Long-term Forecast for Housing Demand —
The Decline in Households Points to
Lower Housing Demand

By Kazumasa Takeuchi
Financial Research Group

1. Housing Construction Underpins the Economy

Housing starts reached 1.21 million units in 1999, stopping the downtrend since 1996. Moreover, condominium sales in the Tokyo area posted a record in 2000.

In particular, the large expansion in demand for owned homes and built-for-sale housing is attributed to targeted policies such as loan interest rate cuts and expanded loan brackets of the Housing Loan Corporation, and tax breaks on housing loans.[1]

This recovery in housing construction has helped support the weak economy since 1997, and is expected to drive the economic recovery in the future.

However, the predicted decline in population raises concerns about the sustainability of the recent expansion in housing demand.

Furthermore, the present demand expansion for owned homes may be attributable to a demand rush caused by the expiration of the tax break on housing loans and expectations of higher interest rates in the future. The decrease in housing demand in 1998, for example, is attributed to a pullback following the demand rush of early 1997 prior to the consumption tax hike.[2] If so, we can expect to return to a housing slump once the temporary demand plays out.

In this paper, we examine long-term rather than short-term trends in housing demand, and predict housing demand based on long-term changes in the number and structure of households. Specifically, we (1) predict new housing demand based on the number of households and replacement demand, (2) predict housing demand by ownership and size of dwelling, and (3) estimate spending on housing construction based on the above predictions.

Figure 1 Housing Starts

(1,000 dwellings)
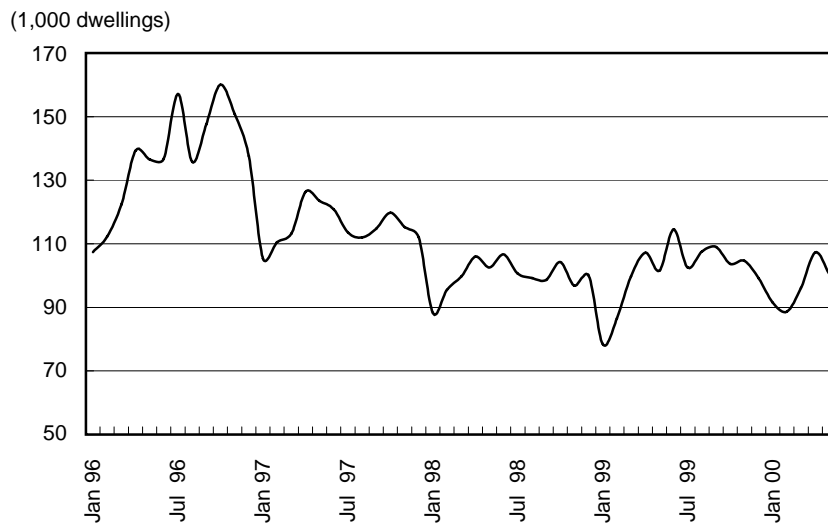
Source: Compiled from *Construction Statistics Monthly*.

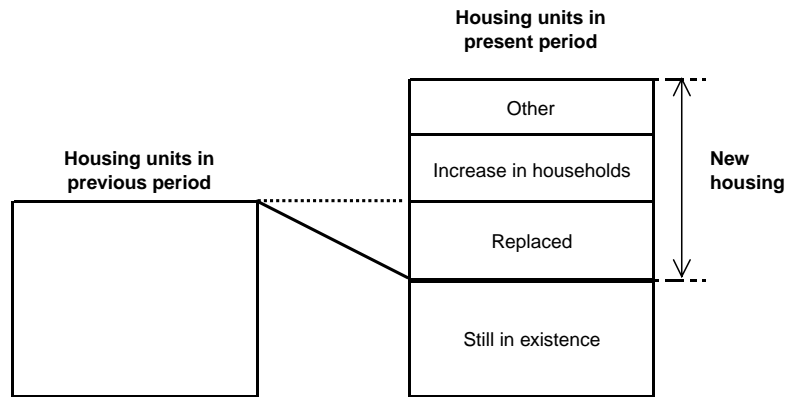## 2. Long-term Prediction for New Housing Demand

(1) Estimation Approach

In general, the total new housing construction for a given period is estimated by adding the increase in households, number of replacement dwellings, and other factors (including increase in vacant houses, etc.) from the previous period.

Our estimation method categorizes the historical data into the above three factors. However, since our focus is on the demand side, we omit the so-called "other factors," which are supply-side factors that cause the gap between supply and demand.

In line with the *Housing and Land Survey of Japan*, we made estimates for five-year periods up to 2038.

