

Population and Dynamic Model : PHM

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1. Background

- Population is the most important factor for future GHG emissions.
- Japan's population decreases from 2006.
- Distribution of population has much effect on structure of energy system in transportation and residential sectors.
- National Institute estimate future national population by 2100, but future number of national household and province-wise population by 2025/2030.

2. Input/Output of PHM

<National>

<Province-wise>

Input

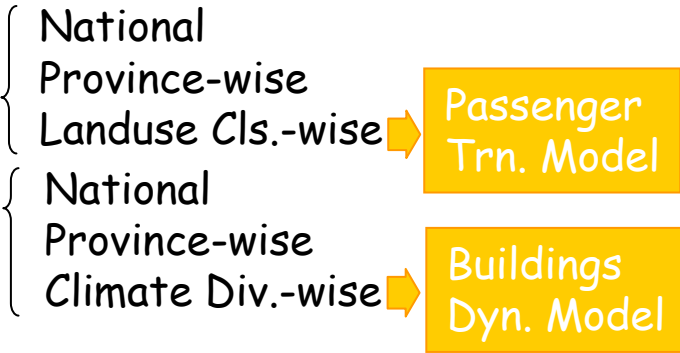
- 1) Population in base year [Sex, Age]
- 2) Birth rate [Sex, Age, Year]
- 3) Int. migration [Sex, Age, Year]
-
- 4) Headship rate [Sex, Age, Family, Year]

- 1) Population in base year [Sex, Age]
- 2) Birth rate [Sex, Age, Year]
- 3) Net migration [Sex, Age, Year]
-
- 4) Headship rate [Sex, Age, Family, Year]
-
- 5) Climate Div. share [Climate, Year]
- 6) Landuse Cls. share [Landuse, Year]

Population and Households Model

Output

- Population [Sex, Age, Year]
- Household [Family, Year]



