) and zCA is a "residual forecasting component" which is calibrated for historical years and indexed to average wage growth in the projection

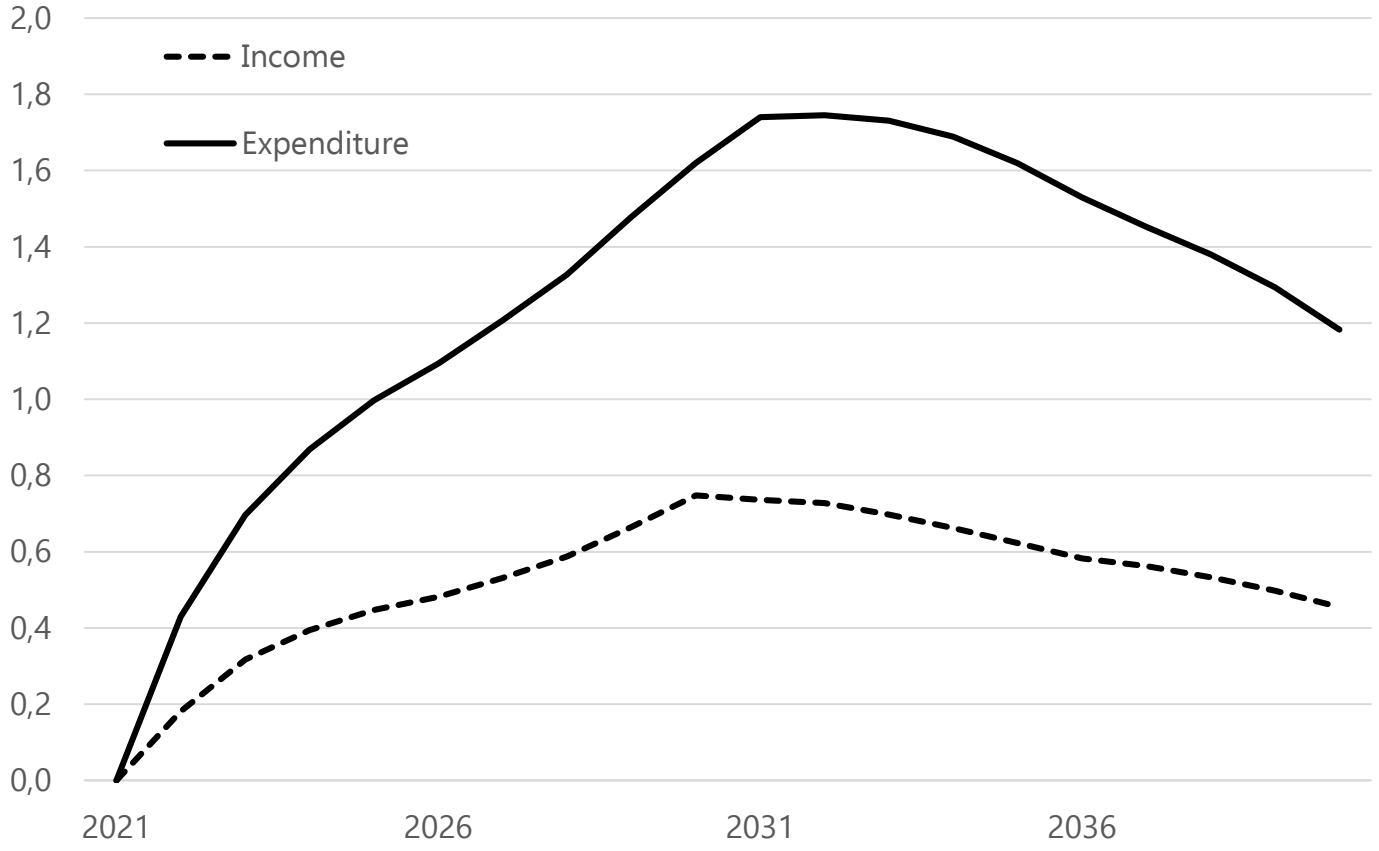
Age related expenditure

Volume index, 2015=100 and per cent of GDP

	2015	2020	2030	2050	2100
Child care	100,0	107,7	116,7	122,2	138,9
	1,7	1,7	1,7	1,6	1,4
Education	100,0	107,6	119,9	125,8	146,9
	4,8	4,7	4,8	4,2	3,7
Health care	100,0	106,9	120,4	138,0	178,0
	6,0	6,0	6,1	5,9	5,7
Elderly care	100,0	107,1	129,8	163,5	244,5
	4,0	4,0	4,5	4,9	5,9
Pensions	7,5	7,2	7,1	6,7	7,3

