Workshop on Dynamic Microsimulation Models in Asia-Pacific Region
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Microsimulation Models in Japan

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Background

- 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)
  - Okazaki, Aoi, Fukawa, Inagaki, Ito, Hanada, Kadowaki, Kaneko, et al.
  - Many policy simulations
  - From 1981 to the present (3rd version)
- Shiraishi model
  - Kousuke Shiraishi, "The Use of Micro Simulation Models for Pension Analysis in Japan," *Fiscal Studies*, Vol. 5, 2009, 84–199. (Japanese)
- Kawashima model (KEISIM)
  - Hideki Kawashima, "Building of Dynamic Microsimulation—National income, pension analysis and welfare demand analysis, by individual and household life cycle," *Research Bulletin of College of Healthcare Management*, No. 1, 2009, 89–102. (Japanese)
- Koshio model
  - Atsushi Koshio, "Projecting Long Term Care Needs in Japan? Microsimulation modeling for super aged society," 4th General Conference of the International Microsimulation Association, College of Business and Economics, Australian National University, Canberra, 12 December 2013.

Development of INAHSIM (1)

- Version 1 (1981–2002): developed by a multidisciplinary team
  - Aoi K., Okazaki Y., Fukawa T., Hanada K. Inagaki S., et al. (1986), *Household Projection By INAHSIM: A comprehensive approach*, Life Span, Vol. 6 (in Japanese).
  - 32,000 persons/10,000 households; 1975–2025
  - 1974 CSLC (private households only)
  - A tool for household simulation
  - FORTRAN, Mainframe

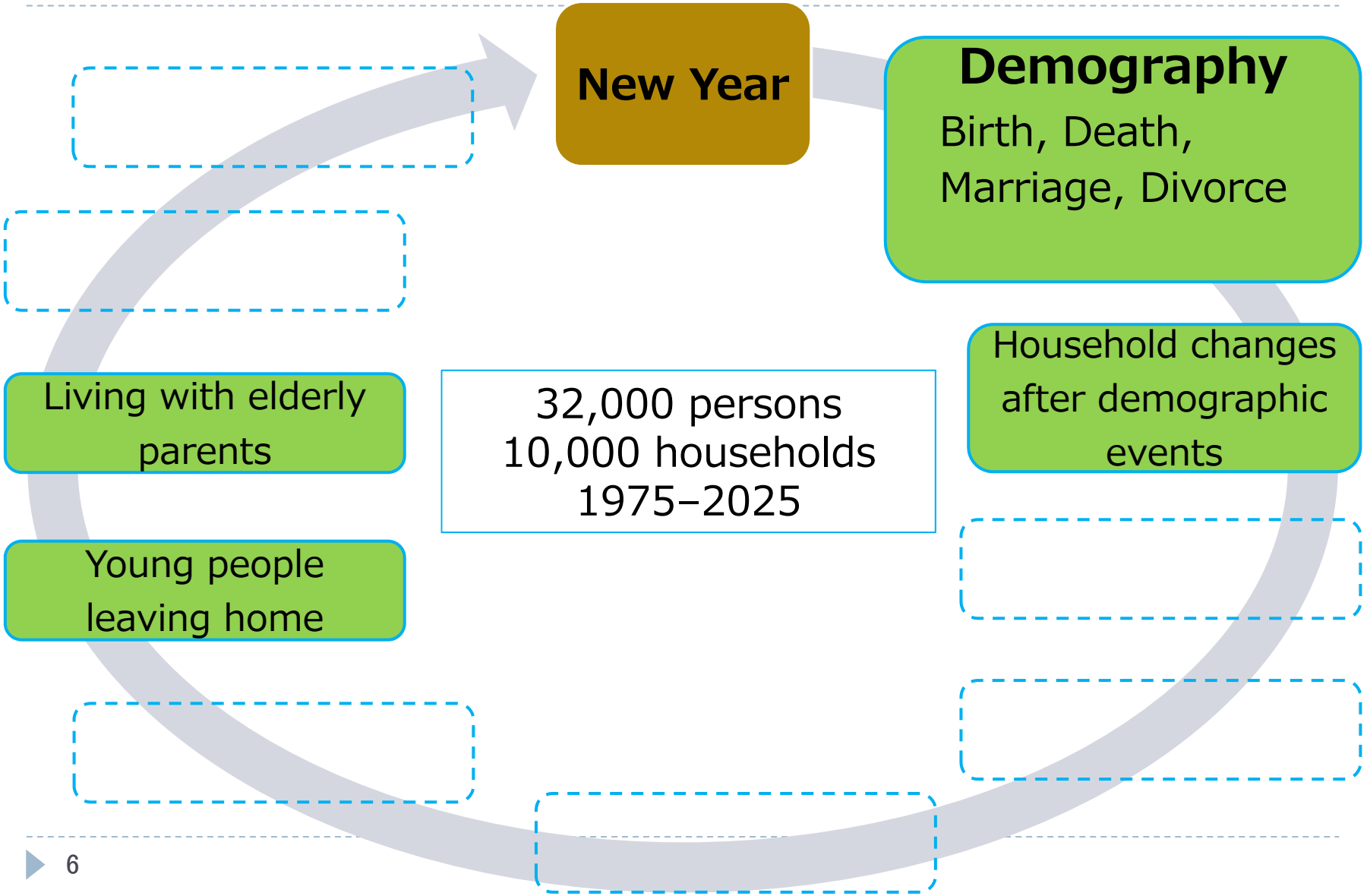
- Version 2 (2003–2007): upgraded by Inagaki
  - Inagaki S. (2005), "Projections of the Japanese Socio-Economic Structure Using a Microsimulation Model (INAHSIM)," *IPSS Discussion Paper Series* No.2005-03.
  - 126,000 persons/46,000 households; 2001–2100
  - 2001 CSLC (private households only)
  - Employment status, health status, earnings
  - FORTRAN, PC (Windows)