Figure 2 Approach to Estimating Housing Demand

Housing units in present period

| Other |
| Increase in households |
| Replaced |
| Still in existence |

New housing

Housing units in previous period

Note: "Other factors" are excluded from the estimations that follow.

(2) Prediction for Number of Households

Based on the median population and household projection by the National Institute of Population and Social Security Research, we made a long-term forecast for the number of ordinary households (Figure 3).

While the population is predicted to start declining in 2008, the number of households will continue increasing until 2014 due in part to an increase in single-person households. After peaking in 2014 at 48 million, the number of households will decline to 43 million in 2040, roughly equivalent to where it was in 1995.

Figure 3 Prediction for Number of Households

(Million households)   (Million households)

Legend: □ No. of households (left)   □ Increase in households (right)
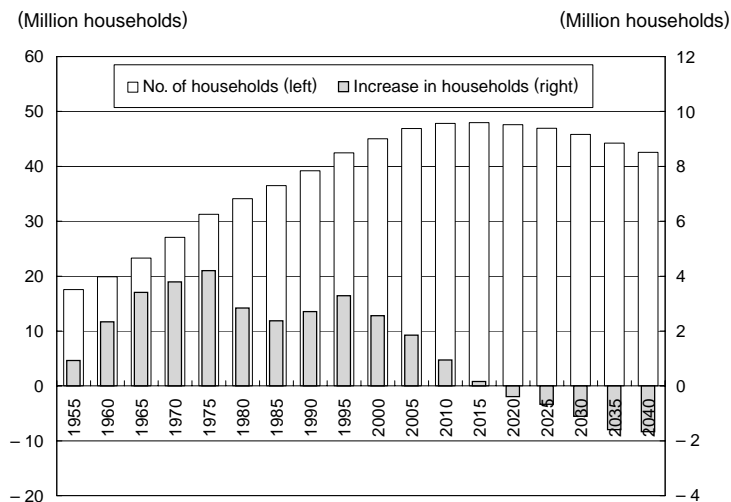
Note: Change in number of households is for each five-year period.
Source: Estimated by NLI Research Institute, based on data from the National Institute of
Population and Social Security Research.

(3) Prediction for Replacement Housing

We assumed that the number of replacement dwellings is equivalent to the number of housing units that are torn down, and obtained the past number of replacement units by subtracting the number of dwellings still in existence from the initial number of units constructed.

For the prediction, we performed a separate regression analysis of trends in the cross section data for extant wood-frame and non-wood frame dwellings, and then estimated the future replacement demand.[3]

According to our estimates, the average number of replacement dwellings increases from 720,000 units per year for the previous past five-year period (1993-98) to 880,000 per year by 2038.

In particular, over 900,000 units are replaced annually during the 2008-23 period to replace large quantities of wood-frame housing built since the late 1960s.

(4) Other Factors Affecting Housing Starts

The "other factors" refer to the portion of housing starts not explained by the increase in households and replacement housing, and consist mainly of unoccupied housing and reduction of dwellings in structures not intended for residential use. The largest factor is the increase in housing unoccupied by households, including vacant housing and construction in progress.

Housing starts attributable to these other factors amounted to 590,000 in the 1993-98 period. During the same period, unoccupied housing increased by 1.22 million units.

In fact, unoccupied housing has risen consistently in the past, and has significantly affected housing starts. Meanwhile, the ratio of total dwellings to households has already reached 1.14, meaning that the housing shortage is being alleviated at least in quantitative terms. Furthermore, unoccupied housing increased 24% in the 1993-98 period from the previous five-year period, or the equivalent of 40% of the increase in households for the same period.

As explained earlier, since our objective in this paper is to predict the long-term demand for housing, we do not estimate these other factors on the supply side. However, circumstances seem to indicate that for the time being, these other factors will account for approximately 100,000 housing starts per year.

(5) Prediction for New Housing Construction

By adding together the increase in households and replacement housing, we find that new housing demand during the 1998-2003 period is 1.34 million units per year, or 110,000 units off the pace of the previous five-year period. However, the pace is almost identical if we exclude other factors in the 1993-98 period (resulting in 1.336 million units per year); and if vacant housing is taken into account, total housing starts are likely to be higher.

From 2003, new housing demand will decrease due to a decline in households, slipping below one million starts per year in 2013-18, and down to approximately 440,000 per year by 2033-38.

