Understanding National Savings

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There are large differences in national saving rates across countries and across time.
National Saving Rates

National Saving Rate = Household + Corporate + Government

Net National Saving Rate: \( \frac{Y_t - C_t - G_t - \delta_t K_t}{Y_t - \delta_t K_t} \)
National Saving Rates

Net National Saving Rate

China
Japan
U.S.
Such differences have often been puzzling

This talk:

What do we know (what have I learned) about these differences in saving rates.
Behavior of the national saving rates
not too puzzling!

Sneak Preview
Outline

- Examine National Saving Rates in
  - Japan
  - Mexico
  - Chile
  - Colombia
  - China
  - U.S.
• Standard Growth Model
• Overlapping Generations Model
• Dynastic Model
• Closed economy and perfect foresight
Japan
Japan versus the U.S

Net National Saving Rate

Japan

U.S.
Why did the Japanese save so much?

Many mentioned:

- differences in preferences,
- the bonus system,
- high housing prices,
- high educational costs,
- high marriage costs.
Japan

- Hayashi (1986): Reconstruction Hypothesis
  - High savings due to the destruction of the capital stock after WW II
Let’s use a standard model

See where it fails

Where it succeeds
Households with $N_t$ members maximize

$$\max \left\{ \sum_{t=0}^{\infty} \beta^t N_t \left[ \log c_t + \alpha \log (T - h_t) \right] \right\}$$

subject to

$$C_t + X_t \leq w_t H_t + \left[ r_t - \tau_t (r_t - \delta_t) \right] K_t + \pi_t$$
Standard Model

- Firms maximize profits

\[ Y_t = A_t K_t^\alpha H_t^{1-\alpha} \]

- Government
  - Taxes capital income to pay for \( G_t \).
  - Uses \( \pi_t \) to balance its budget.
Japan

- Calibrate to Japan
- Set the initial K/Y ratio to its counterpart in the data
- Set the TFP growth rate to the period average
Japanese Saving Rate: Standard Model with constant TFP growth
Japan

- Perhaps we need demographics, aging, social security........
  - Overlapping generations model
    - Changing longevity
    - Retirement
    - Borrowing constraints
    - Increased social security benefits
- Feed in exogenous changes in TFP year by year
- Perfect foresight
Japanese Saving Rate: Data versus the Model

Braun, Ikeda, Joines IER (2009) very similar findings
Decompose the Components

- What made it work?
- Solve the model with one component at a time
  - TFP only
  - Population Growth Rate only
  - Increased longevity only
  - Taxes only
Decompose the Components

Japanese Saving Rate: TFP growth only

[Graph showing the saving rate from 1960 to 2000, comparing data and a model with TFP growth only.]
Lucas says

- Why do you need all the bells and whistles then?
- Infinite horizon with TFP should do it!
- Re-try the standard model but use annual growth rates of TFP!
Back to the Standard Model

- **Households maximize**
  \[
  \max \left\{ \sum_{t=0}^{\infty} \beta^t N_t \left[ \log c_t + \alpha \log (T - h_t) \right] \right\}
  \]
  subject to
  \[
  C_t + X_t \leq w_t H_t + [r_t - \tau_t (r_t - \delta_t)] K_t + \pi_t
  \]

- **Firms maximize profits**
  \[
  Y_t = A_t K_t^\alpha H_t^{1-\alpha}
  \]

- **Government**
  - Taxes capital income to pay for a fixed stream of government purchases \( G_t \).
  - Uses \( \pi_t \) to balance its budget.
Calibration

- Need
  - Tax rate
  - Population growth rate
  - Depreciation rate
  - Initial capital stock
  - TFP growth rate
Japanese Saving Rate: Data versus the Model
Chen, İmrohoroğlu, İmrohoroğlu, AER (2006)
What happened since 2000?
What happened since 2000?

Japanese Saving Rate: Extended Data
Japanese Saving Rate: Data versus the Model
Saving Rate: Mexico
Fernández, İmrohoroğlu, Tamayo (2017)
Chile and Colombia
Chile and Colombia

Gross National Saving Rate: Chile and Colombia
Fernández, İmrohoroğlu, Tamayo (2017)
Saving Rate: Chile
Chile and Colombia

- Why the big increase in the saving rate in Chile?
- Two things happen in the mid-1980s
  - TFP Growth rate in Chile increases compared to the past and compared to Colombia

<table>
<thead>
<tr>
<th>TFP Growth Rate</th>
<th>Chile</th>
<th>Colombia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970 -1985</td>
<td>1.008</td>
<td>1.012</td>
</tr>
<tr>
<td>1986 -1995</td>
<td>1.039</td>
<td>1.002</td>
</tr>
</tbody>
</table>

- Capital income tax rate in Chile: decline from about 50% to 10%. Bergoeing, Kehoe, Kehoe, and Soto (2002)
China
Saving Rate: Japan and China
Saving Rate: Japan and China
China
China Saving and Investment Rate

Chinese Saving and Investment Rate
Chinese Saving Rate: Data versus the Model
What might be going on in China?