Development of INAHSIM (2)

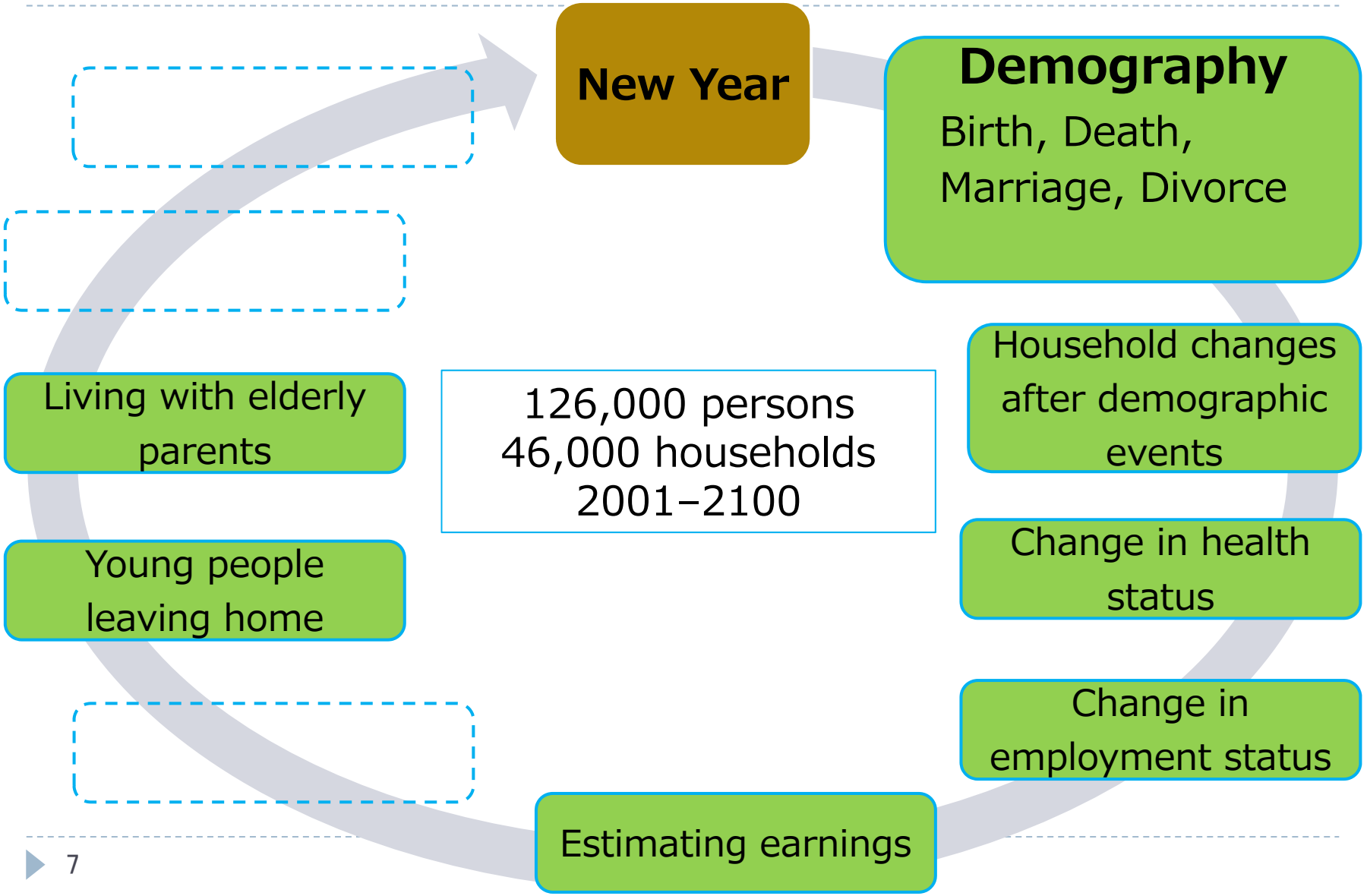
- Version 2 (Rev) (2007–present): revised by Fukawa
  - Fukawa T. (2007), "Household Projection 2006/07 in Japan Using a Micro-Simulation Model," *IPSS Discussion Paper Series* No.2007-E02.
  - 126,000 persons/46,000 households; 2005–2050
  - The initial population was determined by using the INAHSIM model itself.
  - Physical condition
  - FORTRAN, PC (Windows)

- Version 3 (2008–present) : upgraded by Inagaki and Kaneko
  - Inagaki S. and Kaneko Y. (2008), "Projections of Income Distribution Using a Microsimulation Model (INAHSIM)," *Fiscal 2007 Report for Research on Social Security that Pays Attention to the Relationship between Income/Property/Consumption and Contribution/Taxes*, 383–410 (in Japanese).
  - 128,000 persons/49,000 households; 2004–2100
  - 2004 CSLC (aligned with population census)
  - Employment status, health status, earnings, public pension
  - FORTRAN, PC (Windows)

