Economic and Environmental Impacts of Housing Stock Policies in a Shrinking Society: Evidence from Japan

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Population decline and climate change mitigation are two major policy challenges facing many developed countries. The building sector accounts for a substantial share of energy-related COâ‚‚ emissions, and reducing the embodied carbon associated with construction materials and supply chains has become increasingly important. In Japan, however, rapid population decline and aging have led to an oversupply of housing stock, and rising housing vacancies have emerged as a serious social issue. According to the Housing and Land Survey conducted by the Statistics Bureau of Japan, the national vacancy rate reached 13.6% in 2018 and is expected to increase further in the coming decades. Under these circumstances, how housing stock should be managed has become an important policy issue. Various policy directions have been discussed, including promoting the long-term use of housing, removing vacant and deteriorated houses, and revitalizing the existing housing market. However, the economic and environmental implications of these housing stock adjustment policies remain insufficiently understood.

The main research question of this study is: how do housing stock adjustment policies affect economic activity and COâ‚‚ emissions in a shrinking society? In particular, this study evaluates how changes in the flow structure of the housing marketâ€”namely new construction, renovation, and demolitionâ€”affect environmental and economic impacts across supply chains.

First, this study examines the relationship between household dynamics and housing market activities using prefecture-level panel data in Japan. Time-series data on prefectural households from 1998 to 2023 published by the Statistics Bureau of Japan are combined with housing statistics from the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), including housing starts, existing housing transactions, and renovation statistics. Regression analyses estimate the effects of household changes on housing market activities. The estimated relationships are combined with household projections from the National Institute of Population and Social Security Research to project housing demand structures (new construction, renovation, demolition) from 2020 to 2045. Future housing stock and vacancy rates are estimated from the difference between housing stock and households.

Based on these projections, three housing stock adjustment policy scenarios are developed: (1) a conventional scrap-and-build structure centered on new construction, (2) a stock-utilization scenario promoting renovation and use of existing housing, and (3) a stock-reduction scenario promoting demolition of vacant housing. Renovation and demolition activities are assumed to change by 10â€“50% relative to the baseline. The resulting demand changes are introduced into the 2015 Japanese inputâ€“output tables to estimate economic ripple effects and COâ‚‚ emissions. COâ‚‚ emissions are calculated using the Embodied Energy and Emission Intensity Data for Japan Using Inputâ€“Output Tables (3EID) based on the 2015 inputâ€“output tables, provided by the National Institute for Environmental Studies.

The novelty of this study lies in integrating econometric estimation of housing demand with inputâ€“output analysis to evaluate the economic and environmental impacts of housing stock policies. By simultaneously considering structural changes in housing markets and inter-industry linkages, this study proposes a new analytical framework for examining housing policy and climate policy in an integrated manner.

The results indicate that population decline may reduce production in the construction sector by approximately JPY 3.2 trillion (about 12%) under the baseline scenario, while the national vacancy rate is projected to reach about 20% by 2045. In the stock-utilization scenario, embodied carbon emissions from housing construction can be reduced by up to 45 million t-COâ‚‚ annually (20%), while the decline in construction-related production is moderated to approximately JPY 2.4 trillion (9%) due to increased renovation demand. In contrast, the demolition-focused scenario can reduce vacancy rates by up to 5 percentage points but increases demolition-related production by approximately JPY 0.6 trillion and may raise construction-related COâ‚‚ emissions by up to 7% due to new construction.

These findings highlight a policy trade-off between environmental and economic outcomes: promoting the use of existing housing stock can significantly reduce embodied carbon emissions, whereas demolition-oriented policies may generate short-term economic activity but risk increasing emissions. Overall, housing policies relying on quantitative expansion of housing stock are unlikely to be sustainable in a shrinking society. Instead, policy should shift from new construction toward better utilization of existing housing stock, combining renovation promotion with targeted demolition of severely deteriorated housing.