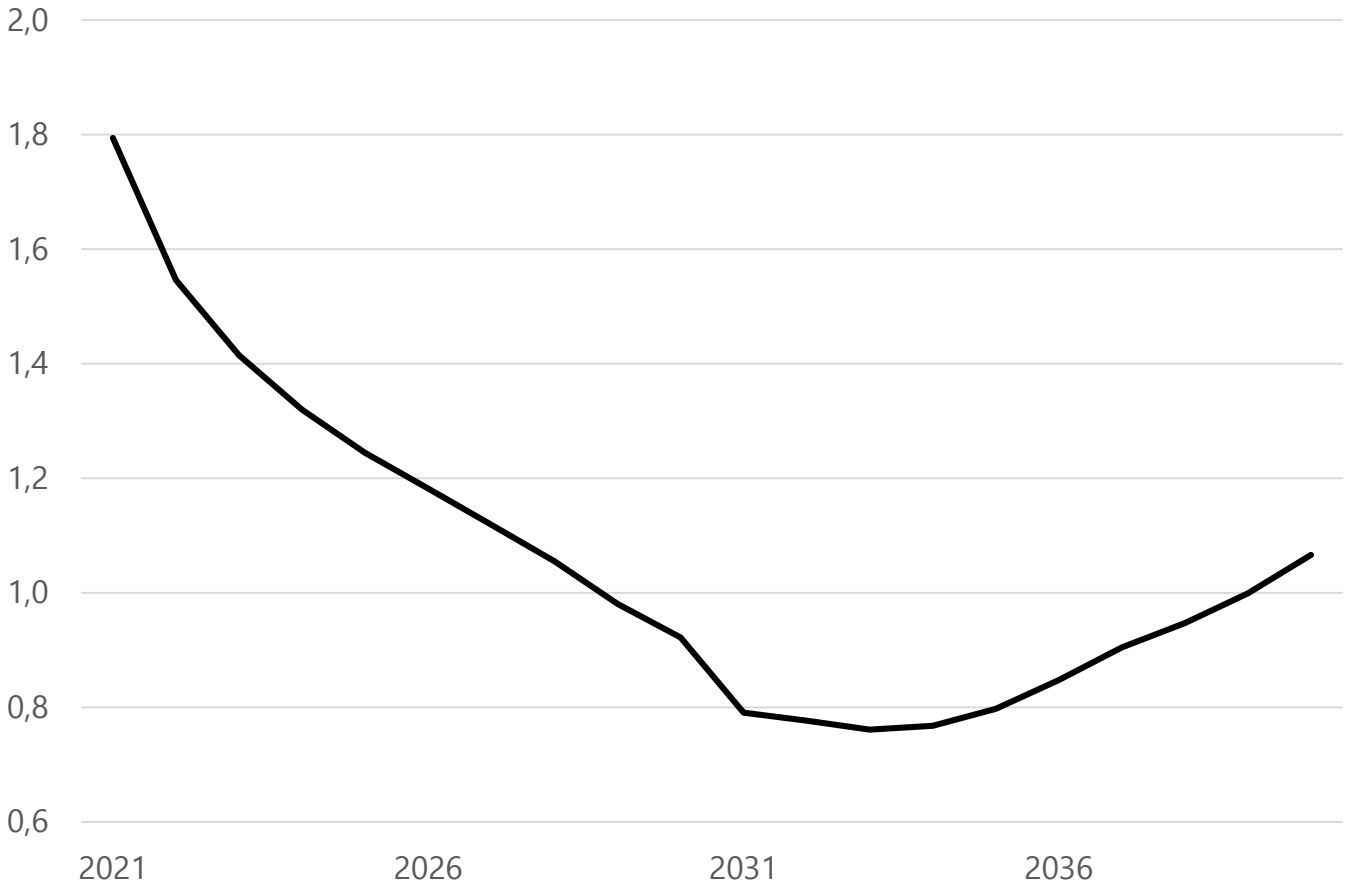
Public sector income and expenditure

Per cent of GDP, change compared to 2021



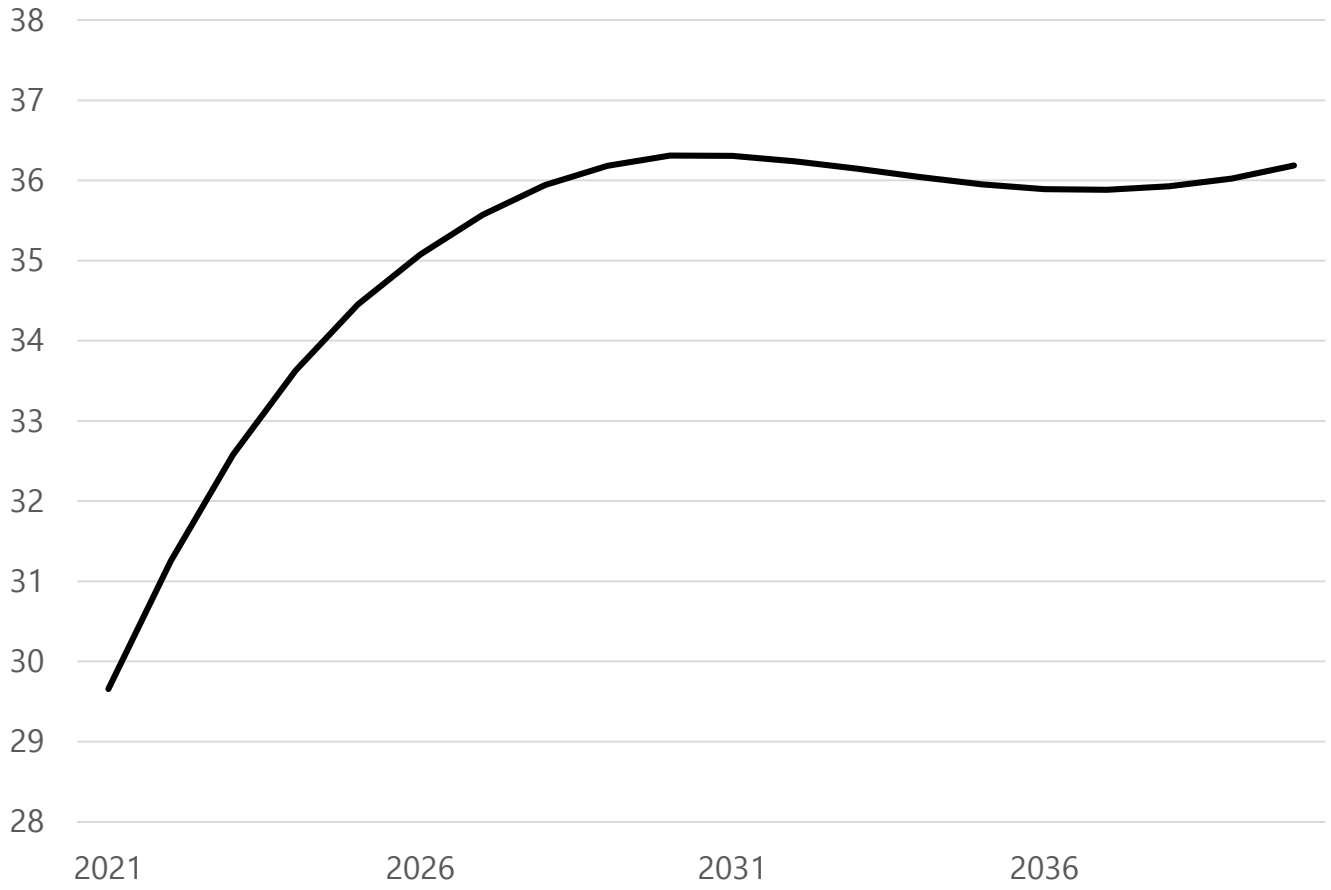
Public sector net lending

Per cent of GDP



Public sector net financial position

Per cent of GDP



Sustainability indicators

- **Very long run inter-temporal budget restriction (S2) difficult in practice, unless very large values**
- **An overall assessment of many scenarios and aspects necessary**
- **Better to focus on an analysis of possible challenges over a reasonably foreseeable future, 10-20 years**

Long-term macroeconomic simulations at NIER

Outline

- The use of long-term simulations at NIER
- The traditional framework
- MIMER
- Lessons from working with MIMER

Long-term macroeconomic simulations at NIER

Main purpose of simulations:

1. Conduct analysis of long-run fiscal sustainability

2. Analyze macroeconomic and fiscal effects of reforms

- To do this, you need some kind of macroeconomic model
  - Public income heavily dependent on the macroeconomic environment
  - Public expenditure also affected, but not to the same extent

Long-term macroeconomic simulations at NIER

Traditional framework – Pure accounting framework

- Macroeconomic simulation model + model for public finances

- A pure accounting model
  - Assumptions made on projection of national account variables directly
  - The economic reasoning is *implicit* in the projections (and not mandatory)

Long-term macroeconomic simulations at NIER

Traditional framework – Pure accounting framework

- *Macroeconomic model - Key assumptions:*
  - Household consumption driven by assumption of balanced trade
