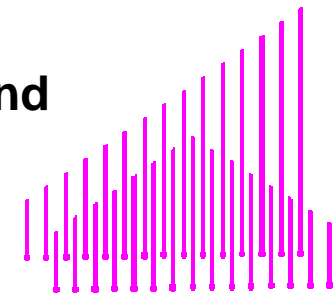


**Savings & Pensions Policy:  
Impact of Household Saving Decisions -  
Results from NIESR Research**

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**National Institute  
of Economic and  
Social Research**

# Overview



- Objectives of the Project
- Approach to modelling
- Results and Simulations
- Next Steps

# Saving is 'Endogenous'

## **Dynamic, stochastic model.**

- Assumes households fully understand their environment.
- Assumes households have a well defined preference ordering
- Households behave so maximise their welfare, so savings endogenous.

**This differs from other approaches, where the propensity to save is independent of the economic environment:**

- Regression based micro-simulation models (e.g. Pensim 2 Microsimulation).

# Key Advantages and Disadvantages

## **Advantages:**

- Households lifetime saving reacts to policy environment
- Can explore both the incentive effects and distributional impacts of policy changes.
- Provides tangible measures of policy impact (in the form of 'welfare' changes).

## **Disadvantages:**

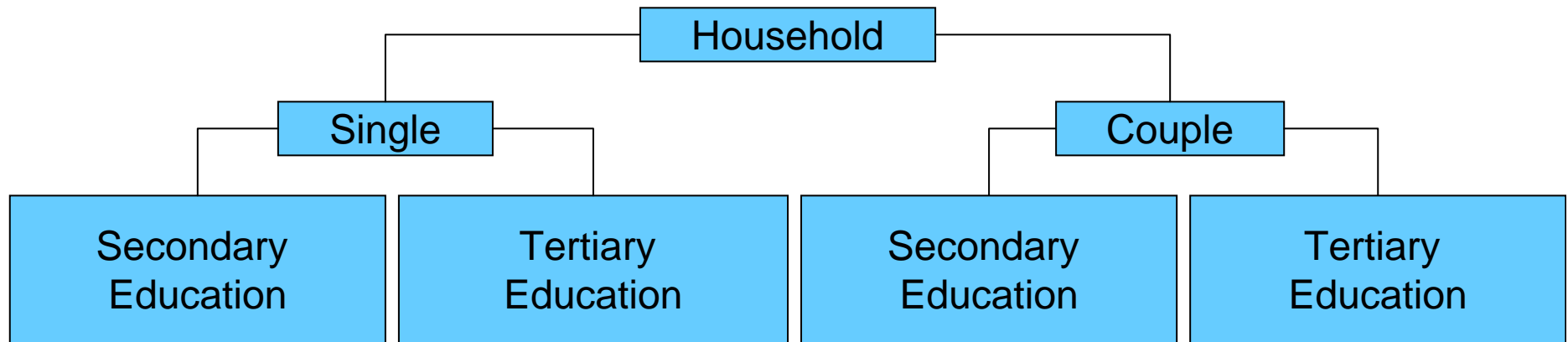
- Makes some strong assumptions.
- Some aspects remain very stylised.

# Key Model Assumptions



- Household Type
  - Single/Couple
  - Education/Skills
  - Children
- Lifespan
- Income Process
- Saving Vehicles (including 'secured' debt)

# Key Aspects of Households



- Income Process are conditional on household type
- Household survival probabilities are conditional on household type
- Household Size is exogenous function of household type and age.

