

Improving Seasonal Adjustment by Accounting for Sample Error Correlation Using State Space Models

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Abstract

When producing time series, national statistical organisations seek to derive seasonally adjusted series in which measurement errors have been minimised and systematic and calendar related effects are removed. Time series derived from survey data contain a sample error component, and for rotating panels such errors are correlated over time. Current seasonal adjustment processes do not account for this, leaving sample error spread across the trend, seasonal and irregular components of the time series. This paper proposes an improvement: to model sample error as a component of a structural time series model, and remove modelled estimates of the sample error component before applying existing seasonal adjustment processes. Additionally, by using prior-corrected data in these models, we ensure sample error estimates are not confounded with known outliers and non-sample error (e.g. systematic effects from collection instruments). This results in improved seasonally adjusted and trend estimates which better reflect underlying movements and real world phenomena. We demonstrate the potential of this approach using the example of state and territory level employment and unemployment series, showing results for a large state (Victoria) and a small state (Australian Capital Territory).