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Methodology and Findings of the
Household Projections for Japan

by

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FOREWORD

The household projections for Japan was first conducted in 1966 by our institute. The present projection is the second and new estimates on the basis of the 1965 and 1970 census data.

The contents of the projection are enlarged to the three types of estimates; they are

- (1) households by number of household members
- (2) households by sex-age household heads
- (3) households by prefectures

These estimates correspond to the increasing demand for household projections of this kind.

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1. Types of household projections

Projections of the number of households have recently been prepared by a good number of countries with growing importance and demands for this estimate, because the household or family is the primary unit for discussing the various problems regarding housing, public works, consumer goods especially durables, social welfare, regional development planning, etc.

In regard to the types of household compositions, they must be divided into the two basically different groups, that is, ordinary household and quasi-household. The number of households in Japan was 27,757 thousands according to the one percent sample tabulation at the 1970 national census. Among them the ordinary household accounted for 26,748 thousands and took the majority, while the quasi-household occupied only 1,010 thousands. It can be said, therefore, that the former one is of much importance in the household projection.

Concerning the methods for the ordinary household projections, three different aspects of household compositions can be taken up as factors or indicators for calculation. They are as follows:

(a) Households by number of household members, that is, one-person, two-person, three-person households and so on. Each of these households should be extended into the future with some interactions.

(b) Households by sex-age-marital status groups of household heads. The household projections of this kind (= the headship rate method) can be calculated on the basis of future population estimates by sex-age-marital status groups.

(c) Households derived from the average number of persons per ordinary household. This projection is also required to use the future population estimates because the number of households are obtained dividing the population by the assumed average number of persons per household. This will be useful for the projections by sub-national areas.

As for the quasi-household projection, a simple future course which goes down to a smaller number of households can be assumed, because the members in a quasi-household may be expected to shift the one-person ordinary household with improvement of housing conditions and advancement of ideas on dwelling status.

In either case, the household projections can be significant provided that reasonably accurate and persistent data on population and households may be available. In Japan, most of these

materials are obtainable mainly from the census data and the vital statistics.

2. Main procedures for the projections

(1) Ordinary households by number of household members

According to the census data at every five years between 1950 and 1970, the number of households of which household members are four and less are remarkably increasing and that of five persons show a moderate growth. On the contrary, the six-person households indicate a decrease since 1960 and the seven-person households since 1955. Those of eight and more are sharply decreasing since the earlier time.

In order to extend these past trends into the future, it may be useful to take an idea on some interactions among the households into considerations. For instance, if the number of one-person households increases, it will be followed by an increase of the number of two-person households with some time lag. Generally speaking, the n -person households can proceed to the $(n+1)$ -person households with marriage or increase of a child. Accordingly, the same statements are true for the cases of two-person to three-person households, three-person to four-person households, and so on.

In this connection, it can be said that the level of the

increasing rate in the $(n+1)$ -person households would become lower to some extent than that of the n -person households because there are a certain number of unmarried or no child households. After reaching a certain level of family size, in most cases, four or five household members, it would turn to a smaller size toward the one-person household with the children's independence. The future course of the number of households having five and less persons can be assumed on the basis of such a frame of reference.

On the contrary, as stated above, it is observed that the households having six and more persons have already been decreasing and the more persons it has, the earlier its beginning of decrease is. Accordingly, the future course of such households can be made on the assumption that the past tendency in the number of the n -person households would be followed by the $(n-1)$ -person households. For instance, in order to assume a decreasing rate of the six-person households in the future, the observed trend in the seven-person households should be considered.

For assuming future course and level in each of the households by number of household members, the index numbers can be used taking the 1950 census household numbers as a unity. There are several mathematical equations useful for calculations of the future index numbers on the basis of the above-mentioned scheme.

Among them logistic curve are especially applicable for many cases because the course of growth drawn by this curve, beginning at zero, rises to a theoretical maximum level, and vice versa.

For actual calculation of this curve, it is required to provide the data at three points of equal time intervals. Moreover, this curve can not be applied in case that the growth rate is higher in the latter half of the two successive periods than in the former half. In this case, the future index number at the point next to the latest time should be assumed beforehand to make this curve applicable.

(2) Ordinary households by sex-age-marital status groups
of household heads

The basic steps required for this projection are (a) to obtain the future population estimates by sex and age, (b) to divide them into marital status (single, married, widowed and divorced), and (c) to assume the specific headship rates to the corresponding categories of the population.

Among these steps, the future population estimates by sex and five-year age groups for Japan have already been calculated by the Institute of Population Problems, Ministry of Health and Welfare. As for marital status, proportions of the married aged 20-24 and 25-29 are most important since they have much differ-

ences from country to country. The proportions of these age groups in Japan are recently ascending, according to the census data, but they are still considerably low as compared with those of the Western countries. These proportions in Japan, therefore, are assumed furthermore to go up into the future.