  - Labor market behavior per age and origin constant over time
  - Costs for public consumption per individual grows with wages
  - Imports calculated as constant input shares of consumption, investment and export
  - Private investment constant in percent of GDP (in nominal terms)
  - Interest rate exogenous, set to equal nominal growth rate in the (very) long run

Long-term macroeconomic simulations at NIER

Traditional framework – Pure accounting framework

- *Public finance model – Key assumptions:*
  - Macro input from above model
  - Transfers projected by wage growth and demography
  - Public investments follow GDP (state investments) and regional government consumption
  - Public pensions projected using the rules for the pension system
  - Taxes are constant as a share of the tax base
  - Very detailed description of public finances

Long-term macroeconomic simulations at NIER

MIMER

Long-term macroeconomic simulations at NIER

MIMER: Background

- LU 1987: Persson and Svensson – Developed a simple OLG model
- Swedish Fiscal Policy council argued for the use of OLG models in long term sustainability analysis
- MIMER developed at Ministry of Finance, project finished 2014

Long-term macroeconomic simulations at NIER

MIMER: Overview

General equilibrium small open economy model

Demography: From Statistics Sweden (divided into age and sex)

Households: Overlapping generations, optimizing agents choose consumption and hours worked

Firms: Intermediate good producer with capital and labor as inputs

- Household consumption, investment and public consumption goods created using intermediate goods as input.