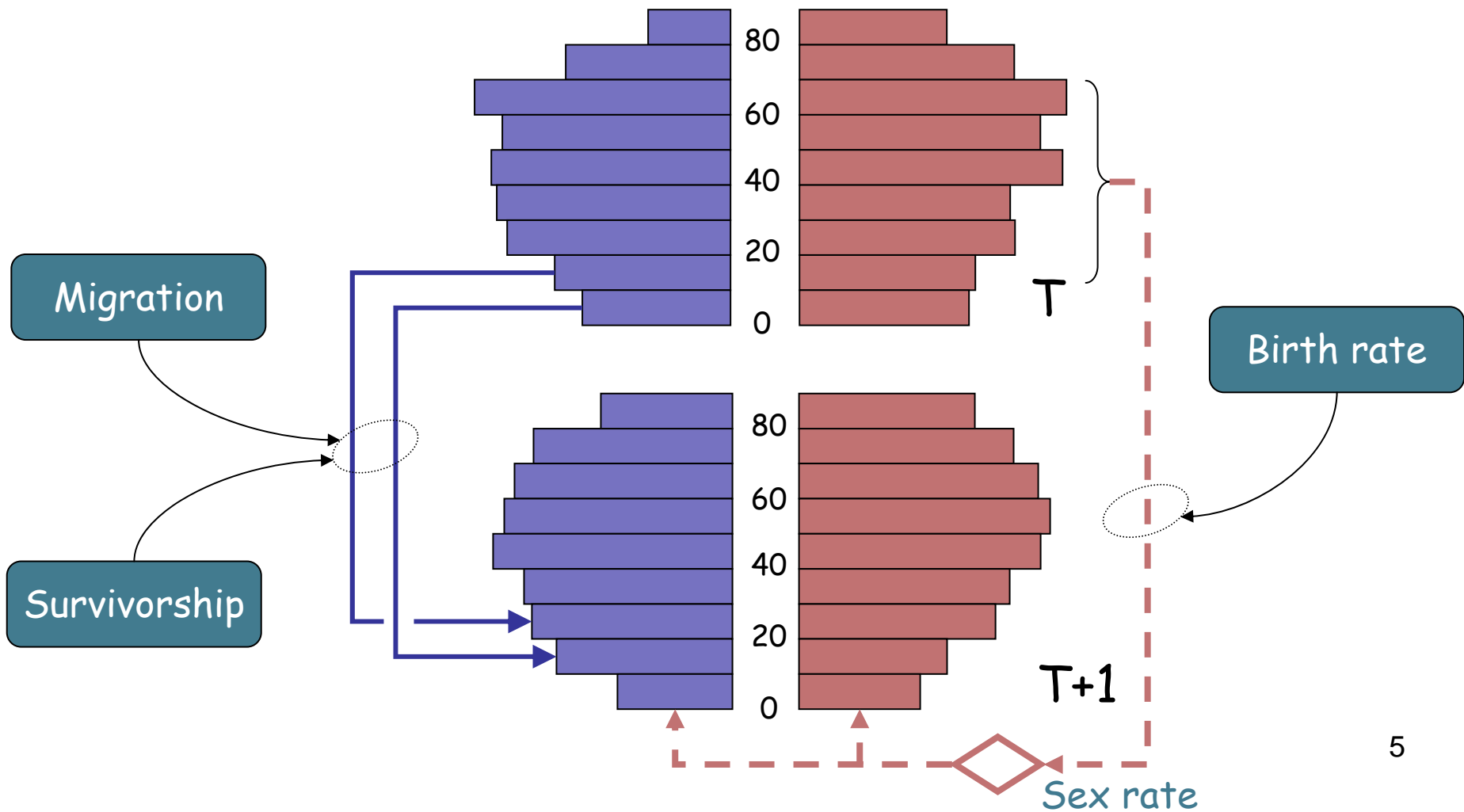
2. Input/Output of PHM

<Source of Input>

Input of PHM	Source (Japan)
1) Population in 2000 (National, Province-wise)	Statistics by Ministry of Internal Affairs
2) Birth rate 3) Migration 4) Headship rate (National, Province-wise) 5) Climate Div. Share 6) Landuse Cls. Share	National Institute of Population and Social Security Research

3. Logic of PHM

< Cohort Component Method >



