SAPW 2024 Agenda

Wednesday, September 11, 2024

Welcome

Jim Livsey, U. S. Census Bureau

Session 1 – Software for Seasonal Adjustment

Chair: Dario Buono, European Commission, EUROSTAT

Enhanced Features for Production of Seasonally Adjusted Data Using JDemetra+ 3.x
Anna Smyk, INSEE

A Python-based Platform for Seasonal Adjustment of Economic Time Series
Lijing Sun, U. S. Census Bureau

RegComponent Modeling in the SeasCen Software Platform
William R. Bell, U. S. Census Bureau

X-13-SAM and PyGenhol: Updates to X-13ARIMA-SEATS Helper Programs
Demetra Lytras, U. S. Census Bureau

Concurrent Session 2a

Novel applications of modeling and forecasting

Chair: Becca Weaver, U. S. Census Bureau

A Seasonality Diagnostic Based Upon Multi-Step Ahead Forecasting Errors
Tucker McElroy, U. S. Census Bureau

Modeling Weather Effects and Seasonal Noise in U. S. Monthly Regional Housing Starts
William R. Bell, U. S. Census Bureau

Improving Nowcasts of International Trade Data for the Index of Economic Activity (IDEA)
Elizabeth Marra Viehdorfer and Valerie Pianin, U. S. Census Bureau

Concurrent Session 2b

Special Adjustments

Chair: Kathy McDonald-Johnson, U. S. Census Bureau

The Effects of Different Temporary Change Decay Rates in U. S. Monthly Retail Sales Time Series
Eric Valentine, U. S. Census Bureau

An Application of Functional-Coefficient Autoregressive Modeling in Cybersecurity
Pei Geng, University of New Hampshire

Official Holiday Dates Are Not Enough for Holiday Adjustments
Hideki Furuya, SKANIOGLOS Investment Advisory Co., Ltd.

Thursday, September 12, 2024

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James Livsey, U. S. Census Bureau

Concurrent Session 3a

Signal Extraction

Chair: Tucker McElroy, U. S. Census Bureau

New Results for Time-Dependent Models
Guy Mélard, Université libre de Bruxelles

Accounting for Sampling Errors in Seasonal Adjustment
Connor Doherty, U. S. Bureau of Labor Statistics

Concurrent Session 3b

R Packages for Seasonal Adjustment

Chair: Brian Monsell, NSR Solutions Inc. and U. S. Bureau of Labor Statistics

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The blsplotGG Package
Brian C. Monsell, NSR Solutions Inc. and U. S. Bureau of Labor Statistics (Lightning)

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Direct and Indirect Seasonal Adjustment

Chair: James Livsey, U. S. Census Bureau

The Divergence Between Direct and Indirect Seasonal Adjustment When Using the Contribution-to-Growth Method
Mark Hogan, ONS

A Look at Indirect Seasonal Adjustment Using Multivariate Signal Extraction Versus Existing Methods
Osbert Pang, U. S. Census Bureau

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Seasonal Breaks in Official Statistics

Chair: Eric Valentine, U. S. Census Bureau

Processing Breaks in Seasonality in Time Series
Dimitrios Nikolakis, ONS

Testing for Changes of Seasonal Patterns in Census Bureau Time Series
Demetra Lytras, Laura James, Samantha Nguyen, Erin Wrona, U. S. Census Bureau

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Seasonal Adjustment Applications

Chair: Demetra Lytras, U. S. Census Bureau

Using Seasonal Adjustment for Data Review of the Quarterly Survey of Plant Capacity Utilization
Jess Huang, U. S. Census Bureau

Investigating the Impact of Noise Infusion on Seasonal Adjustment in the Quarterly Financial Report
David Mullens, U. S. Census Bureau (Lightning)

Identifying Seasonality Across Numerous Small Area Time Series: An Investigation into Agricultural Employment Across U. S. Counties
Andrew Forrester, U. S. Bureau of Labor Statistics (Lightning)

Concurrent Session 5b

Training Panel Session

Chair: Wendy L. Martinez, U. S. Census Bureau

Transitioning to Virtual Seasonal Adjustment Training
Brian Monsell, NSR Solutions, Inc. and U. S. Bureau of Labor Statistics; Catherine Harvill Hood, Catherine Hood Consulting; Kathy McDonald-Johnson, U. S. Census Bureau; and Wendy L. Martinez, moderator, U. S. Census Bureau

Abstracts

Wednesday, September 11, 2024

Session 1 – Software for Seasonal Adjustment

Enhanced Features for Production of Seasonally Adjusted Data Using JDemetra+ 3.x, Anna Smyk, INSEE

Abstract: I would like to present enhanced features for production of seasonally adjusted data using JDemetra+ 3. x, a software providing access to various SA algorithms via a Graphical User Interface (GUI) and R packages. Version 3.x allows to run a complete production process in R, including infra-annual revision policies. But also enables the user to wrangle JDemetra+ workspaces (data structure necessary to use the GUI) with bespoke R tools for customizing specifications series by series or merging workspaces. The user can smoothly switch from GUI, convenient for manual fine tuning, to R based tools more efficient for mass scale operations.