Public sector: Consumes, distributes transfers, collects taxes

Private pension system

Foreign sector: Clears the market for non-public final goods

Neither stochasticity nor nominal frictions. Purely real model

Long-term macroeconomic simulations at NIER

MIMER: Households

Live until age 105 at most

Choose consumption and hours worked

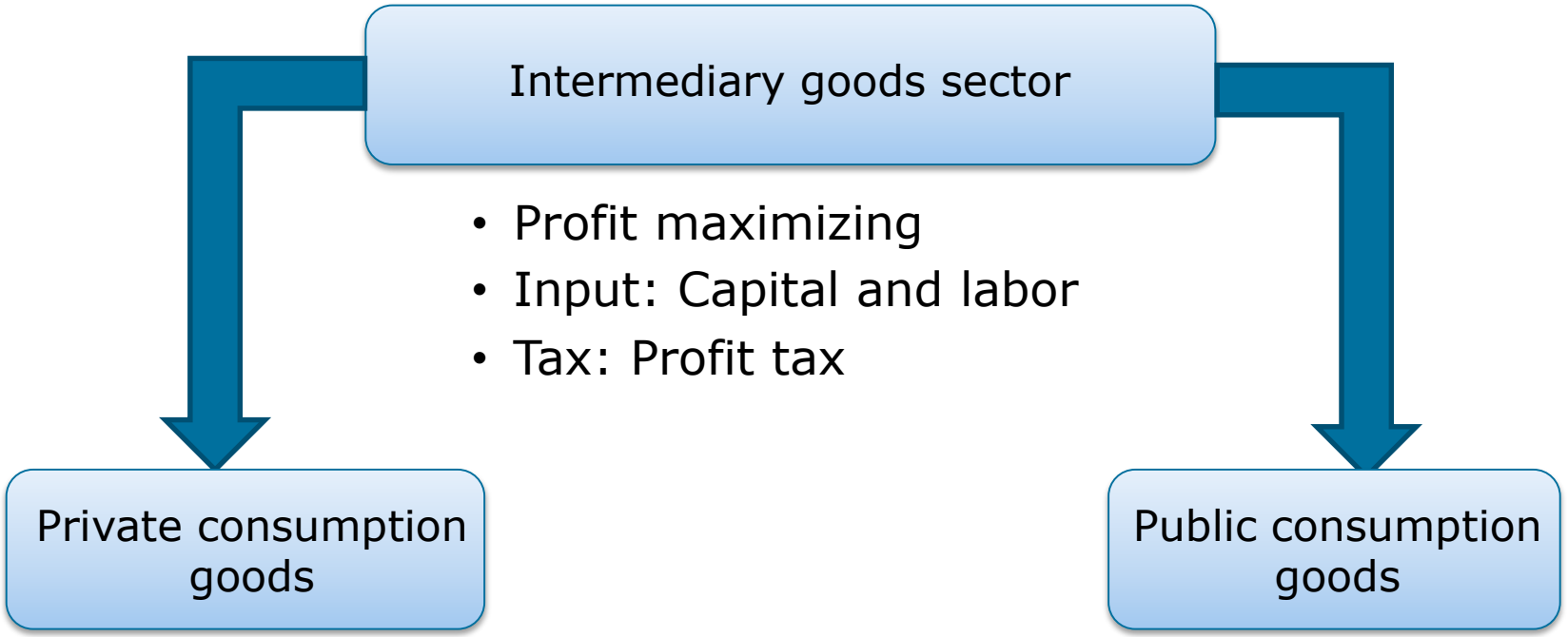
- Given the institutional setting (pension system, education etc.)
- Given the prices in the economy (wages, return on capital)