# Preferences Structure

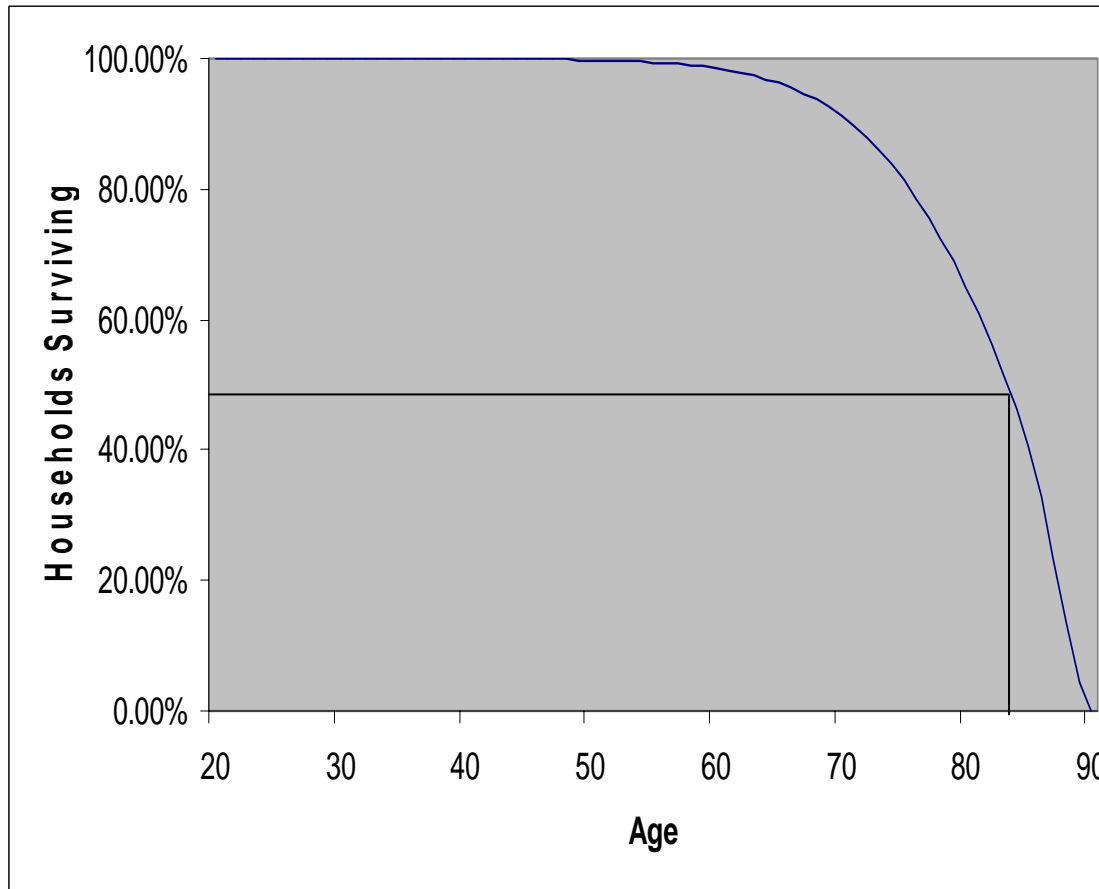
- Household welfare is the expected discounted sum of future utility

$$E_t \sum_{k=t}^T \frac{(1+\delta)^k}{(1-\gamma)^k} l_{t,k} U(C_k, H_k)^{1-\gamma}$$

- Where household utility is CES function of consumption and housing services

$$U(C_t, H_t) = \left( \kappa \left( \frac{C_t}{m_t} \right)^{1-\eta} + (1-\kappa) \left( \xi \frac{H_t}{m_t} \right)^{1-\eta} \right)^{\frac{1}{1-\eta}}$$

# Lifespans in the Model mirror Observed Patterns



- Households have an 'expected' life in the model but death is random
- Lifespan mirrors observed patterns, with an average (median) lifespan of 83.
- Maximum age of 90.

# Income Process

- Calibrated on survey data (BHPS) for each of the four representative households.
- Household labour supply decisions are implicit within the income process.
- Model generates 30,000 synthetic households of each type. The distribution of incomes reflect those of the the UK population.

# Income Process

- The income process is modeled by persistent random shocks around a deterministic trend

$$\ln \frac{y_t}{\bar{y}_t} = u_t = \rho_u u_{t-1} + \varepsilon_t^u,$$

- Where  $\varepsilon_t^u \sim N(0, \sigma_u^2)$

# Saving Motives



Saving in the model is essentially for two purposes:

- **Retirement** - providing an income in old age.
- **Precautionary** - to meet 'rainy day' needs

The model has no planned bequests, although 'accidental' bequests do occur.

# Saving Instruments

Asset	Riskiness	Mean Return	Liquidity	Tax Treatment (on returns)
Cash (interest)	Safe	2.5%	Liquid	Taxed as Income
Equity (dividend/capital gain)	Risky	5%	Liquid	Taxed as Income
Housing (equity stake)	Safe	Housing Services	Liquid	Untaxed
Secured Debt (housing)	Safe	3.5%	Liquid	Untaxed
Pension	Risky	5%	Illiquid	Tax Advantaged

- Household portfolio made up of 5 instruments.
- Assets types vary by risk, liquidity, and rate of return
- Savers build a 'portfolio' to meet both retirement and precautionary saving needs.