Figure 4 Predicted Average Annual Demand for New Housing
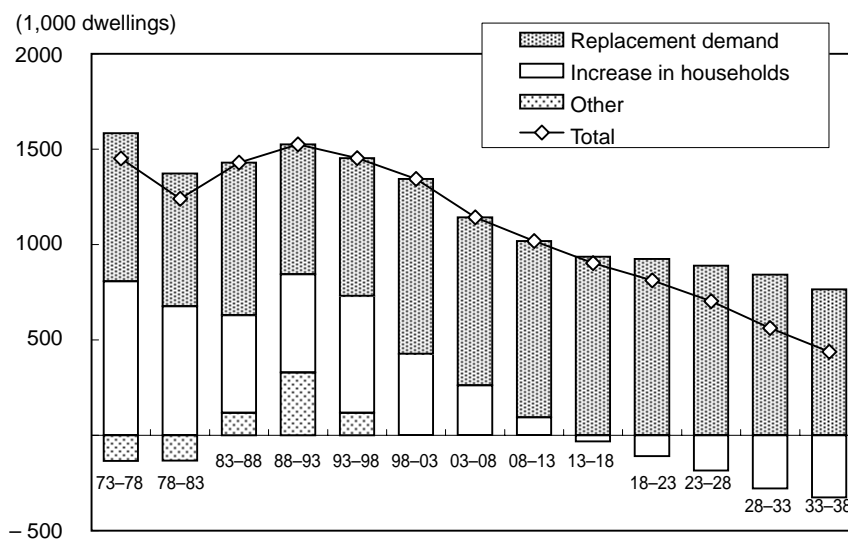
Note: Values from 1998-03 period forward are predictions.

Figure 5 Predicted New Housing Demand by Factor

| Construction period	Housing starts by factor (1,000 units)				Annualized, by factor (1,000 units)			
	Total	Change in house-holds	Replace-ment	Other factors	Total	Change in house-holds	Replace-ment	Other factors
1993-1998	7,269	3,058	3,621	590	1,454	612	724	118
1998-2003	6,719	2,132	4,588		1,344	426	918	
2003-2008	5,717	1,305	4,412		1,143	261	882	
2008-2013	5,090	473	4,617		1,018	95	923	
2013-2018	4,516	-169	4,684		903	-34	937	
2018-2023	4,061	-557	4,619		812	-111	924	
2023-2028	3,513	-935	4,448		703	-187	890	
2028-2033	2,812	-1,400	4,211		562	-280	842	
2033-2038	2,187	-1,640	3,827		437	-328	765	

Note: Values from 1998-03 period forward are predictions.

3. Estimation of Owned and Rented Housing Demand

(1) Trends in Owned and Rented Housing Demand

Since the late 1980s, the construction of rental housing (rented and employer-issued housing) has declined, while that of owned housing (owner-occupied and built-for-sale) has remained firm at 750,000 to 950,000 units per year. As a result, the home ownership ratio of newly constructed housing has risen from a low of 47% in the late 1980s to 64% in 1999.

Figure 6 Housing Starts and the Home Ownership Ratio
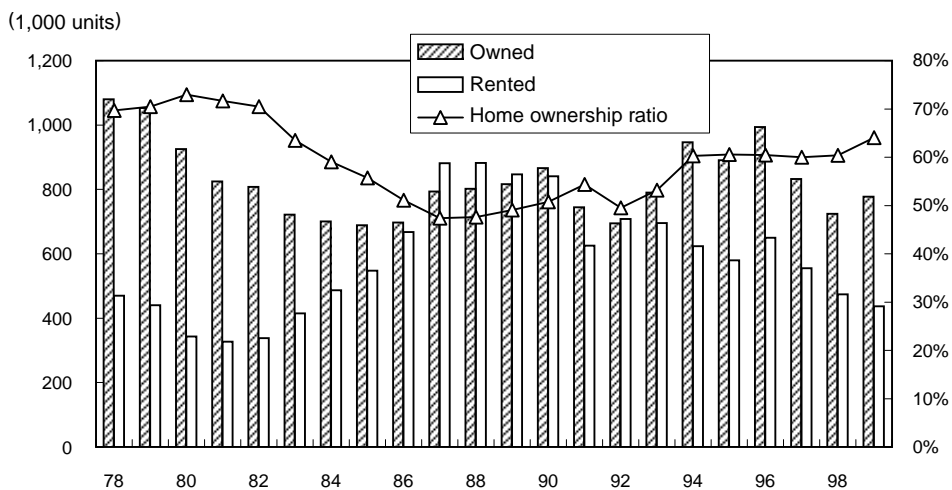
Source: MOC, *Annual Construction Statistics*.

Contrary to appearances, the rising home ownership ratio does not necessarily suggest a shift in preferences from rented housing to owned housing; it can largely be explained by such factors as the changing structure of households.

This is because owned and rented housing are clearly distinguished by dwelling size and are thus not perfect substitutes. For example, since there is an extremely limited supply of large rental housing, families who need more space often decide to quit renting and buy a home instead.