Borrowing constrained

Utility from bequests

Long-term macroeconomic simulations at NIER

MIMER: Production



- Profit maximizing
- Input: Intermediary goods
- Exogenous productivity growth

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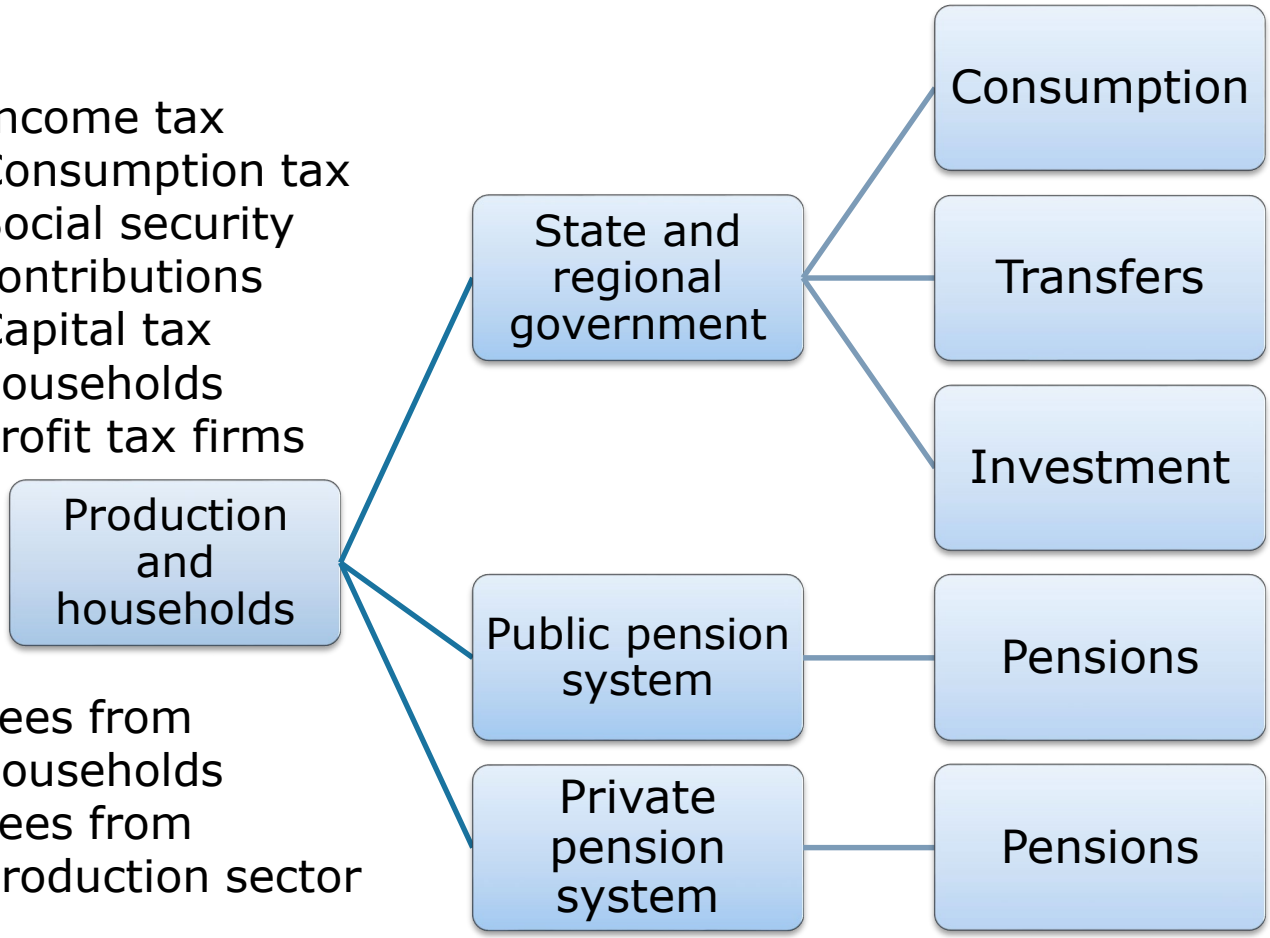
Long-term macroeconomic simulations at NIER

MIMER: Public sector

- Income tax
- Consumption tax
- Social security contributions
- Capital tax households
- Profit tax firms

- Fees from households
- Fees from production sector



Long-term macroeconomic simulations at NIER

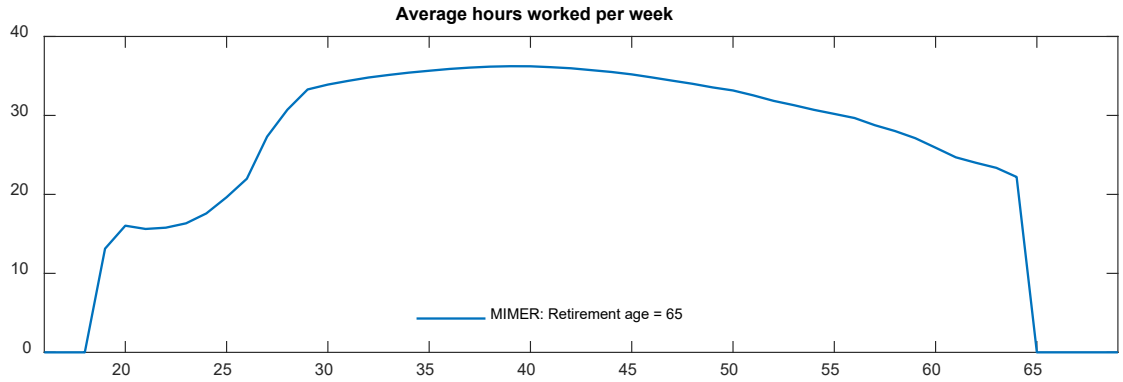
MIMER: Labor supply and the pension system