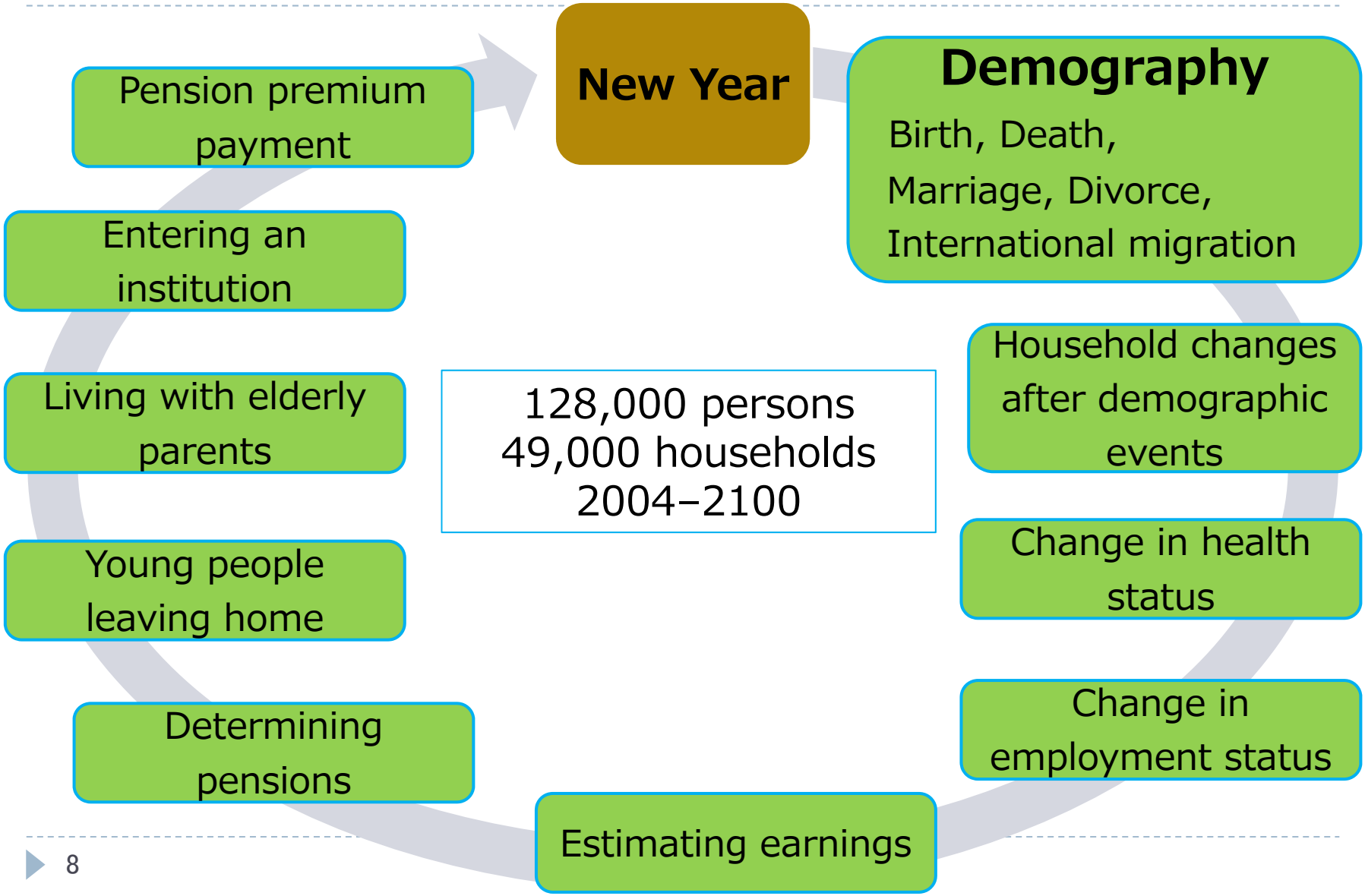
INAHSIM (Ver. 1) (First released in1986)



INAHSIM (Ver. 2) (First released in 2005)