# Housing and Secured Debt

- Housing can either be rented at rate  $r^H(y_t)$  or bought at price  $p$  with the aid of mortgage subject to three constraints
  1. Minimum size  $H_t > H_{min}$  (= £50,000)
  2. Can only borrow up to 90% of the value of the house.
  3. Mortgage Repayments must be <30% of income given the term of the mortgage is less than number of years until retirement (65).

# Pension Assets

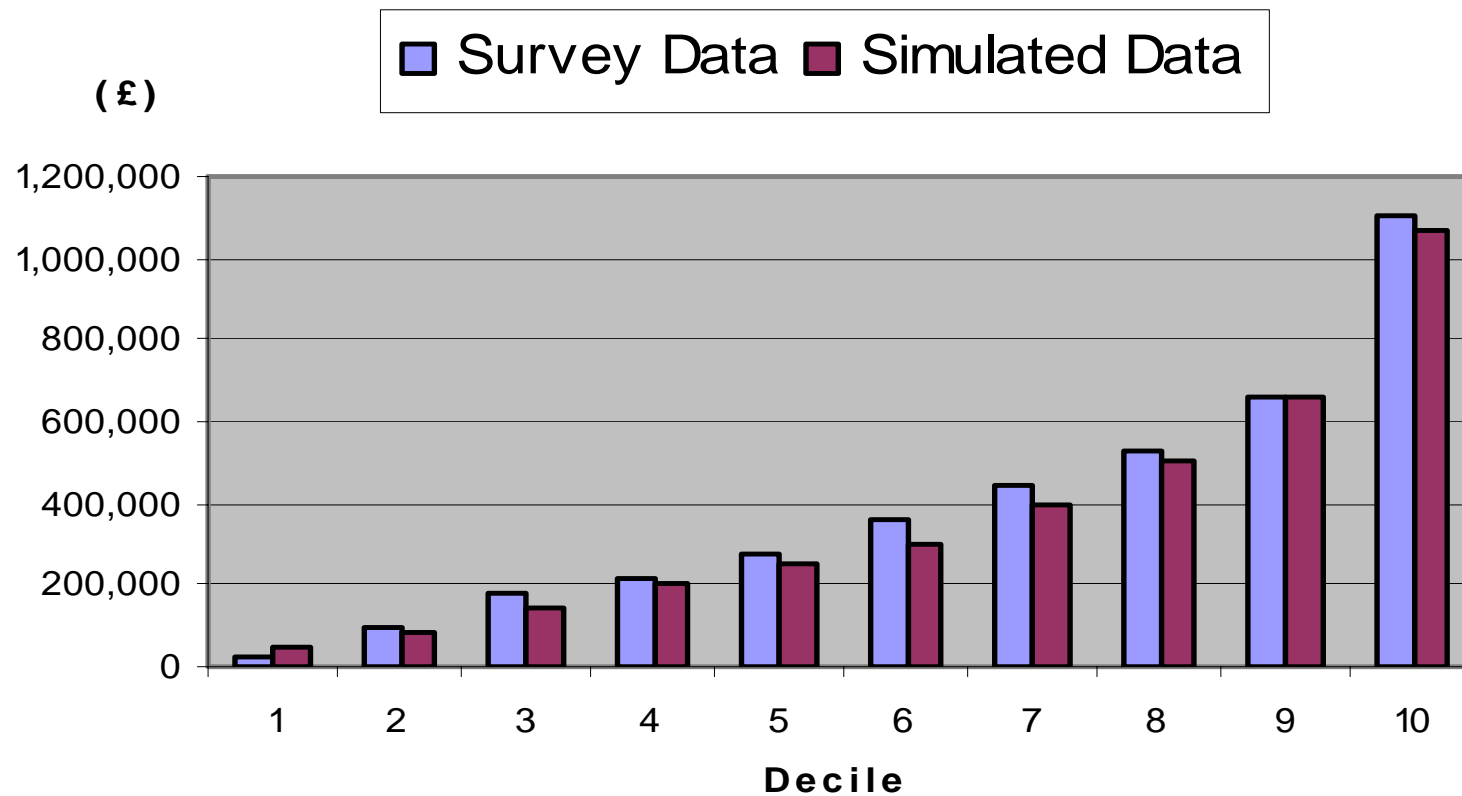
- Households can invest tax free in an illiquid 100% equity invested DC pension.
- At retirement 25% is received as a tax free lump sum and the rest is annuitised.
- Contributions are subject to the following constraints
  1. Within a defined income band  $\alpha_t^{\min} y_t \leq c_t^{Pension} \leq \alpha_t^{\max} y_t$
  2. Less than the annual allowance
  3. Overall pension assets are less than a given lifetime allowance