In order to assume the future level of headship rates, their regional differences by sub-national areas should be referred. From this point of view, it can be said that in most of the categories by sex-age-marital status groups at a certain year, the headship rates are on the highest levels in urban areas, especially in "Densely Inhabited Districts" which substantially imply a group of built-up areas. Accordingly, the highest rates in each of the categories can be set up as a target on the national level in the future. These assumed headship rates multiplied by the above-mentioned population estimates by sex-age-marital status groups can make the estimated number of ordinary households by sex-age-marital status groups of household heads.

For actual use, the number of households by sex and five-year age groups can be obtained by summing up the number of households by marital status in each of the age groups.

(3) Ordinary households by sub-national areas

Assumptions of future average persons per ordinary household in each of sub-national areas are the basic step for this projection. Census data on the 47 prefectures in Japan indicate that the average persons are decreasing between 1950 and 1970 in every prefectures and as for regional differences they are lower in urbanized areas than in rural areas. In this respect, Tokyo is the lowest (3.15 persons for 1970) and Osaka is the second lowest (3.40 persons), while the national average is 3.69 persons.

Therefore, the future average persons per ordinary household in each prefecture should be assumed by adopting a declining tendency toward lower level. For actual calculations, in case of prefectures where show higher average persons in 1970 than that of the national average, its future levels are assumed to decrease toward the national average persons for 1970.

For instance, if the average persons in 1970 for a certain prefecture is most near to the national average for 1964, it would reach the national level in six years, at 1976. After that, the average persons of the prefecture would still go down to the lowest level of Tokyo. It may be said that it takes seven years for the prefecture to get the level of Tokyo because the national average in 1970 is most near to the level of Tokyo

for 1963.

These assumed average persons per ordinary household in each of the 47 prefectures can be applied for the above-mentioned future population estimates by prefectures. In this calculation, however, the population estimates should be decreased by about 5 percent as it includes quasi-household members. Thus modified, the population estimates by prefectures divided by the assumed average persons per ordinary household make the future estimates for the ordinary households.

(4) Future estimates for quasi-households

According to the 1970 census data on quasi-households by number of household members, one-person quasi-households occupy 70 percent of the total number of quasi-households. Moreover, annual changes show that only one-person quasi-households are increasing, while all of two-person and more households are decreasing.

As stated above, even in case of the one-person quasi-households, they are expected to shift to the one-person ordinary households in the future, with improvement of housing conditions and advancement of ideas on dwelling status. Accordingly, future course of the number of quasi-households is set up with a simple way assuming that the national total may decrease by one half during the period of 1970-1985.

3. Some findings of the estimates

The national totals of ordinary households obtained from each of the above-mentioned three kinds of methods are different to each other. Among them, the estimate derived from the households by number of household members gives a high variant and the households by sex and age groups a low variant. Therefore, a medium total is given as an average of these two estimates and the household compositions already calculated should be modified according to the medium national total.

As shown in Table 1, the three estimates for 1985 including the quasi-households are 37,884, 38,891 and 39,898 in thousands. Table 1 also indicates that the increase of households is very rapid as compared with that of total population. The index numbers of households for 1985 taking the 1970 household as a unity are 137-144 while that of population is 116.

It results in a decrease of average persons per household. The corresponding averages are 3.19, 3.11 and 3.03 persons for 1985. In this respect, the 1970 census returns have already showed that the number of households increased for all of the 47 prefectures between 1965 and 1970 while the population in 20 prefectures decreased.

In any case, it can be said that the averages for 1985 are much the same as the existing levels in the Western countries.

It implies that future household size in Japan may be expected to reach the same small family size as that of the Western countries provided that segregation and independence of young people from their home would widely prevail both in urban and in rural areas.

These tendencies are confirmed again by the fact, as indicated by Fig. 1, that the increase of the two-person households among the ordinary households by number of household members show the highest index number of 209 (1970=100) and the one-person and three-person households the second and third highest of 198 and 174.

In spite of that, another important fact is that the households by sex and age groups of household heads will show the aging of household heads in the near future. For instance, the number of household heads aged 70 and over at 1970 may be just doubled in 15 years, while the national total would increase by 40 percent during the same period. This implies that the nuclearization of Japanese families in the near future would be accelerated not only by the independence of young people but also by the rapid increase of the aged household heads.

Table 1. Household estimates for Japan, 1970-1985

	Census	E s t i m a t e s		
	1970	1975	1980	1985
Number of total households				
low variant	27,757	31,299	34,769	37,884
medium variant	27,757	32,027	35,831	38,891
high variant	27,757	32,754	36,893	39,898
Index number of households (1970=100)				
low variant	100	113	125	137
medium variant	100	115	129	140
high variant	100	118	133	144
Average persons per household				
low variant	3.72	3.51	3.34	3.19
medium variant	3.72	3.43	3.24	3.11
high variant	3.72	3.36	3.14	3.03
Index number of total population (1970=100)				
medium variant	100	106	112	116

Fig. Annual changes in the index number of ordinary households by number of household members, 1970-1985