In fact, dwellings with at least $70m^2$ of floor space comprise only 10% of rental housing, and 7% of all housing stock including owned dwellings.

Below the $70m^2$ threshold, the housing stock is almost equally divided in the 50-$69m^2$ category between owned and rented dwellings. However, in terms of new housing starts, owned dwellings comprise only 13% of this size category. Moreover, few households would choose to buy existing dwellings of this size.

Figure 7 Housing Starts of Owned and Rented Dwellings

（Million units）
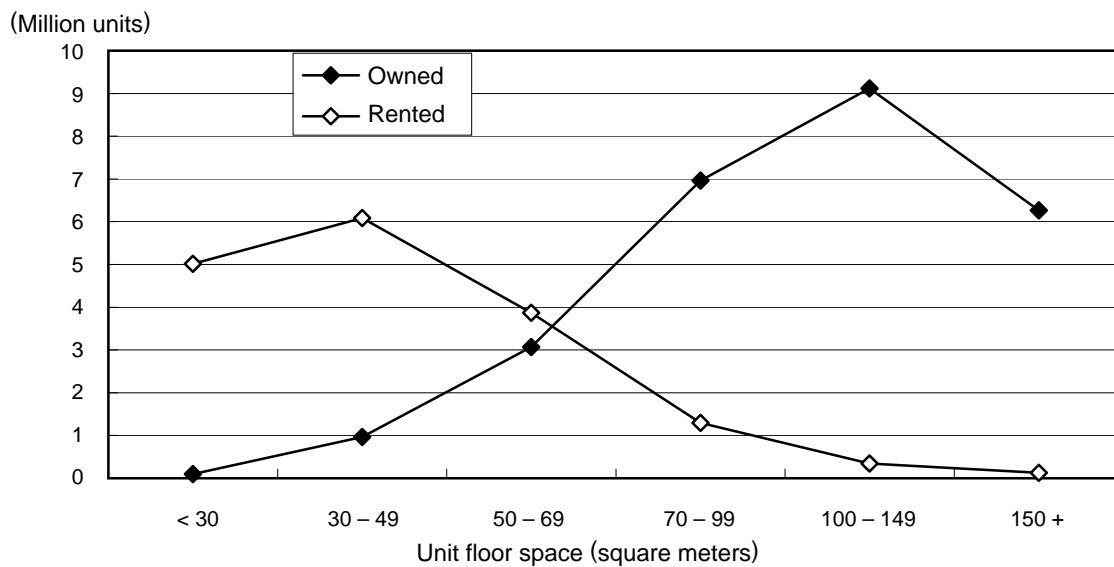
Source: Compiled from *Housing and Land Survey* of Japan (1998).

(2) Prediction for New Housing Demand by Ownership and Dwelling Size

Based on the relationship between dwelling size and home ownership ratio, we can assume that the decision to own or rent is largely determined by the living space requirements of the household. On the other hand, dwelling size is likely to be determined by factors such as household size, household income, and age of householder.

To predict new housing demand for owned and rented housing, we took the following procedure.

First, for housing built since 1991, we obtained the relationship between living space (measured in *jo*, or tatami mats of $1.65m^2$) and home ownership ratio by fitting a logistic curve (logit analysis).[4]

Next, we performed a log regression analysis to obtain the relationship between the mat size of living space and household characteristics (income and age of householder, and size of household).[5]

We then compiled a matrix of the future number of households by household characteristics, and obtained the future demand for housing by living space.[6] We multiplied this with the home ownership ratios for different dwelling sizes (obtained by logit analysis) to obtain the number of owned dwellings as well as the overall home ownership ratio.

According to our estimates, the present home ownership ratio of 60% for newly constructed housing will rise temporarily to 61%, and then return to 60%.[7]

Multiplying the predicted ownership ratios for each year with the annual demand for new dwellings, we find that the annual demand for newly-constructed owned dwellings will decline from 880,000 in the 1993-95 period to 550,000 in 2013-18, and drop further to 260,000 in 2033-38.

By dwelling size, the decline occurs across all size categories, but the rate of decline is lower for mid-sized dwellings in the 30-36 mat range.