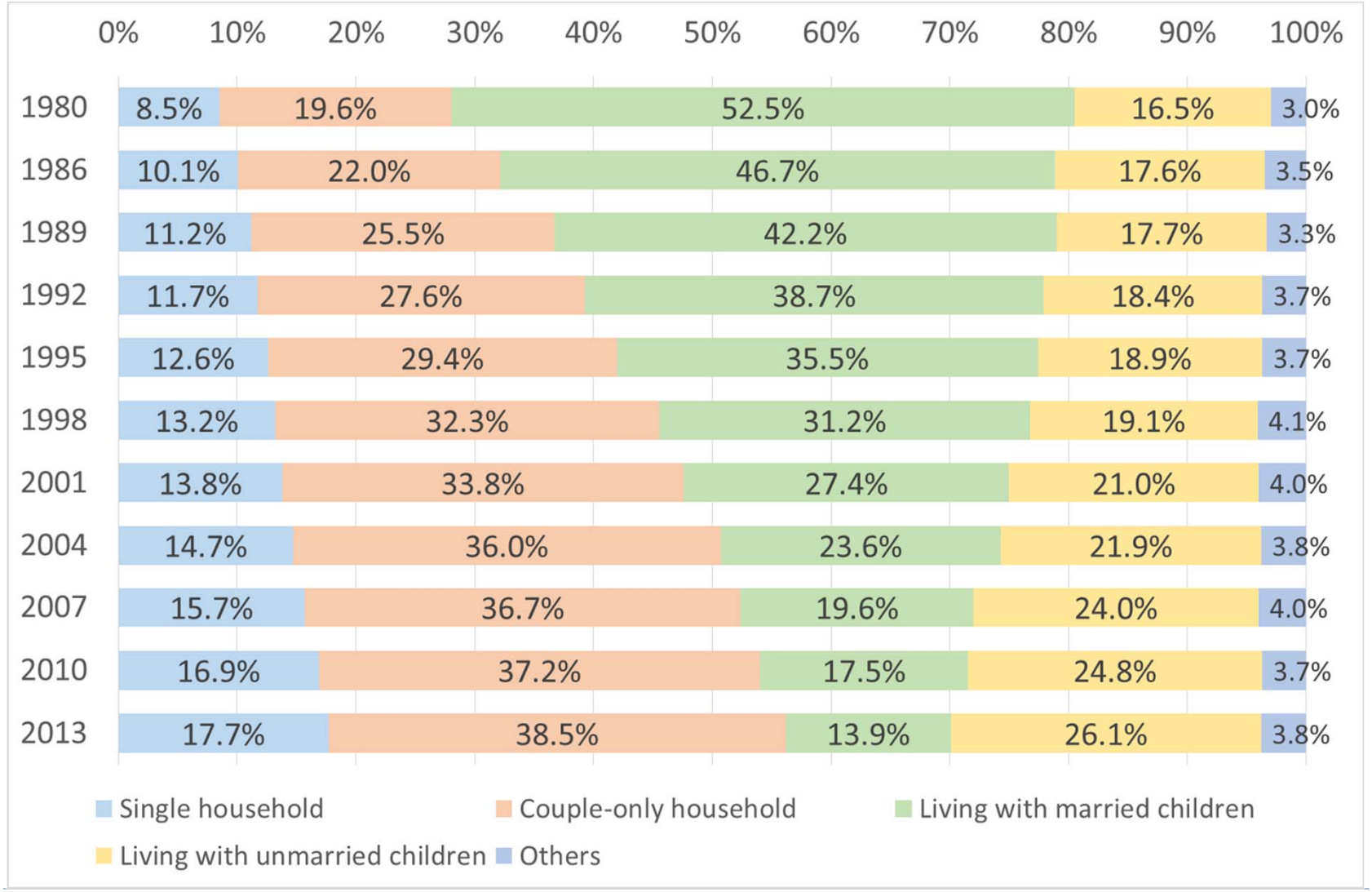
INAHSIM (Ver. 3) (First released in 2008)



Distribution of the elderly by coresident family type

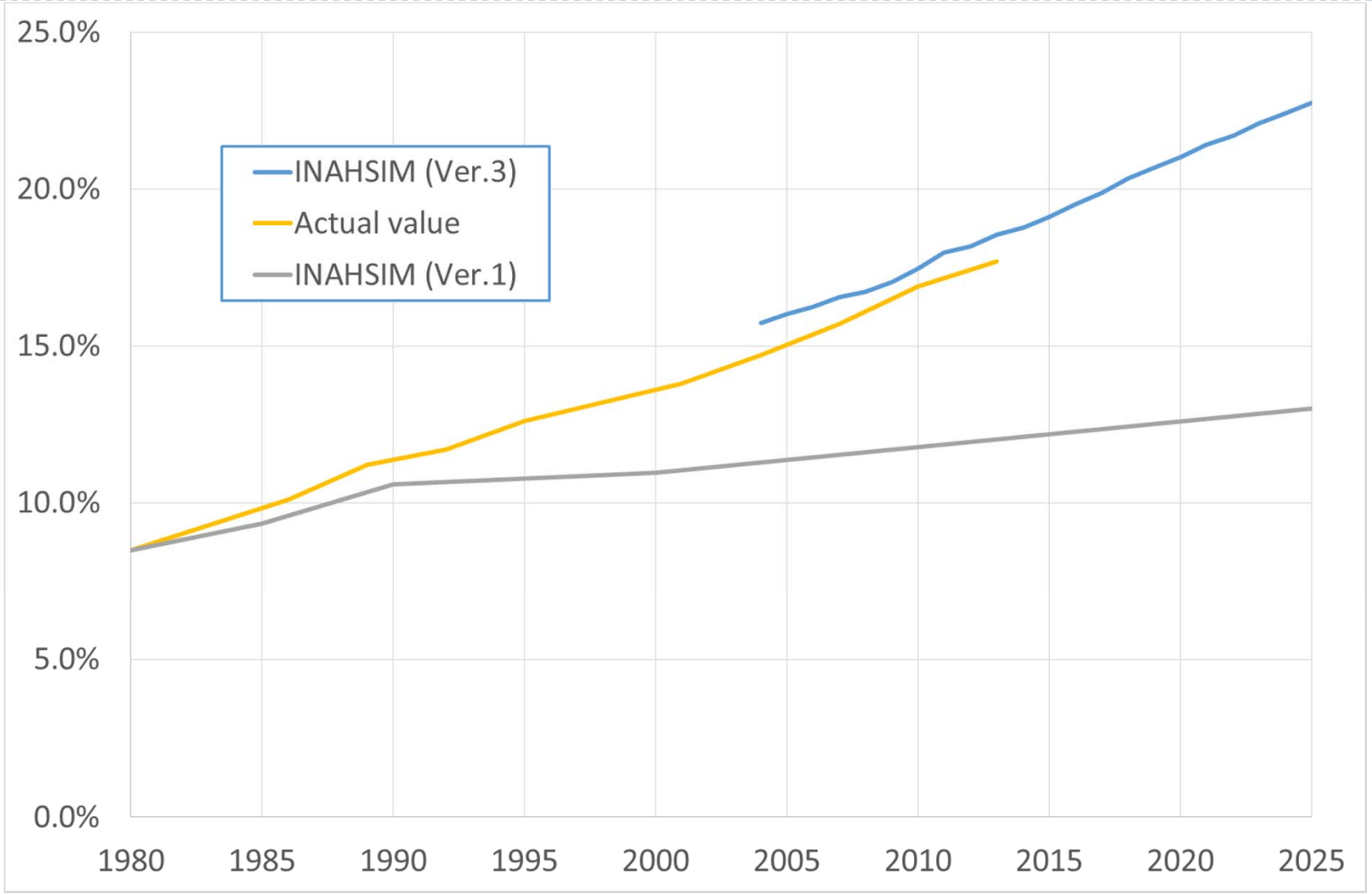
- The distribution of the elderly (aged 65 years and above) by coresident family type is very important for Japan's social security system.
- The distribution reflects people's behavior, and it changed dramatically after the 1980s.
  - Before the 1980s (traditional behavior)
    - Almost all men and 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)

