Appendix 6 Details of seasonal adjustment with X-12-ARIMA

The specification file (at the time of 2020-base revision (Note 1)), set in X-12-ARIMA for calculating the seasonally adjusted indices of the 2020-base CPI, is shown below.

Specification file

series{start=2010. 01	Start of data: January 2010
span=(2010.1,2020.12)	Period of data: January 2010 to December 2020 (Note 1)
period=12	Type of data: Monthly data
}	
transform{function=log}	Log transformation of data
regression{variables=(LS2014.4)}	Prior adjustment of outliers (Note 2)
x11{	(X-11 part)
sigmalim=(2 3)	Singular term management limit: 2σ to 3σ
seasonalma=X11default	X-11 default used for moving average
appendfcst=yes	Output of prediction period of Reg-ARIMA model
save=(d10 d11)}	Storage of seasonal and seasonally adjusted indices in the file
arima{ model=(p d q)(P D Q)}	ARIMA model setting (Note 2)
estimate{ }	Default estimation of Reg-ARIMA model

(Note 1)The seasonally adjusted indices are revised every year when the December result for Japan is compiled. For example, when the December 2021 result for Japan is compiled, the seasonal indices from January 2010 to December 2021 will be calculated with "span = (2010.1, 2021.12)", as well as the estimated seasonal indices from January to December 2022. Based on the seasonal indices calculated here, the seasonally adjusted indices from January 2010 to December 2021 will be recalculated. The seasonally adjusted indices from January to November 2022 (to preliminary figure in December for the Ku-area of Tokyo) given by the estimated seasonal indices calculated here are the first published figures.

(Note 2)For the ARIMA model, the model with minimum AIC (Akaike Information Criterion) is selected among the combinations of the difference order and seasonal difference order are fixed at 1, and other orders are within the range of 2 or less, after confirming the statistical significance of each order. Outliers that are considered most appropriate for each series are selected after verifying the statistical significance of the impact of changes in the index level due to the revision of the consumption tax rate and the effects such as linking both old and new base indices, each having different weights in January in the base year. The Reg-ARIMA model to be applied is reviewed by adding the latest data when the seasonally adjusted indices are revised every year. A list of Reg-ARIMA models is to be published on the website and in the Annual Report on the CPI.