- Exercise nr 1: Increase retirement age over time with 2/3 of increase in expected life-span

- Compare result of how such an exercise is usually done to the result using the endogenous MIMER response

Long-term macroeconomic simulations at NIER

MIMER: Labor supply and the pension system



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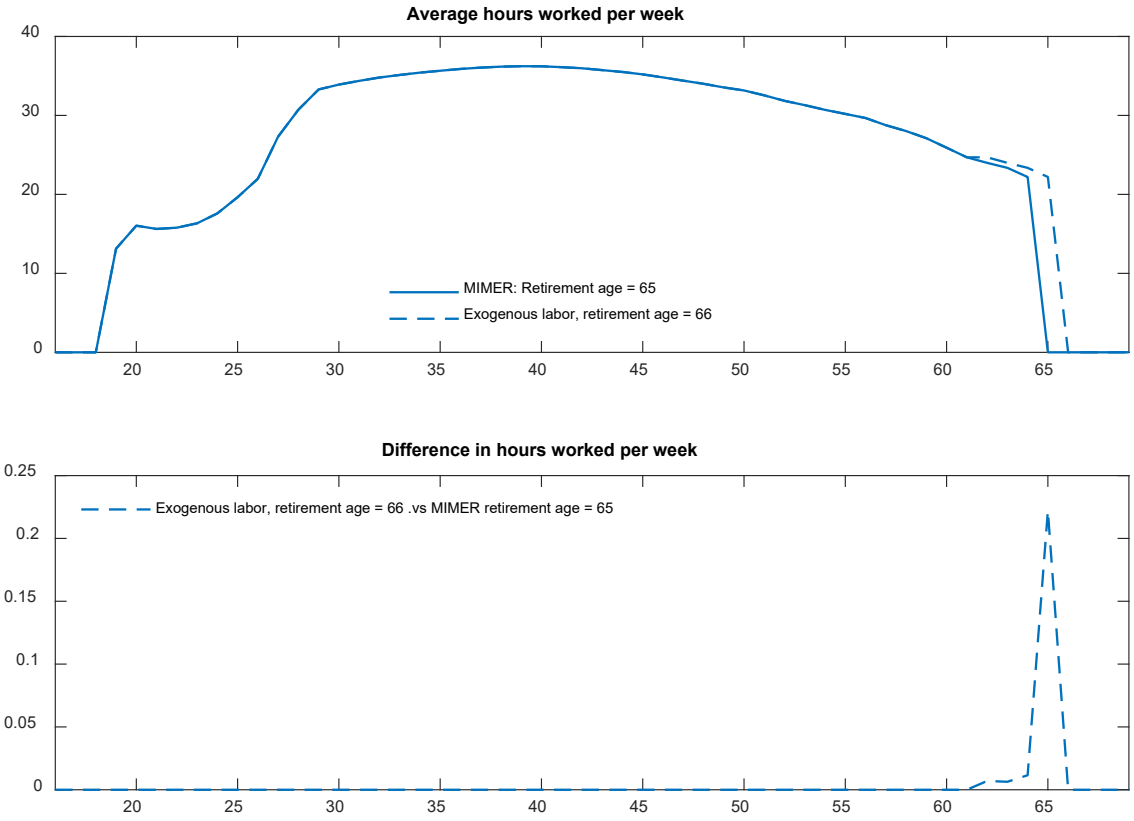