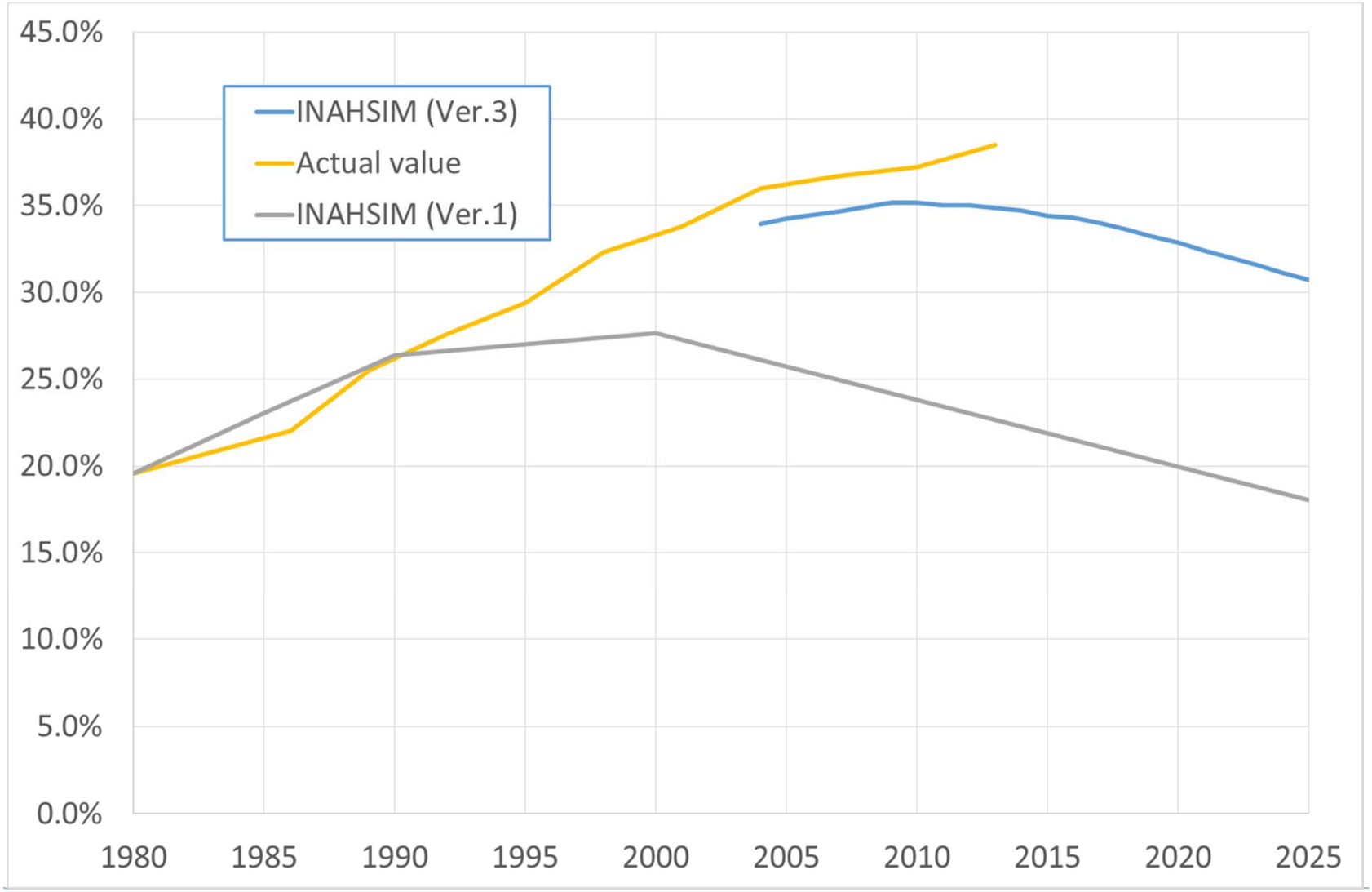


Source: Comprehensive Survey on Living Conditions (Ministry of Health, Labor, and Welfare)