# Tax System

- The tax system is a stylized version of the UK tax and benefit system. It has the following salient features
  1. Taxable income is labour income plus returns to any financial assets plus any pension income
  2. The tax system is piecewise linear with
    - A lower income level
    - A working tax credit, basic and higher income tax rates

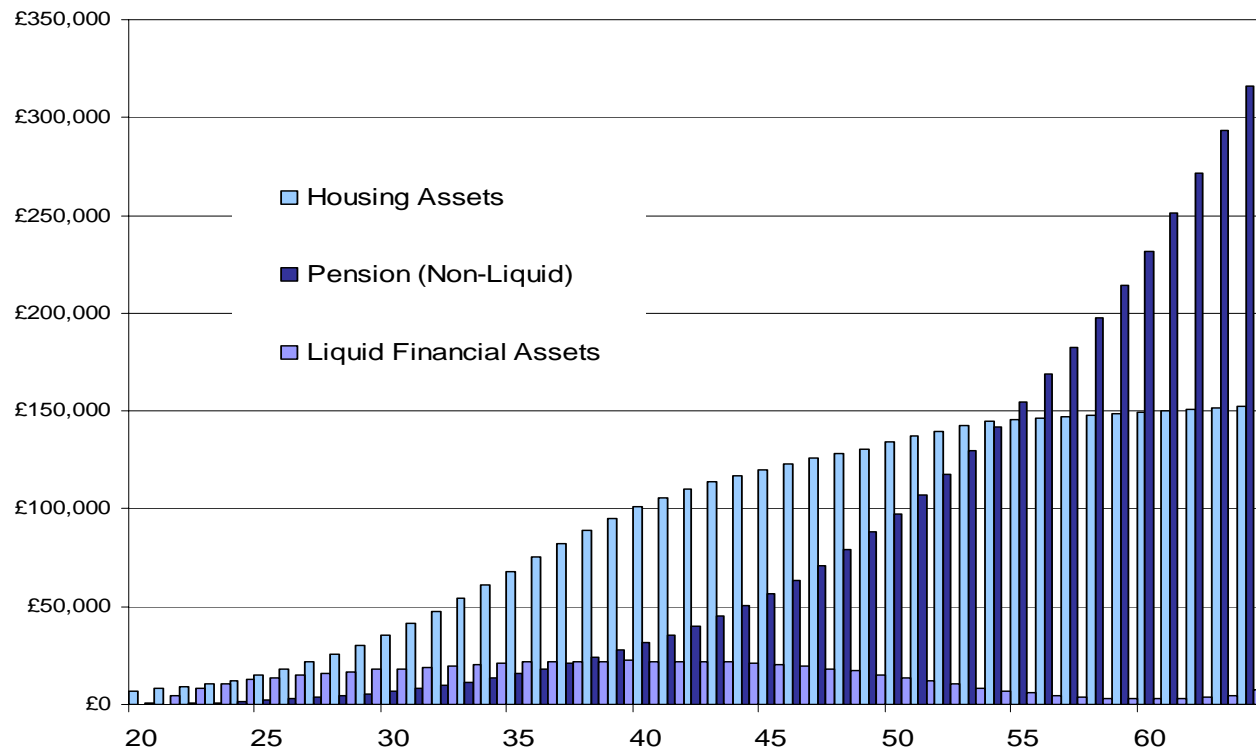
# Calibration

## Total Wealth at age 60



# Overall Pattern of Saving

## Illustrative Case: Representative family with tertiary education



- Are we under saving?
- Observed contribution rates vary widely.
- Old people do contribute more than younger people on average.