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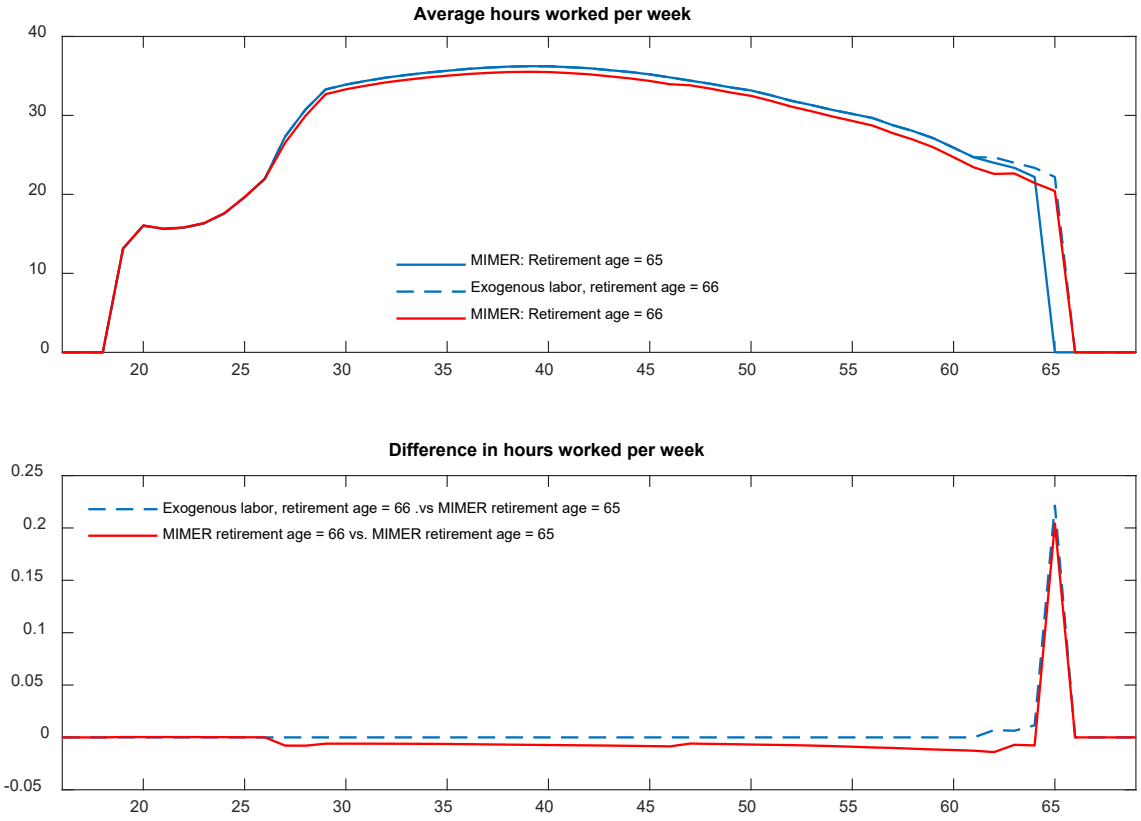

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- **Conclusion:**
  - Traditional way of making such an exercise gives the best possible outcome from a public finance perspective.
  - The outcome from MIMER is more ambigous

Long-term macroeconomic simulations at NIER

MIMER: Labor supply and the pension system

- Exercise nr 2: Increase public pensions relative to baseline
- Investigate response of household asset holdings
- Baseline scenario: Public pensions calculated using SCB demographic forecast
- Alternative scenario: Public pensions holding life-expectancy constant over time

Long-term macroeconomic simulations at NIER

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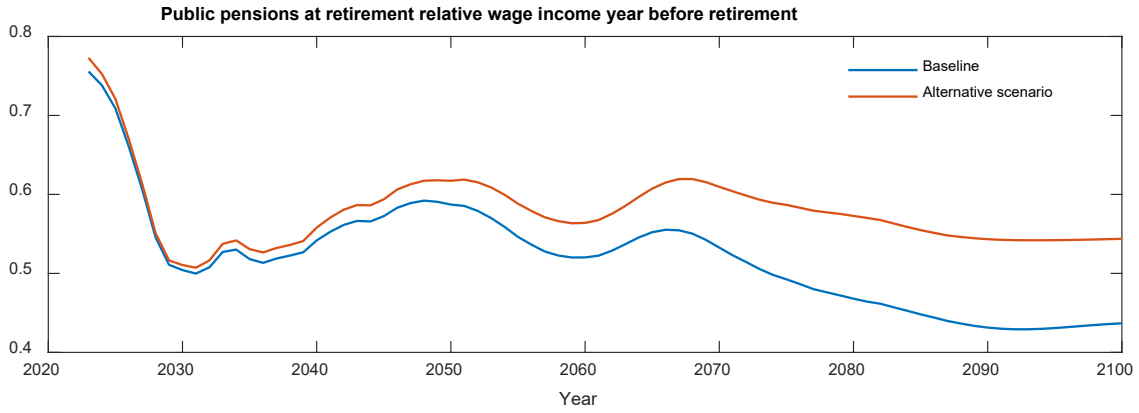

