Microsimulation Models in Japan

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In Japan, the proportion of individuals aged 65 years and above in the total population is the highest worldwide. Therefore, I think microsimulation models are essential tools for policymaking.

Microsimulation models, as in the field of policy modelling, are often used to evaluate the distributional impact of possible policy changes on individuals/households.

- Static: immediate effect
- Dynamic: long-term effect

In the Japanese context, some studies use static models but few use dynamic models. However, these models, especially dynamic models, are not commonly used and they are seldom used for policymaking.

The purpose of this presentation is to introduce some dynamic microsimulation models and to consider how they are useful in policymaking.
Dynamic microsimulation models in Japan

- **Integrated Analytical Model for Household Simulation (INAHSIM)**
  - Multidisciplinary team (1st version only)
  - Many policy simulations
  - From 1981 to the present (3rd version)

- **Shiraishi model**

- **Kawashima model (KEISIM)**

- **Koshio model**
Development of INAHSIM (1)

- **Version 1 (1981–2002):** developed by a multidisciplinary team
  - 32,000 persons/10,000 households; 1975–2025
  - 1974 CSLC (private households only)
  - A tool for household simulation
  - FORTRAN, Mainframe

- **Version 2 (2003–2007):** upgraded by Inagaki
  - 126,000 persons/46,000 households; 2001–2100
  - 2001 CSLC (private households only)
  - Employment status, health status, earnings
  - FORTRAN, PC (Windows)
Development of INAHSIM (2)

- **Version 2 (Rev) (2007–present):** revised by Fukawa
  - 126,000 persons/46,000 households; 2005–2050
  - The initial population was determined by using the INAHSIM model itself.
  - Physical condition
  - FORTRAN, PC (Windows)

- **Version 3 (2008–present):** upgraded by Inagaki and Kaneko
  - 128,000 persons/49,000 households; 2004–2100
  - 2004 CSLC (aligned with population census)
  - Employment status, health status, earnings, public pension
  - FORTRAN, PC (Windows)
INAHSIM (Ver. 1) (First released in 1986)

Demography
Birth, Death, Marriage, Divorce

New Year

Living with elderly parents

Young people leaving home

32,000 persons
10,000 households
1975–2025

Household changes after demographic events
INAHSIM (Ver. 2) (First released in 2005)

New Year

Demography
Birth, Death, Marriage, Divorce

Living with elderly parents

126,000 persons
46,000 households
2001–2100

Household changes after demographic events

Young people leaving home

Change in health status

Living with elderly parents

Change in employment status

Estimating earnings
INAHSIM (Ver. 3) (First released in 2008)

New Year

Demography
Birth, Death, Marriage, Divorce, International migration

Pension premium payment

Entering an institution

Living with elderly parents

Young people leaving home

Determining pensions

Estimating earnings

Household changes after demographic events

Change in health status

Change in employment status

128,000 persons 49,000 households 2004–2100
Distribution of the elderly by coresident family type

- The distribution of the elderly (aged 65 years and above) by coresident family type is very important for Japan’s social security system.
- The distribution reflects people’s behavior, and it changed dramatically after the 1980s.
  - Before the 1980s (traditional behavior)
    - Almost all men and women used to marry and seldom preferred divorced.
    - Married children lived with their parents and took care of their aging parents.
  - After the 1980s (new behavior)
    - Many people do not marry and more than 30% of couples opt to divorce.
    - Many married children do not live with their parents.
- Assumption in each version.
  - INAHSIM (Ver.1) assumed the traditional behavior.
  - INAHSIM (Ver.3) assumed the new behavior.
Trends in the distribution of the elderly by coresident family type (actual value)

<table>
<thead>
<tr>
<th>Year</th>
<th>Single household</th>
<th>Couple-only household</th>
<th>Living with married children</th>
<th>Living with unmarried children</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>8.5%</td>
<td>19.6%</td>
<td>52.5%</td>
<td>16.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>1986</td>
<td>10.1%</td>
<td>22.0%</td>
<td>46.7%</td>
<td>17.6%</td>
<td>3.5%</td>
</tr>
<tr>
<td>1989</td>
<td>11.2%</td>
<td>25.5%</td>
<td>42.2%</td>
<td>17.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td>1992</td>
<td>11.7%</td>
<td>27.6%</td>
<td>38.7%</td>
<td>18.4%</td>
<td>3.7%</td>
</tr>
<tr>
<td>1995</td>
<td>12.6%</td>
<td>29.4%</td>
<td>35.5%</td>
<td>18.9%</td>
<td>3.7%</td>
</tr>
<tr>
<td>1998</td>
<td>13.2%</td>
<td>32.3%</td>
<td>31.2%</td>
<td>19.1%</td>
<td>4.1%</td>
</tr>
<tr>
<td>2001</td>
<td>13.8%</td>
<td>33.8%</td>
<td>27.4%</td>
<td>21.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>2004</td>
<td>14.7%</td>
<td>36.0%</td>
<td>23.6%</td>
<td>21.9%</td>
<td>3.8%</td>
</tr>
<tr>
<td>2007</td>
<td>15.7%</td>
<td>36.7%</td>
<td>19.6%</td>
<td>24.0%</td>
<td>4.0%</td>
</tr>
<tr>
<td>2010</td>
<td>16.9%</td>
<td>37.2%</td>
<td>17.5%</td>
<td>24.8%</td>
<td>3.7%</td>
</tr>
<tr>
<td>2013</td>
<td>17.7%</td>
<td>38.5%</td>
<td>13.9%</td>
<td>26.1%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

Source: Comprehensive Survey on Living Conditions (Ministry of Health, Labor, and Welfare)
The elderly in single households
The elderly in couple-only households
The elderly living with married children
The elderly living with unmarried children
Selected research outputs (1)


Abstract of the latest research


- The social security system in Japan was developed under the premise that postwar families represented the most common type of family. A “postwar family” refers to a family in which: (1) men and women are married; (2) husbands work as regular employees and wives are dependent homemakers; and (3) husbands and wives seldom get divorced. Therefore, the social security system is particularly generous towards dependent wives and widows.

- However, these premises are no longer valid because Japanese nuptiality behavior has completely changed since the 1980s. Marriage rates have decreased and divorce rates have significantly increased. Nevertheless, society still suffers from a wage inequality between men and women. As a result, the number of never-married or divorced elderly women will increase, and these women might face a serious poverty risk in the future.

- In this study, the author makes simulations of the living arrangements and poverty rates for the elderly in Japan and evaluates the effect of changes in nuptiality behavior on these poverty rates using a dynamic microsimulation model. The simulation results indicate that changes in nuptiality behavior will affect the poverty rate for elderly women, but not for elderly men.
The effect of changes in nuptiality behavior

If nuptiality behavior takes the traditional trend again, ........

Source: Simulation results of INAHSIM.
Future work on MSM in Japan

- INAHSIM is still valid as a household simulation tool.
  - It follows real society very well in terms of distribution of the elderly by coresident family type.
  - A multidisciplinary team for microsimulation models should be formed again.
  - The program should be rewritten in a simplified language, such as LIAM2, to increase the number of users.
  - The base dataset (initial population) should be prepared for all researchers.
- Other microsimulation models (e.g. single-purpose models) should be developed.
- International collaboration should be further developed, because it would progress the research further.
Thank you for your attention.