- Choukhmane, Coeurdacier, and Jin (2013): The impact of the one-child policy
- Curtis, Lagauer and Mark (2014): Demographics
- Wei and Zhang (2011): The rising sex ratio imbalance
- Wang and Wen (2011): High housing prices
- Song, Storesletten and Zilibotti (2011): Financial frictions, reallocation of resources across heterogenous firms
We will incorporate some of these components

In particular

- Significant amount of family insurance in China
  - Especially Long-Term Care (LTC) mostly provided by families
  - LTC: Disabled in activities of daily living (eating, dressing, bathing, getting in and out of the bed, inside transferring...)
- One child policy eroding family insurance
- Government provided social insurance increasing but weak
• A general equilibrium model with two-sided altruism
  • Laitner (1992), Fuster, İmrohoroğlu, and İmrohoroğlu (2003 and 2007)

• Decision-making unit is the household consisting of a parent and $n$ children who pool resources together

• Life cycle of an individual:
  • born at age 20,
  • become parents (of 20 year old kids) at real-age 55,
  • retire at age 60, and
  • live up to age 90.

• An individual’s life overlaps with his parent’s in the first 35 periods and with the life of his children in the last 35 periods
Households

• Individuals face labor income risks

• Parents face health related risks that necessitate long-term care
  • If LTC needed there is a time (of the children) and money cost
    • Use micro data to calibrate expenditures and time spent on informal care for individuals in LTC

• Social security not great:
  • In 2002 and 2005, 40-50% of the elderly in cities and more than 90% of the elderly in rural areas did not have a pension

• Help for the most destitute not great
A representative firm produces a single good using

\[ Y_t = A_t K_t^\alpha N_t^{1-\alpha} \]

The government taxes both capital, and labor income.

Uses the revenues to finance an exogenously given stream of government expenditures \( G_t \).

Also taxes to pay for social security
The Chinese Saving Rate: Data versus the Model
Role of the one-child policy

• What if they did not have the one-child policy?
• There would be more family insurance
• Let the fertility rate decline gradually along the transition path
• Fertility rate reaches the replacement rate of one child per parent in 2050
The Chinese Saving Rate: Data versus the Model

Role of the one-child policy

The graph shows the saving rate for China from 1970 to 2030. It compares the data with the benchmark and the model predictions.

- **Data**: The red line represents the actual saving rate data.
- **Benchmark**: The blue line represents the benchmark scenario.
- **No one-child policy**: The green line represents the scenario without the one-child policy.

The saving rate is measured along the y-axis, ranging from 0.00 to 0.50, while the x-axis represents the years from 1970 to 2030.
• What if there were no long-term care needs. All healthy families.
The Chinese Saving Rate: Data versus the Model
Data versus the Model

• Results are sensitive to:
  • What happens to the most destitute
  • Generosity of social security
  • The severity of the risk
Data versus the Model

• What happens to the most destitute?
  
  • De Nardi, French and Jones (JPE 2010) : “Properly accounting for old age expenditure on medical care and for social insurance programs providing a consumption floor are very important to explain the elderly’s savings”

  • In the U.S. Medicaid for the most destitute

• In China
  
  • No Medicaid
  
  • High poverty rate among the elderly
Sensitivity

- Lower /Higher saving rates
  - Higher/lower social security replacement rate;
  - Higher/lower consumption floor
The Chinese Saving Rate: Sensitivity
The Case of China

• High saving rates in China
  • Risks faced in old age
  • Decline in family insurance
  • Government provided insurance for old-age risks not so good “yet”
Why was TFP important in Japan but not in China?
TFP Growth Rates

Japan

China
United States
U.S. Saving Rate: Data versus the Model
• This is a symptom of other failures

• Standard theory does well until the late 1980s

• But later misses
  • savings
  • and the hours boom
- Not so easy to change this
- McGrattan and Prescott (AEJ Macroeconomics, 2010): Intangible Capital
- Hansen and Ohanian (Handbook of Macroeconomics, forthcoming): Home Production
- Mendoza, Quadrini, and Rios-Rull (JPE, 2009): Financial Integration, Global Savings
Conclusions
Conclusions

- Differences in National Saving Rates
  - TFP (especially for the high-frequency fluctuations)
  - Taxes
  - Demographic changes
  - Family Insurance
  - Social Insurance
    - Social Security; Medicaid
Conclusions

- Differences in National Saving Rates
  - Not too puzzling
  - Some mysteries remain
Conclusions

• Looking behind the aggregate savings
• Differences across corporate, household, and government savings
• Differences in saving rates across households
• Differences in returns across households
Conclusions

Thank you!