

Seasonal Adjustment for Currency in Circulation Data

February 7, 2024

Bank of Japan

Currency Issue Department

The Bank of Japan has revised the seasonally adjusted data for the average amounts outstanding of banknotes in circulation and those for the amounts outstanding at end of period, both of which are released as part of the Currency in Circulation data.

This revision is conducted regularly every year when the final figures for the previous calendar year become available.

Details of the seasonal adjustment method are shown below:

1. The U.S. Census Bureau's X-12-ARIMA (version 0.3) is used.
2. All seasonally adjusted data from 1968 onward are calculated using a logarithmic transformation with a multiplicative model. The critical values for *additive outliers* and *temporary changes* follow the default settings in X-12-ARIMA (version 0.3). Data from January 1968 to December 2023 (56 years) are used for seasonal adjustment. Thereafter, seasonally adjusted figures are calculated by applying the predicted seasonal factors. Seasonally adjusted data before 1968 are not revised.
3. For the trading-day adjustment, user-defined, day-of-the-week variables are used.

Models Used for Seasonal Adjustment

Indicator	ARIMA model	Level shift and ramp	Trading-day adjustment	Length of the data series
Banknotes in circulation (average amounts outstanding)	(010)(011)	February 1989 From February to April 2002 From February to April 2005	None	From January 1968 to December 2023
Banknotes in circulation (amounts outstanding at end of period)	(112)(010)	March 2002 March 2005	Yes	From January 1968 to December 2023

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