Comparing Model-Based and Empirical Approach to Seasonal Adjustment of Croatian Time Series

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There has been a long dispute whether model-based approach to seasonal adjustment is better than empirical approach, both from theoretical and empirical point of view. Though theoretical advantages seemed to be obvious, applications to economic time series in practice showed that the empirical advantage was not so clear. This was particularly due to the fact that model-based approach was not capable to cope with special features of monthly and quarterly time series, such as holidays (particularly moving holidays), trading days effect, outliers and missing data. Among empirical models X-11 from Census Bureau family dominated and has been steadily improved throughout the time. Development of TRAMO/SEATS model was a turning point for the application of model-based methods in official statistics.

We have analyzed 470 Croatian economic time series both with model-based approach (TRAMO/SEATS) and ad-hoc methods (X-12-ARIMA as the newest product from Census Bureau). There were substantial differences in detecting seasonality, recognizing difficult time series, testing significance of trading days effect and Easter effect, among others. Using X-12-ARIMA there were 58 series found to have significant Easter effect compared to 14 using TRAMO/SEATS. Applying X-12-ARIMA there were 157 series with significant seasonality and 310 series using TRAMO/SEATS.

X-12-ARIMA declared 364 series to be difficult but TRAMO/SEATS found only 217. It is to be mentioned here that such a huge number of difficult time series is due to war in Croatia and transition in economy from socialist to market oriented one. So we can conclude that TRAMO/SEATS is better modeling difficult time series. The same reason is for big number of outliers, but there was no significant difference in number of outliers found between two approaches.

On theoretical grounds TRAMO/SEATS is superior since it has been based on statistical mathematics, and X-12-ARIMA is in its core part a set of ad-hoc procedures, mostly empirically based. With the implementation of RegARIMA procedures it has been much improved, particularly in preadjustment phase. The lack of confidence intervals is a serious setback for ad-hoc procedures, so the comparison is confined to point estimates.

Testing for empirical criteria there was not so obvious advantage of TRAMO/SEATS, much smaller than theory suggested. Idempotency criterion is better fulfilled with TRAMO/SEATS, but ortogonality criterion couldn't distinguish between two methods.

Analyzing stability of the outcome, we have found that TRAMO/SEATS produces bigger variability of seasonal figure, which proved to be an advantage when testing idempotency criterion. Analyzing trend-component the conclusion is similar, but the measures of instability have smaller values due to greater smoothness of trend-component.

When coming to aggregation problem, we concluded that indirect method is more appropriate to Croatian economic time series due to their stochastic properties, and also TRAMO/SEATS proved to be better both in direct or indirect seasonal adjustment.

Overall conclusion, after testing so many series is that TRAMO/SEATS methods is better suited for seasonal adjustment of Croatian time series, both theoretically and empirically, despite the fact that some empirical tests didn't show great advantage of model-based approach. It should be emphasized that Croatian economic series are generally more erratic than those from western world, due to reasons mentioned before.

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RESUME

La méthode statistiques la plus utilisée pour désaisonnalisation est sans aucun doute celle mise en œuvre dans la famille X-11, particulièrement X-11-ARMMI/88 et, récent, X-12-ARMMI.

Nous avons comparé les méthodes empiriques (famille X-11) et les méthodes que sont basée sur la theorie statistique (TRAMO/SEATS). L'analyse est été exécuté dans les 470 séries temporelles économiques Croates.

Après l'analyse nous avons tiré des conséquences que la méthode TRAMO/SEATS soit supérieur théorétique. Le différence est plus petit empiriques. Nous pouvons recommander la méthode TRAMO/SEATS pour la désaisonnalisation dans le statistique officielle.