Figure 8 Predicted Average Annual Demand for New Housing and Ownership Ratio
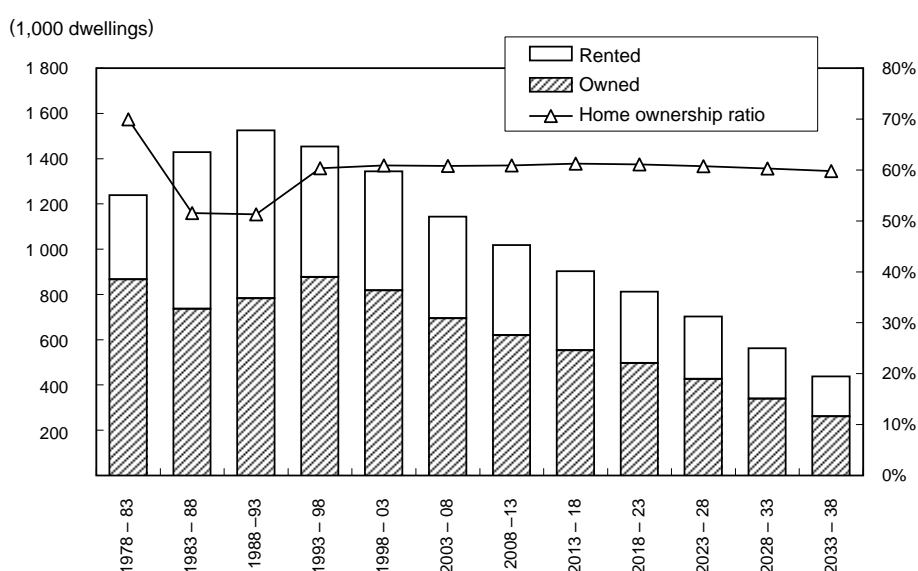
Note: Values for 1998-03 and beyond are predictions.

Figure 9 Predicted Demand for New Owned Dwellings by Dwelling Size

(1,000 dwellings)

Legend:
- 46 mats +
- 36 – 46 mats
- 30 – 36 mats
- 24 – 30 mats
- < 24 mats
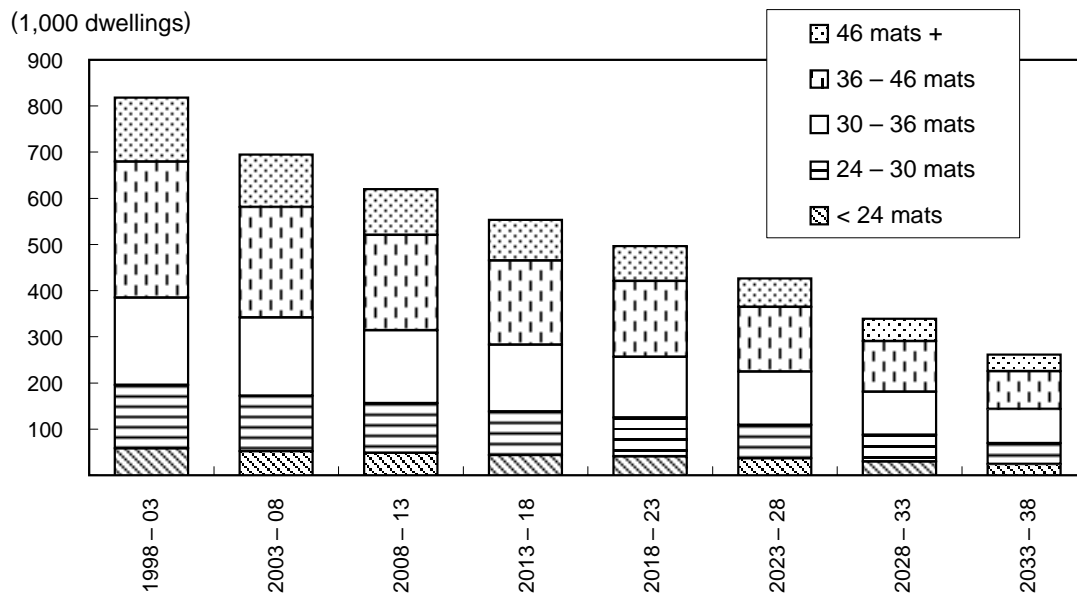
Note: Size categories are for floor space of living area, measured in tatami mats.