A Python-based Platform for Seasonal Adjustment of Economic Time Series. Lijing Sun, U. S. Census Bureau

Abstract: The U.S. Census Bureau has been developing a new computer platform for seasonal adjustment that includes both a new Python-based user interface and an enhancement of X-13ARIMA-SEATS based on wrapping the FORTRAN code in Python. This new implementation will also provide an analogous environment for RegComponent modeling capabilities, and will facilitate analyses in X-13ARIMA-SEATS by Linux users. The new Python-based platform will also include some additional capabilities for seasonal adjustment such as a tool to calculate X-11 symmetric filter weights for estimates of the various components: the nonseasonal (seasonally adjusted series), seasonal, seasonal-irregular, trend, and irregular.

RegComponent Modeling in the SeasCen Software Platform, William R. Bell, U. S. Census Bureau

Abstract: RegComponent models extend RegARIMA models to allow the regression error to follow an ARIMA component model. Bell (2004,2011) illustrates several uses of these models such as (i) model-based seasonal adjustment, (ii) modeling time series of repeated survey estimates, allowing for the sampling error component, (iii) estimating models with stochastically time-varying regression parameters, and (iv) modeling seasonally heteroscedastic noise in series affected by unusual weather. REGCMPNT is a Fortran program developed at the Census Bureau to implement the capabilities of RegComponent models. The REGCMPNT capabilities have been integrated into the SeasCen platform with a GUI interface very similar to that for the X-13 program. The presentation will briefly review RegComponent models and then demonstrate their implementation in SeasCen.

X-13-SAM and PyGenhol: Updates to X-13ARIMA-SEATS Helper Programs, Demetra Lytras, U. S. Census Bureau

Abstract: This talk will demonstrate new features in two software products designed to help in running X-13ARIMA-SEATS. X-13-SAM edits multiple spec files at one time; new features to the program allow the user to analyze settings within groups of spec files. Genhol is a long-standing program that creates user-defined holiday regressors; the new PyGenhol recreates the program in Python with expanded options for creating holiday regressors and a user-friendly interface.

Concurrent Session 2a

Novel applications of modeling and forecasting

A Seasonality Diagnostic Based Upon Multi-Step Ahead Forecasting Errors, Tucker McElroy, U. S. Census Bureau

Abstract: We define seasonality as a high annual persistence that is not explained by the intervening seasons. Supposing there are s seasons, we parse this definition of seasonality in terms of two types of forecast comparisons: (i) intra-seasonal association is the variance of s-step ahead forecast errors, and (ii) seasonal persistence is the covariance of s+1-step ahead and 1-step ahead forecast errors. A seasonal process is characterized by low intra-seasonal association and high seasonal persistence. This definition is applied to processes with fixed or dynamic seasonal (and nonseasonal) effects and is illustrated on real data.

Modeling Weather Effects and Seasonal Noise in U. S. Monthly Regional Housing Starts, William R. Bell, U. S. Census Bureau

Abstract: Previous research over many decades has investigated to what extent seasonal variations in U.S. monthly regional housing starts can be explained using time series models with weather variables as covariates, beyond the fairly regular seasonal patterns captured by models without such covariates. See Pang, Bell, and Monsell (2022) for a detailed review and for recent results. Trimbur and Bell (2012) accounted for such variation by adding to conventional seasonal time series models a heteroskedastic seasonal noise term affecting just the winter months. Here we show that both model features – regression effects using weather covariates taken from Pang, et al. (2022), as well as seasonal noise terms – are important to the modeling of Northeast and Midwest regional housing starts, i.e., one cannot get by with either one alone. Seasonal adjustment results from such a model are illustrated.