Population(Age, Sex, Year)

= Population(Age, Sex, Year-1)

× Survivor rate(Age~Age+1, Sex, Year)

× 1+Net Migration rate(Age~Age+1, Sex, Year)

Population("1", Sex, Year-1)

= \sum {Population(Age, "Female", Year-1)

× Birth rate(Age, Sex, Year)}

× Survivor rate("Birth~1", Sex, Year)

× 1+Net Migration rate("Birth~1", Sex, Year)

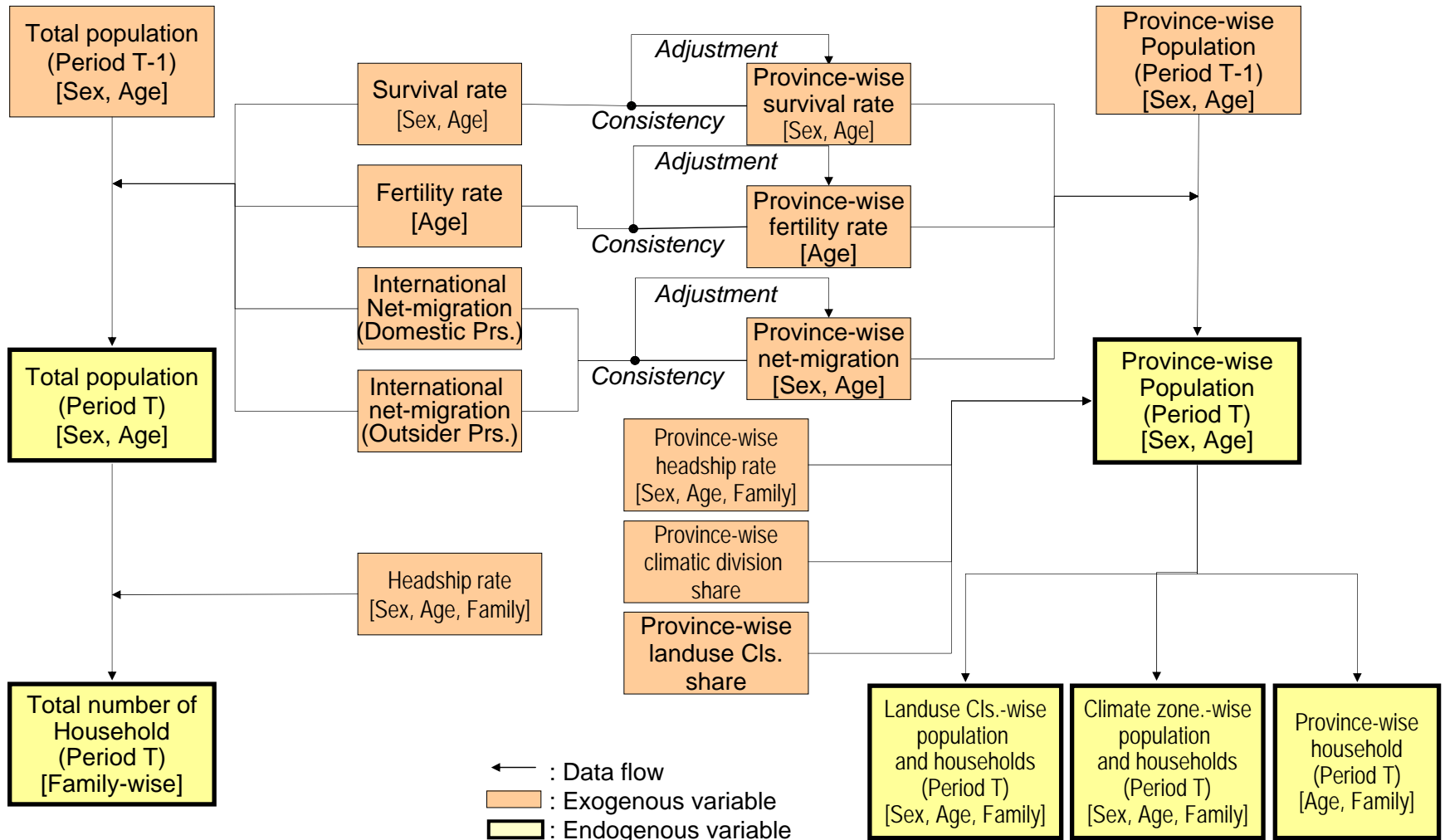
Number of Households (Family, Year)