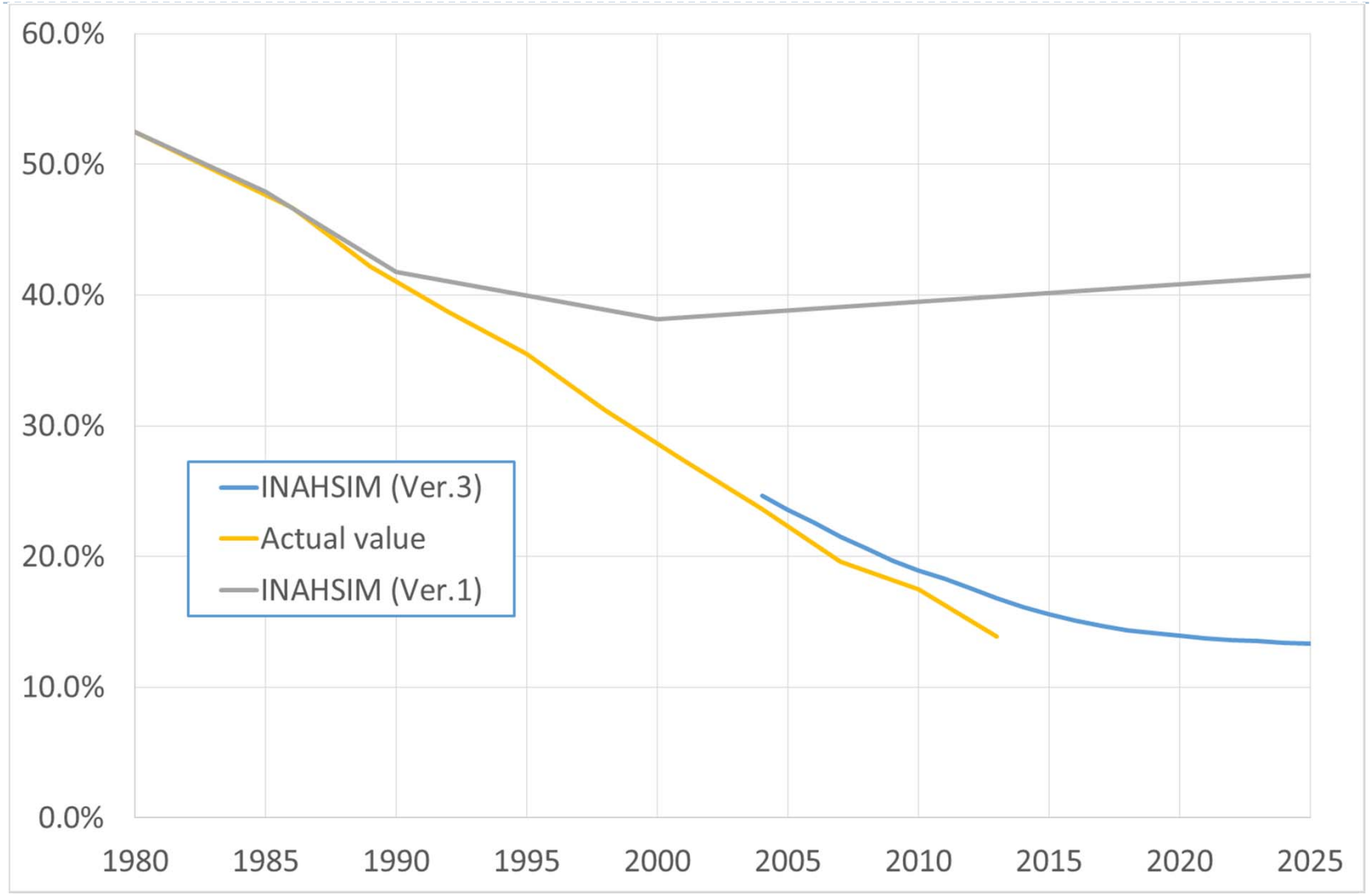
The elderly in single households



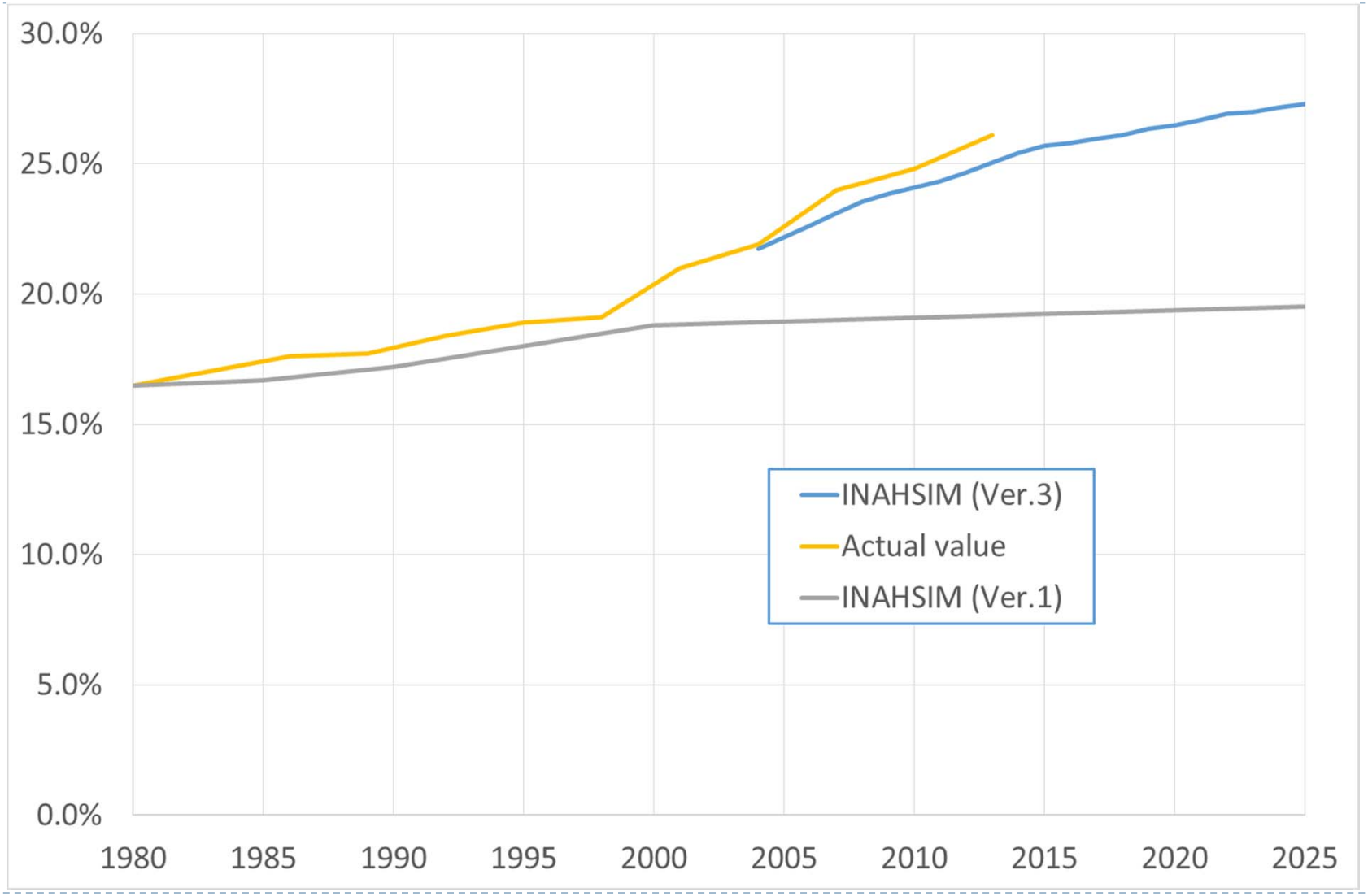
The elderly in couple-only households



The elderly living with married children



The elderly living with unmarried children



Selected research outputs (1)

- Seiichi Inagaki and Yoshiro Matsuda, "Population and Socio-Economic Structure Simulation using Micro Data," *Bulletin of the International Statistical Institute*, 54th Session, 2003, Vol. LX, Book 2 (Invited Papers), pp.442-445.
- Seiichi Inagaki, "Projections of the Japanese Socio-Economic Structure Using a Microsimulation Model (INAHSIM)," *IPSS Discussion Paper Series* No.2005-03, 2005.
- Tetsuo Fukawa, "Household projection 2006/07 in Japan using a micro-simulation model," IPSS Discussion Paper Series No.2007-E02, 2007.
- Tetsuo Fukawa, "Health and long-term care expenditures of the elderly in Japan using a micro-simulation model," *The Japanese Journal of Social Security Policy*, Vol.6, No.2, Nov. 2007, 199-206.
- Seiichi Inagaki, "The Impact of the Increase in Non-regular Employment on Income Disparities," *Journal of Income Distribution*, Vol.16, No.3-4, December 2007, pp.71-87.
- Seiichi Inagaki, "A Microsimulation Model for Projections of Japanese Socioeconomic Structure," *The Review of Socionetwork Strategies*, Vol.2, No.1, Springer Japan, October 2008, pp.25-41.
- Tetsuo Fukawa, "Household projection and its application to health/long-term care expenditure in Japan using INAHSIM-II," 2nd General Conference of the International Microsimulation Association, Ottawa, Canada, June 8-10, 2009.
- Seiichi Inagaki, "The Effects of Proposals for Basic Pension Reform on the Income Distribution of the Elderly in Japan," *The Review of Socionetwork Strategies*,Vol.4, No.1, Springer Japan, June 2010, pp.1-16.