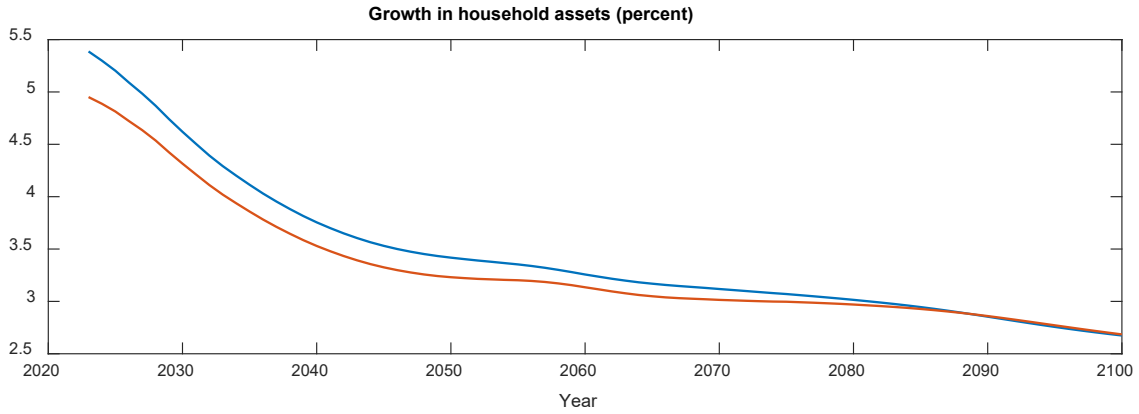

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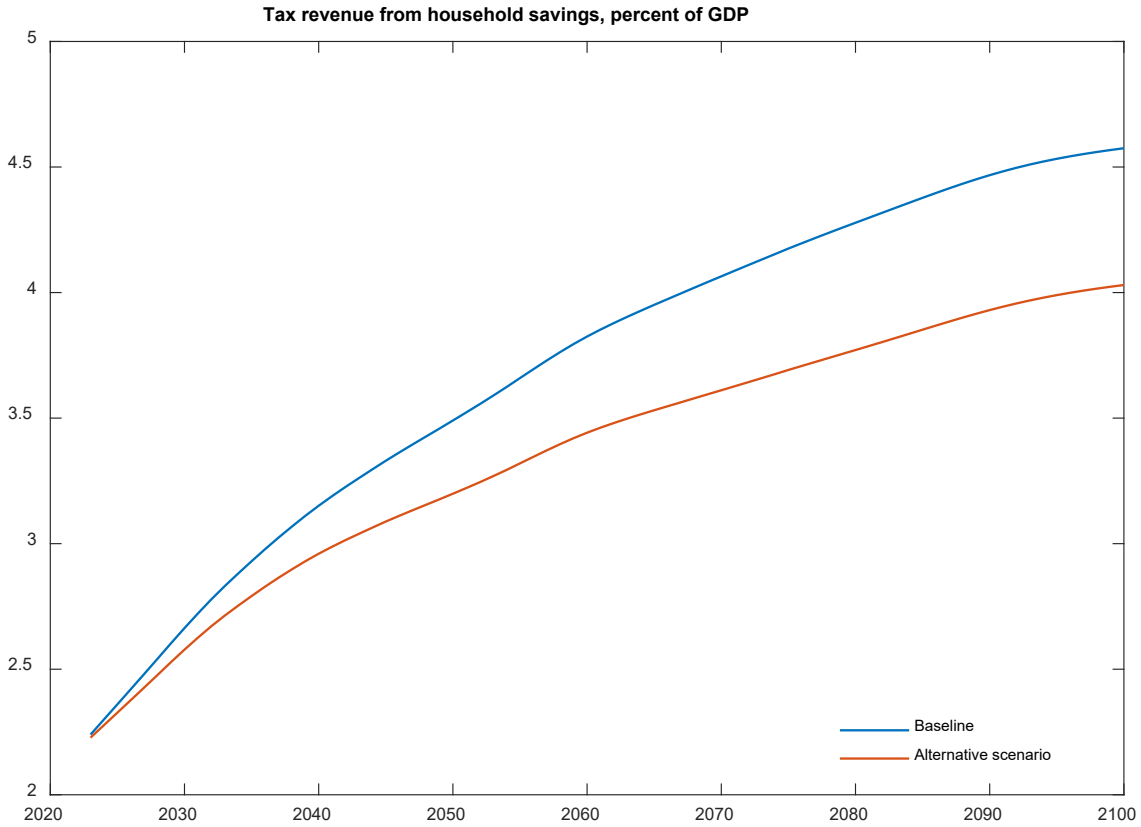

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- **Conclusion:**

  - Pension reforms that increases pensions in the future will affect savings, and hence the capital income immediately.

Long-term macroeconomic simulations at NIER

Conclusions – MIMER's advantages and disadvantages

- Advantages:
  - Agents respond to changes in the environment
  - Clear link between economic behavior and macroeconomic outcomes
  - Restrictions on what is possible to do

- Disadvantages:
  - Might be hard to mimic some data series exactly
  - Requires more aggregate data than accounting models
  - Restrictions on what is possible to do
  - Competence provision

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Long-term macroeconomic simulations at NIER

Lessons from practical use of MIMER

- Structural macroeconomic models and the National Accounts does not always speak the same language
  - Need to be careful in translating model data into National Accounts, and think it through carefully beforehand, build infrastructure for this.

- Think hard about, and make structure for, how to go from short- and medium run to the long run. They will probably be calculated in different models, but data needs to be integrated.

- Important to spend time on the interpretation and analysis of what happens in the scenario. In contrast to the accounting framework, where everything is exogenous in some sense, it is the economic preferences that govern the result in the structural model. The reasons for behavioral changes over time might be subtle, but simultaneously be very important for the end result.