Improving Nowcasts of International Trade Data for the Index of Economic Activity (IDEA), Jose Asturias, William R. Bell, Rebecca Hutchinson, Elizabeth M. Marra, Tucker McElroy, Valerie E. Pianin, and Rebecca L. Weaver, U. S. Census Bureau

Abstract: The U.S. Census Bureau Index of Economic Activity (IDEA) is an experimental data product that was first released in February of 2023. It is constructed from 15 of the Census Bureau's primary monthly economic time series, providing a single time series reflecting the variation of the full set of component series over time. Updated daily, the IDEA incorporates nowcasts of component series whose values have not yet been released for the current month. This presentation briefly discusses the purpose and construction of the index, then describes the nowcasting problem and research into a potential improvement to the nowcasting methodology.

Concurrent Session 2b

Special Adjustments

The Effects of Different Temporary Change Decay Rates in U. S. Monthly Retail Sales Time Series, Eric Valentine, U. S. Census Bureau

Abstract: Temporary change regressors fit one type of outlier in regARIMA modeling (regression modeling with errors that follow an autoregressive integrated moving average process). They are sometimes employed in modeling monthly retail sales time series. When using this outlier, a rate of decay for the temporary change is needed and the X-13ARIMA-SEATS default decay rate is 0.7. Users can change the decay rate, but there is no guidance on how to optimally set it. This project initially evaluated the effect of four different decay rates (0.2, 0.5, 0.7, and 0.9) of temporary change regressors on regARIMA model fit, forecasting, and seasonal adjustments of U.S. retail sales time series. I show research into more rates (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, and 0.9) to evaluate the log-likelihood.

An Application of Functional-Coefficient Autoregressive Modeling in Cybersecurity, Pei Geng, University of New Hampshire

Abstract: In cybersecurity, data breaches and hacks may cause massive financial loss, operational downtime and loss of sensitive data, hence it is important to study the evolvement of these incidents over time. We investigate the relationship between the monthly data breach records and the common vulnerability and exposure (CVE) between January 2010 and November 2018. Three models are fitted to the data breach time series: autoregressive models (AR), functional-coefficient autoregressive models (FAR) and FAR with measurement error in time series.

Official Holiday Dates Are Not Enough for Holiday Adjustments, Hideki Furuya, SKANIOGLOS Investment Advisory Co., Ltd.

Abstract: Our enhancement of X-13ARIMA-SEATS has been targeting to detect most of the statistically significant holiday factors of the world. Regressors for holiday factors are not always the same as official holiday dates of each country. Most of them are unknown a priori. A holiday Factor of goods are often recognized as surges prior to, sudden stops at, or recoveries after holidays. Holiday factors of a country are also be detected in the statistics of its trade partners or travel destinations. Furthermore, we are to present the results of detection of the holiday factors in tourism of selected European countries.

Thursday, September 12, 2024

Concurrent Session 3a

Signal Extraction

New Results for Time-Dependent Models, Guy Mélard, Université libre de Bruxelles

Abstract: In a few recent papers [1, 2, 3], I have investigated ARMA and VARMA models with time-dependent (td) coefficients varying in a deterministic way. For a comparison with other approaches, see [4]. From the practical point of view, a study of U.S. industrial production monthly time series [5] has shown that these models fit better the data. Of course, this required an asymptotic theory to prove that the QML estimators are consistent and asymptotically normal but the assumptions in [2, 3] were complex. Following the path started in [6] for models with constant coefficients, simpler sufficient assumptions based on the roots of the tdAR and tdMA coefficients (or their eigenvalues in the multivariate case) can be used instead.

References

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Accounting for Sampling Errors in Seasonal Adjustment, Connor Doherty, U. S. Bureau of Labor Statistics

Abstract: Most seasonal adjustment production by government agencies utilize the X-13ARIMA-SEATS program. Employment and unemployment estimates from the Current Population Survey (CPS) tend to have variability due to small samples, changes in reliability, and strong positive autocorrelations and heteroscedasticity in the sampling errors (SE). Unfortunately, the X-13 program does not allow for explicit modeling of the SE component, so the irregular component is a combined error that includes both irregular and SE variations. We fit structural time series models that include an SE component. Comparisons of seasonal adjustments between SEATS and models accounting for SE are made.

Concurrent Session 3b

R Packages for Seasonal Adjustment

R Package boiwsa for the Seasonal Adjustment of Weekly Data, Tim Ginker, Bank of Israel

Abstract: This article introduces the R package boiwsa for the seasonal adjustment of weekly data based on the discounted least squares method. It provides a user-friendly interface for computing seasonally adjusted estimates of weekly data and includes functions for the creation of country-specific prior adjustment variables, as well as diagnostic tools to assess the quality of the adjustments. The utility of the package is demonstrated through two case studies: one based on US data of gasoline production characterized by a strong trend-cycle and dominant intra-yearly seasonality, and the other based on Israeli data of initial unemployment claims with two seasonal cycles (intra-yearly and intra-monthly) and the impact of two moving holidays.