= \sum {Population(Age, Sex, Year)

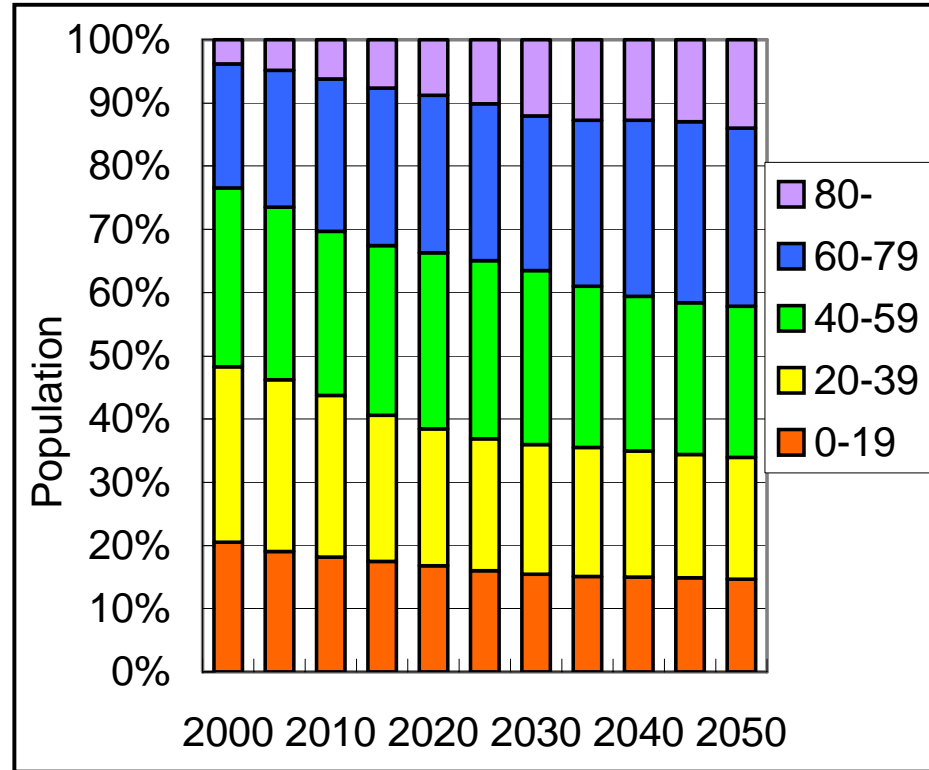
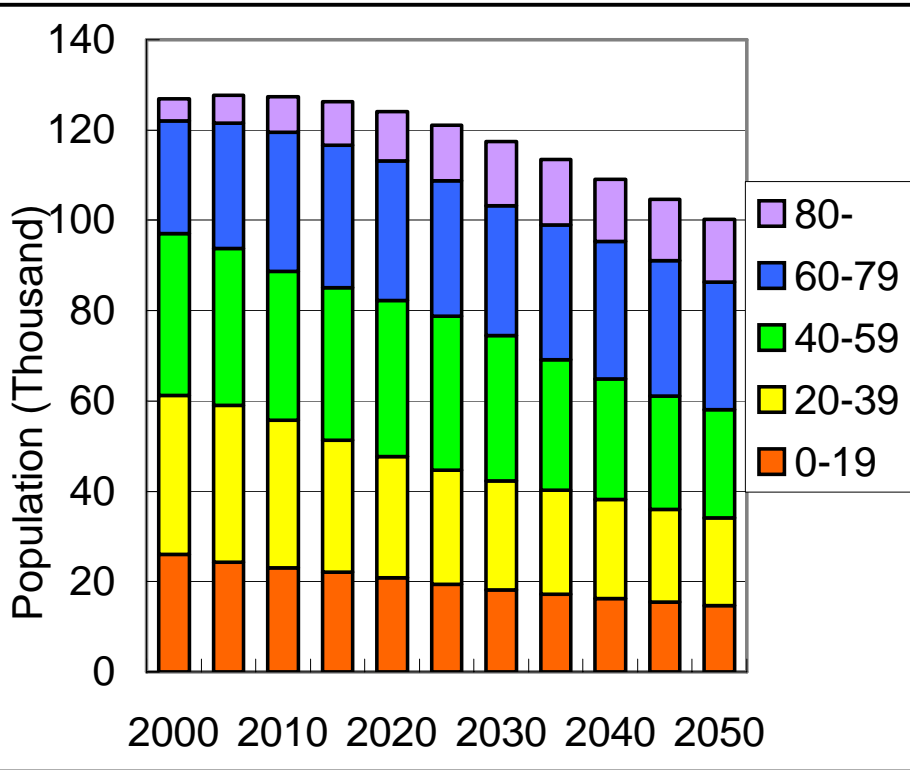
× Headship rate(Family, Age, Sex, Year)}