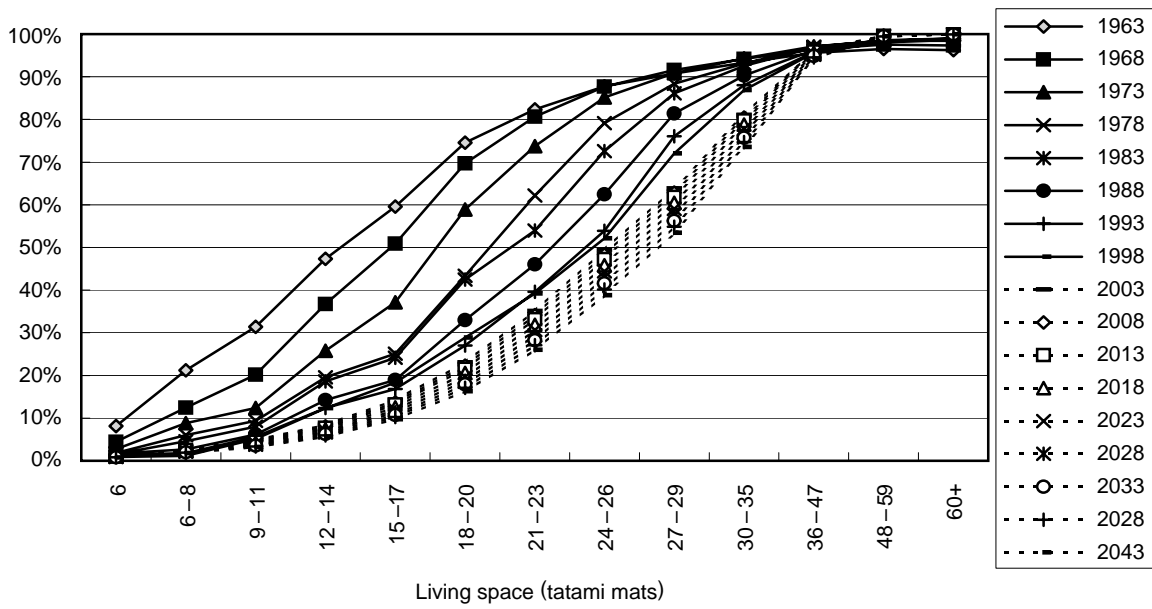## (3) Calculation of Total Dwellings by Ownership

In recent years, the size of rental dwellings has continued to expand consistently, which has affected ownership ratios by size of living area. For example, in the 24-27 mat size category, the ownership ratio had fallen from 79% in 1978 to 52% in 1998. Thus owners and tenants are almost evenly divided.

In addition to the trend toward larger rental dwellings, the supply of large rental dwellings should be enhanced by the new fixed-term leasehold system, which allows landowners to manage residential rental properties more easily.[8]

In estimating the residential stock by ownership, the upward trend in living space for rental housing is explicitly included in the function. Specifically, we performed a logit analysis of home ownership ratios by living space per household, and obtained predictions based on trends in the cross section data.[9]

Based on our calculations, we predict that the total number of owned dwellings will increase from 26.5 million units in 1998 (60% ownership ratio) to 28 million units in 2013 (58% ownership ratio), and subsequently decline to 23 million units in 2038 (53% ownership ratio).

Figure 10 Home Ownership Ratio for All Dwellings by Dwelling Size

◇	1963
■	1968
▲	1973
✕	1978
✳	1983
●	1988
＋	1993
―	1998
·■·	2003
·◇·	2008
·□·	2013
·△·	2018
·✕·	2023
·✳·	2028
·○·	2033
·＋·	2028
·■·	2043

Living space (tatami mats)

Note: Values from 2003 forward are predictions.
Source: Data up to 1998 is compiled from *Housing and Land Survey* of Japan.

Figure 11 Home Ownership Ratio for All Dwellings

(1,000 dwellings)

□ Rented
▨ Owned
—△— Home ownership ratio
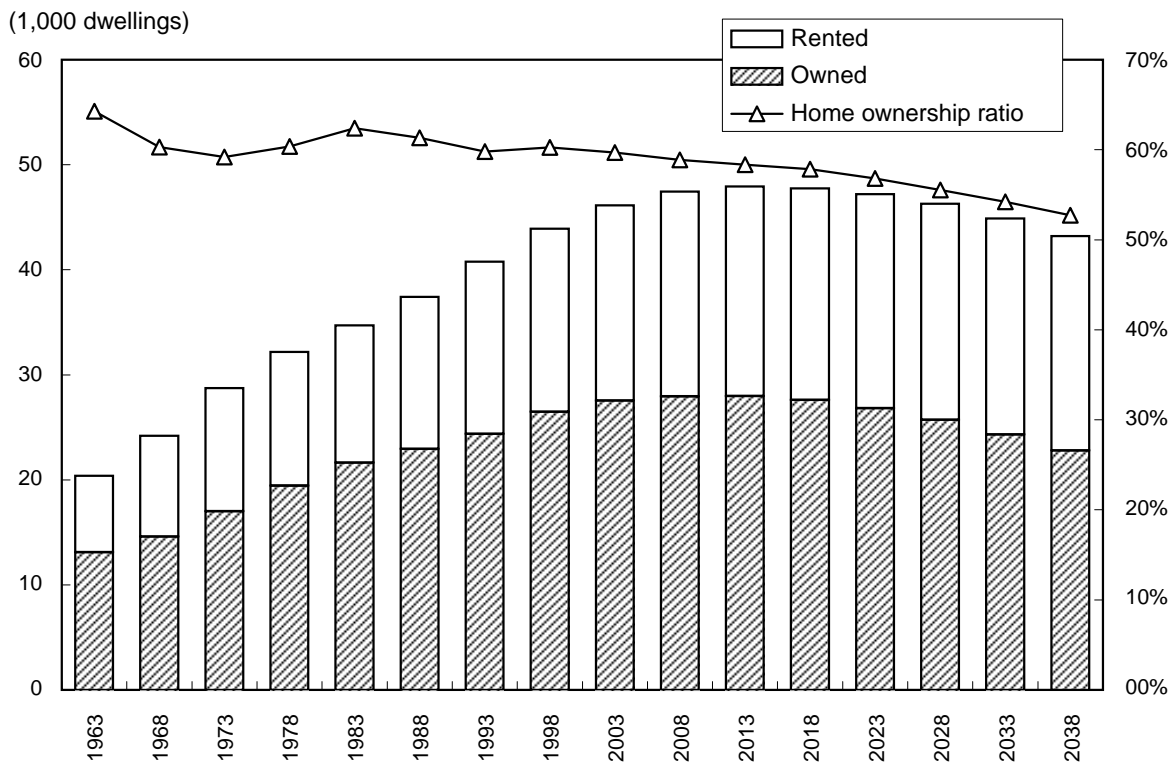
Note: Values from 2003 forward are predictions.

