

Evaluation of Errors in Official Subnational Population Projections for Japan Compared to Those for English-Speaking Countries and the EU

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Future regional population trends are a major concern for the Japanese, because the national population has declined since its peak in 2008. The National Institute of Population and Social Security Research (IPSS) has developed subnational population projections for Japan that have been widely used. However, these projections have not been fully evaluated. In this paper, we hence assess their accuracy.

For prefectures, the median absolute percent error (MedAPE) increases according to the projection duration. MedAPEs after a 5-year duration, which are approximately 1%, are smaller than those after a 10-year duration, which are approximately 2%. The prefectures with relatively large percent errors, many of which are included by metropolitan region, are those that have experienced significant changes in net migration, although a relationship between percent error and population size cannot be found.

The accuracy for municipalities is worse than that for prefectures. MedAPEs after 5-year and 10-year durations are approximately 1.5% and 3.5% respectively for municipalities, which are 0.5 percentage points and 1.5 percentage points higher than those for prefectures, respectively. Municipalities with small populations tend to have larger percent errors than those with large populations. MedAPE after a 10-year duration is 4.0% for municipalities with populations less than 10,000 and 2.7% for those with populations greater than 100,000.

For prefectural and municipal projections by age, accuracy for the youngest age group (0-4 years), young adult group (20-39 years), and oldest age group (80 years and above) is lower, on average, reflecting fluctuations in births and migration, migration, and deaths within those ages, respectively.

In addition, we compare the accuracy of the IPSS subnational population projections against the accuracies of subnational population projections conducted by government agencies in English-speaking countries, including Australia, New Zealand, the UK, the US, and the EU. According to several measurements, such as root mean square error (RMSE), mean absolute percent error (MAPE), 90th percentile of absolute percent error, and percentage of area units with absolute percent error, the accuracy of IPSS subnational population projections is rather low compared to the accuracy of projections by other countries' officials. This result seems to be related-not to the IPSS's projection model, which is a cohort component method with net migration rates that is less sophisticated than multiregional projection models developed by other officials, but to the relative stability of population changes in Japan caused by population aging and a lower influx of international migrants.