# Conclusions

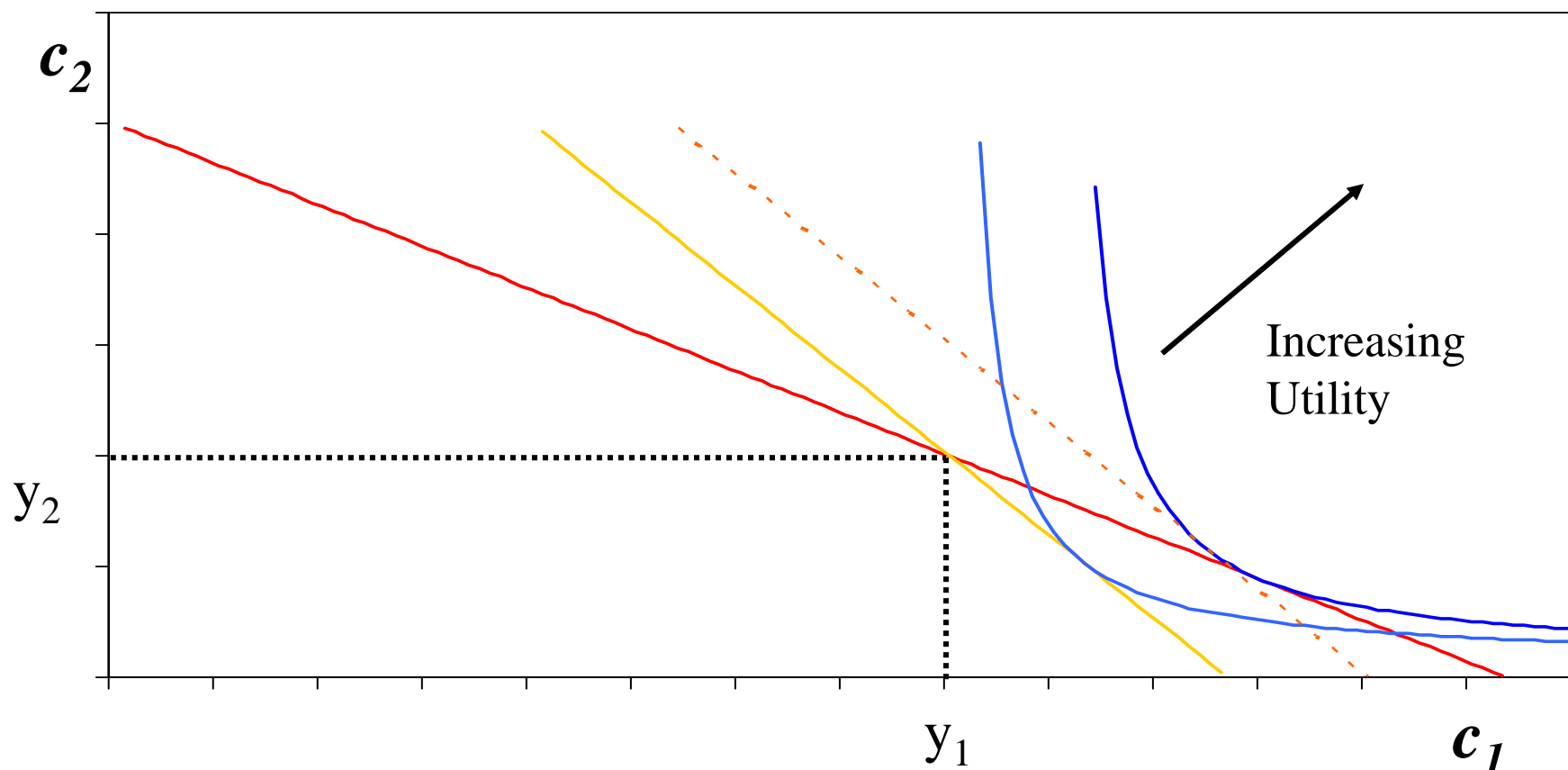
- Model shows how ‘rational’, forward-looking households should and do save over their lifetime, with saving determined ‘endogenously’.
- Model fits the aggregate data, reproducing observed aggregate household saving and consumption patterns.
- Model provides a powerful tool for examining changes in savings and pensions policy - on the basis that households act ‘rationally’ and with full information.



# ANNEX

# Borrowing in First Period

**Substitute:**  $c_1 \downarrow$  and  $c_2 \uparrow$    **Income:**  $c_1 \downarrow$  and  $c_2 \downarrow \Rightarrow : c_1 \downarrow$  and  $c_2?$



# Saving in First Period

**Substitute:**  $c_1 \downarrow$  and  $c_2 \uparrow$     **Income:**  $c_1 \uparrow$  and  $c_2 \uparrow \Rightarrow : c_1?$  and  $c_2 \uparrow$