## 4. Effect of the Decline in New Housing Demand, and Future Housing Policy

According to our long-term prediction, annual housing starts will fall below one million units in the 2013-18 period.

Below we assess how the decline below one million housing starts will affect the housing related industry, based on predicted construction costs for residential structures derived from *Annual Construction Statistics*. Construction costs are expressed in 1990 prices.

First, we obtained actual data on planned construction cost per square meter of residential space, and extrapolated the trend into the future. We then multiplied these costs with predicted floor space per dwelling by ownership and dwelling size to obtain future construction spending for owned and rented dwellings.

According to our results, annual construction spending will amount to ¥17 trillion in the 2013-18 period (of which owned dwellings account for ¥13 trillion), and ¥10 trillion in 2033-38 (of which owned dwellings account for ¥7 trillion). By comparison, actual construction spending was ¥23 trillion per year during the 1993-98 period, and ¥19.4 trillion in 1999 (¥20.9 trillion in nominal terms).

However, we must note that these calculations are based on simplified assumptions, and that results can vary considerably depending on changes in unit construction costs and predicted dwelling size.

Figure 12 Prediction for Annual Residential Construction Spending

(¥ billion)
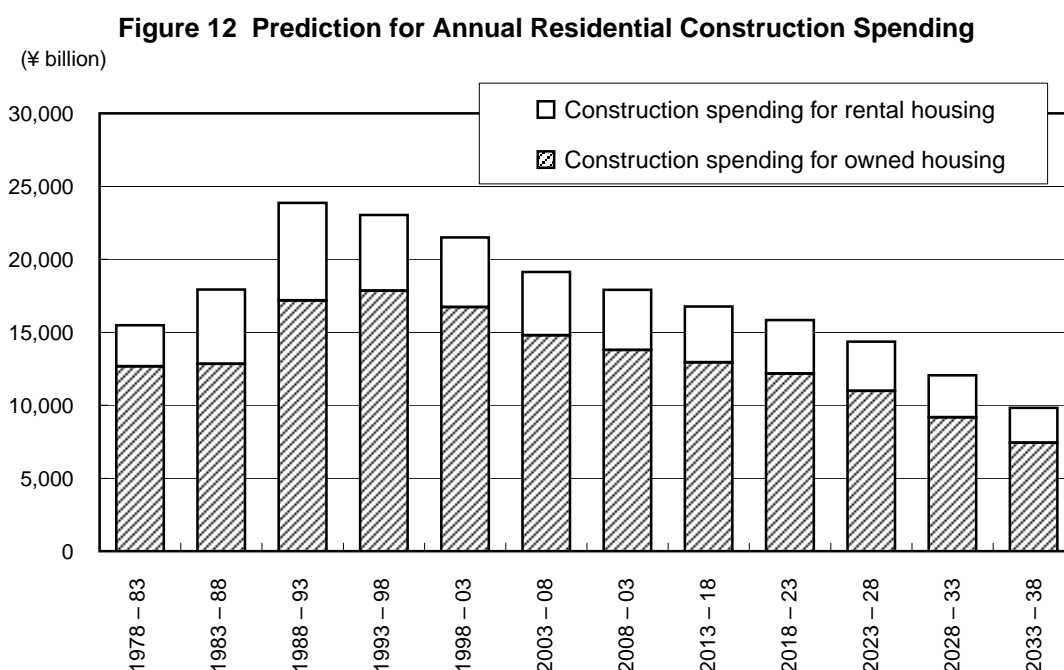
Note: Values for 1998-2003 and beyond are predictions. Construction cost is calculated with 1990 as base year.