3. Logic of PHM

< Flow of PHM >

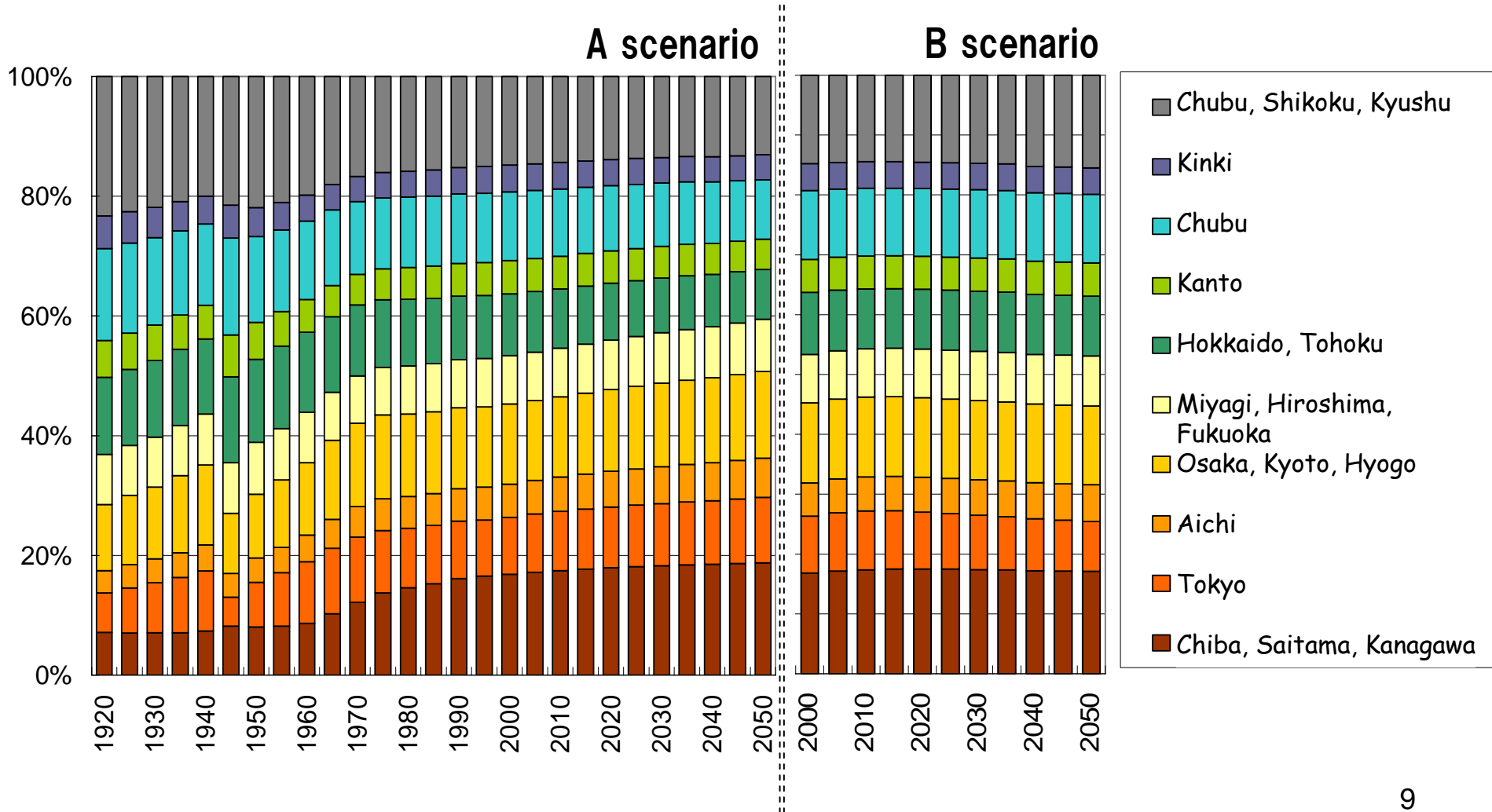


4. Output of PHM

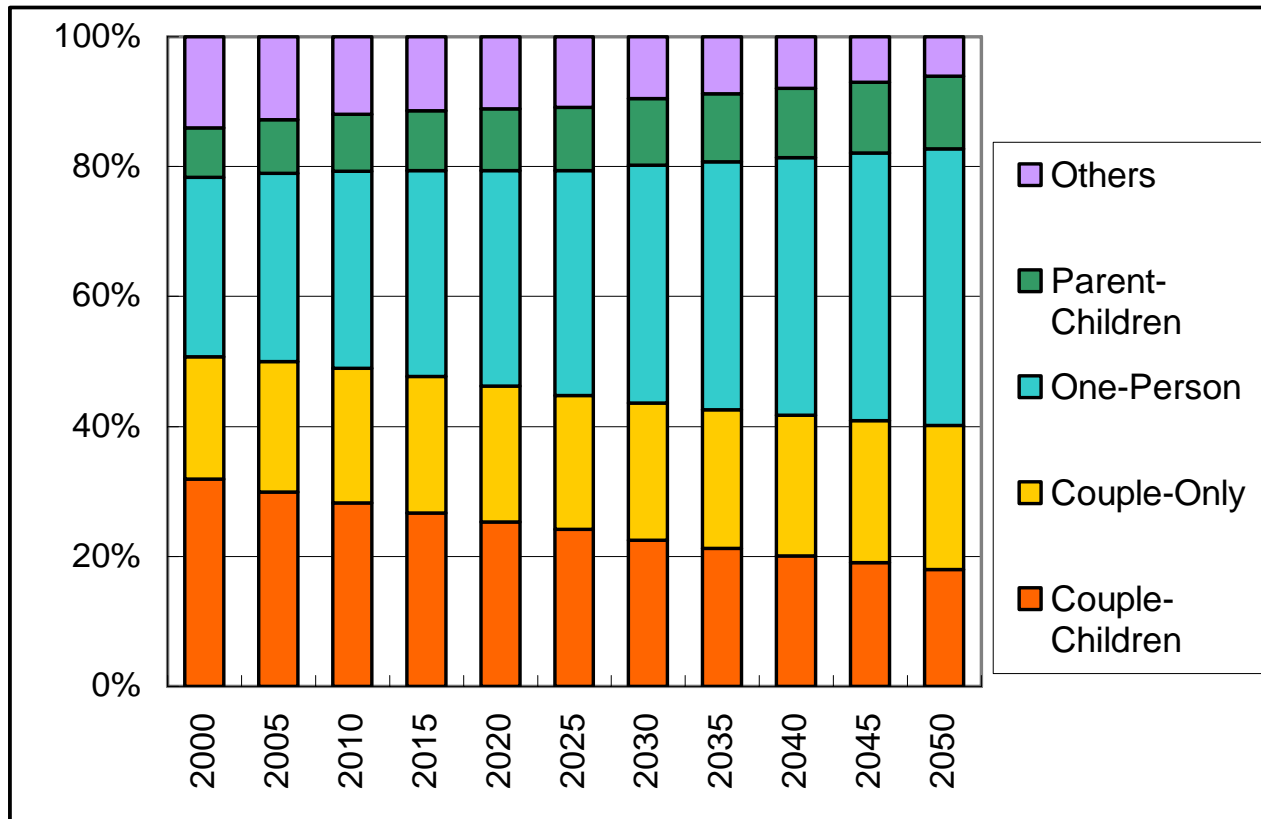


Japan's future population

4. Output of PHM



4. Output of PHM



Japan's future number of household