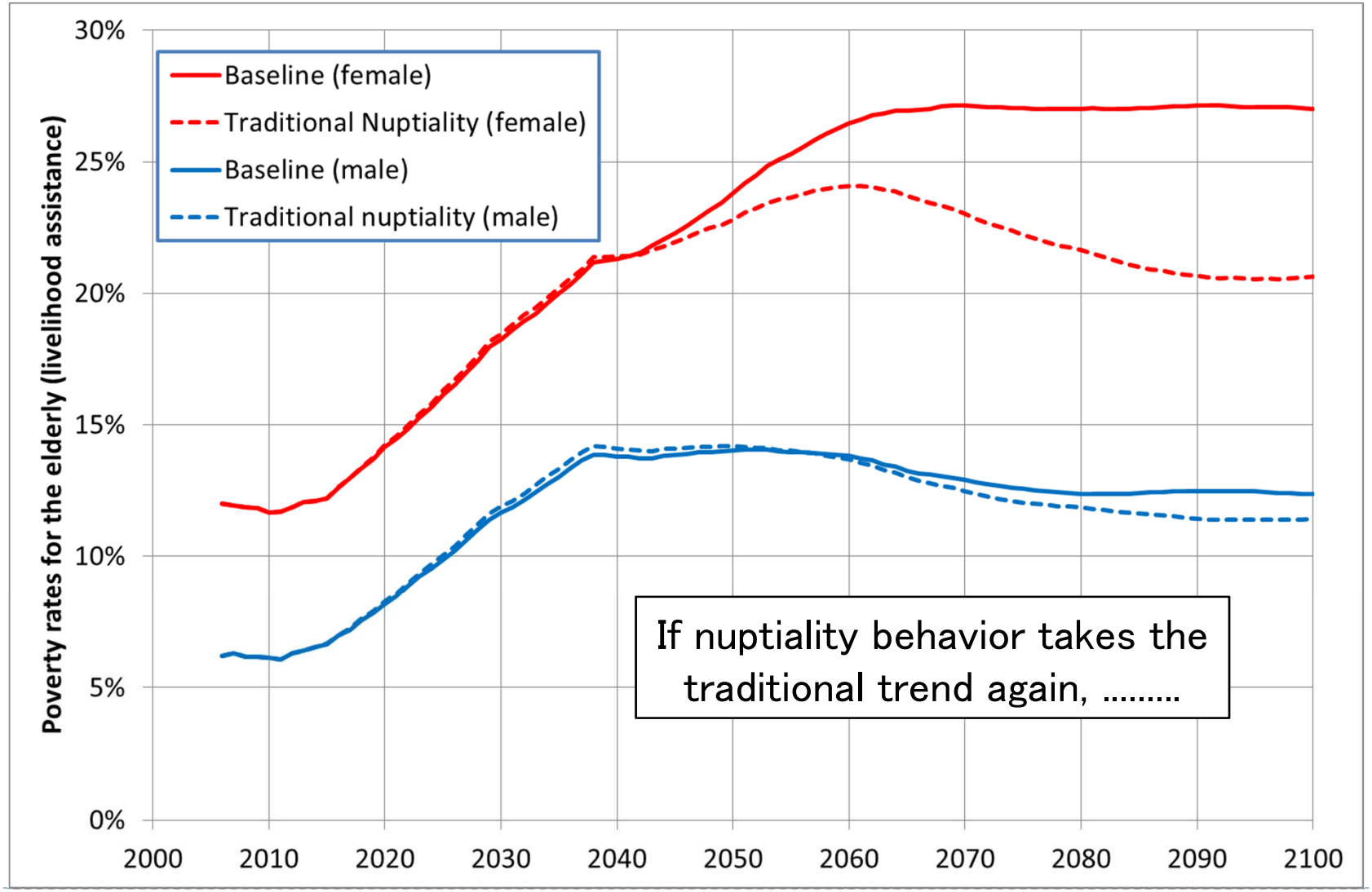
Selected research outputs (2)

- Tetsuo Fukawa, "Household projection and its application to health/long-term care expenditure in Japan using INAHSIM-II," *Social Science Computer Review*, 29(1), 2010, 52-66.
- Tetsuo Fukawa, "Projection of Social Burden of the Elderly in Japan Using INAHSIM-II," *Epidemiology Research International*, Vol. 2012. Article ID 832325, 9 pages, 2012.
- Dekkers, G., Inagaki, S., and Desmet, R., "Dynamic Microsimulation Modeling for Policy Support: An Application to Belgium and possibilities for Japan," *The Review of Socionetwork Strategies*, Vol.6, No.2, Springer Japan, December 2012, pp.31-47.
- Tetsuo Fukawa, "Financing long-term care for the elderly in the Netherlands and Japan," *IFW Discussion Paper Series* No.2013-1, Apr. 2013.
- Tetsuo Fukawa, "Comparison of the LTC expenditures for the elderly in Japan and the Netherlands," *IFW Discussion Paper Series* No.2014-4, Feb. 2014.
- Seiichi Inagaki, "Simulating Policy Alternatives for Public Pensions in Japan," in Gijs Dekkers, Marcia Keegan and Cathal O'Donoghue, eds., *New Pathways in Microsimulation*, ASHGATE Publishing Ltd., February 2014, pp.129-144.
- Seiichi Inagaki, "The effect of changes in nuptiality behavior after the 1980s on the poverty rate for the elderly in Japan—Analysis using a dynamic microsimulation model," *The Review of Socionetwork Strategies*, Vol.8, No.1, Springer Japan, June 2014, pp.1-18.
- Seiichi Inagaki, "Effect of the introduction of Category 3 contributions on the adequacy and sustainability of the public pension system in Japan," *PIE/CIS Discussion Paper* No.636, Institute of Economic Research, Hitotsubashi University, October 2014.

Abstract of the latest research

- Seiichi Inagaki, "The effect of changes in nuptiality behavior after the 1980s on the poverty rate for the elderly in Japan—Analysis using a dynamic microsimulation model," *The Review of Socionetwork Strategies*, Vol.8, No.1, Springer Japan, June 2014, pp.1–18.
  - 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



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.