Still, in the long term, we can predict with reasonable certainty that residential demand and residential investment will decline due to trends in the number and structure of households.[10] If this is so, then economic policies intended to stimulate home purchases and residential investment will serve only to shift, not expand, the demand for home ownership. Once the policy effect fades, we may see a serious housing slump or perhaps the degradation of local residential environments due to an increase in vacant dwellings.

Thus policies that neglect factors such as changes in the structure of households may cause more harm than good. As the Construction Ministry's Council on Housing and Land has already proposed,[11] we need to abandon policies that emphasize newly constructed owned dwellings, and instead build a market environment that offers diverse housing choices.[12] For example, we should develop the secondary market for existing dwellings, the rental housing market, and the house reform market, as well as a system for renewing existing residential stock including apartment buildings. Considering that diverse life styles cause housing demand to diversify, it is not difficult to make demographic predictions regarding what types of households will increase in the future and by how much. Housing policy should thus consider the effect of demographic trends on housing demand and choices, and adapt dynamically to meet society's needs.

Notes

1. See EPA, *FY 2000 Economic Survey of Japan*, chapter 1, section 1.6.

2. See Iizuka, Nobuo, et al (1999), "The Evaluation of Housing Policy and Future Issues — Are Additional Housing Measures Necessary?" JCER Paper, no. 64.

3. After estimating both the logistic curve and log curve functions, we chose the one with the higher R-squared. For example, the equation for extant wood-frame residential structures built in 1961-70 was estimated as follows.
ln (Ratio of extant dwellings) = 0.27239 − 0.03485 * (Age of structure)
$\quad\quad\quad\quad\quad\quad\quad\quad\quad$ (t=18.76) (t= -53.34)
$\quad\quad$ R-squared = 0.998
However, due to quality improvements, we assume that the half-life of housing constructed in the future is 1.3 times longer than for housing built in the 1970s.

4. The logit equation estimation results are as follows. This is a cross-section analysis of data from the *Housing Demand Survey* (1998).
Constant: -3.587 (t=-53.049)   Tatami mat count: 0.149 (t=59.216)
Likelihood: 6095.95   Chi-square: 7743.2

5. The log regression equation estimation results are as follows.

(Tatami mat count of living space) =   -0.234   +   0.551   * ln (Age of householder)
                                        (t=-4.290)   (t=43.312)

    +   0.461   * ln (Size of household)   +   0.166   * ln (Household income)
        (t=56.203)   (t=25.633)

    (R-squared = 0.452)

6. In the matrices for future household characteristics, we use the Fratar method and target values (estimated elsewhere) for the number of households by age of householder, household size, and household income. We assume that the distribution of household income remains unchanged from the present.

7. Compared to Figure 11, the predicted home ownership ratio in Figure 8 is more stable for two reasons: (1) it is a cross section analysis of 1998 data, and (2) the effect of aging is offset by the decline in household size.

8. For example, while only 10% of rental housing is 70m^2 or larger, in fiscal 1998 20% of rental housing starts were at least 71 m^2 in size.

9. The survey year is included as a variable in the annual change in the home ownership ratio. We include only 20% of the change to avoid unrealistic results caused by the accelerating pace of rental housing since 1988. In this analysis, data in the *Housing and Land Survey* of Japan was converted into binary form (owned or rented). The estimation results for the logit equation are as follows.

    Constant: 0.612 (t=1.216)   Tatami mat count: 0.197 (t=19.124)
    Survey year: -.058 (t=-8.316)
    Likelihood: 599.4   Chi-square: 933.9

10. In predicting replacement housing, we assume the same probability of replacement for existing housing as in the past. However, with respect to condominiums, replacement faces issues such as aging of residents, depreciation of asset value, and legal problems such as separate ownership rights. If the pace of replacement construction slows from the present, new housing construction will fall below our prediction. Moreover, it is clear that the population is declining faster than projected by the National Institute of Population and Social Security Research (in the median projection).

11. See the report of the Ministry of Construction's Council on Housing and Land *(Jutaku Takuchi Shingikai)*, "On Housing and Residential Land Policies to Support Prosperous Living in the 21st Century," June 2000.

12. As explained earlier, for households seeking large dwellings, even the basic decision of whether to own or rent is restricted by the scarcity of large rental housing.