The blsplotGG Package, Brian C. Monsell, NSR Solutions Inc. and U. S. Bureau of Labor Statistics (Lightning)

Abstract: Over the past year, I have converted many useful seasonal adjustment plots that used the base R package to utilize the ggplot2 data visualization package developed by Hadley Wickham. In this presentation, I'll show examples of line and spectral plots, and generate classic plots such as year-over-year and seasonal factor plots using ggplot2. I'll also show a function that generates alt text for ggplot2 objects.

Concurrent Session 4a

Direct and Indirect Seasonal Adjustment

The Divergence Between Direct and Indirect Seasonal Adjustment When Using the Contribution-to-Growth Method, Mark Hogan, ONS

Abstract: A business area in the UK National Statistics Institute uses the Contribution-to-Growth (CTG) method to process their data. This involves calculating for each component the period growth rates and aggregating them using weights. When performing Indirect seasonal adjustment, a divergence was noticed between the Direct and Indirectly seasonally adjusted series. This was investigated using theoretical, simulation, and empirical approaches. The cause was that the weights used in the CTG method were annual weights derived from non-seasonally adjusted data, but they were applied to quarterly seasonally adjusted data. This caused a discrepancy in the CTG which was compounded over time.

A Look at Indirect Seasonal Adjustment Using Multivariate Signal Extraction Versus Existing Methods, Osbert Pang, U. S. Census Bureau

Abstract: One approach to obtaining a seasonal adjustment for an aggregate series is indirectly, by summing the (univariate) seasonal adjustments for its components. This has the advantage of preserving accounting relationships. Can a multivariate approach offer improvement by leveraging the potential interrelatedness of series? For the purposes of comparison, we use data from the Census' Manufacturers' Shipments, Inventories, and Orders (M3) survey. We consider the distinction between multivariately adjusting, within the same industry sector, differing series types (e.g., total inventories and value of shipments) and multivariately adjusting the same series type across ostensibly related industry sectors.

Concurrent Session 4b

Seasonal Breaks in Official Statistics

Processing Breaks in Seasonality in Time Series, Dimitrios Nikolakis, ONS

Abstract: Some time series show sudden breaks in seasonality, which need to be processed meaningfully for appropriate seasonal adjustment. Here, I offer an overview of the three approaches commonly used by the UK Office for National Statistics (for this purpose, I used 3 different series). In the first series, I conducted a sensitivity analysis of the most effective datapoint of the break. In the other two series, I investigated the use of seasonal - seasonal - seasonal breaks and seasonal - nonseasonal breaks. This talk also considered the tools (diagnostics and graphs) available in X-13ARIMA-SEATS to make effective seasonal adjustment decisions.

Testing for Changes of Seasonal Patterns in Census Bureau Time Series, Demetra Lytras, Laura James, Samantha Nguyen, Erin Wrona, U. S. Census Bureau

Abstract: Even at the start of the COVID-19 pandemic, questions arose from seasonal adjustment practitioners and data users. Would the pandemic effects result in changes in seasonal patterns? Testing for a change of regime would take time because not only did we want to have enough observations within a new pattern to feel confident in the test results, but we also wanted to avoid using estimates that might be more volatile, compiled during the height of the pandemic. We explain our approach to change-of regime testing and show results from tests of various Census Bureau economic time series.

Concurrent Session 5a

Seasonal Adjustment Applications

Using Seasonal Adjustment for Data Review of the Quarterly Survey of Plant Capacity Utilization, Jess Huang, U. S. Census Bureau

Abstract: The Quarterly Survey of Plant Capacity Utilization (QPC) is a joint effort of the Federal Reserve Board and the Census Bureau to estimate plant capacity utilization rates. Industries that show large quarter-to-quarter changes in utilization are flagged for further data review. Recently, the QPC program has begun exploring the benefits of reviewing seasonally adjusted rates as a complement to its traditional data review process. We found that seasonal adjustment can enable more targeted data review. Attention can be removed from industries with rate changes largely explained by predicted seasonal variation and towards industries with rate changes deviating from predicted seasonal variation. Overall, we found that using seasonal adjustment can improve data review and ultimately data quality.

Investigating the Impact of Noise Infusion on Seasonal Adjustment in the Quarterly Financial Report, David Mullens, U. S. Census Bureau (Lightning)

Abstract: In recent efforts to enhance data privacy, the Quarterly Financial Report (QFR) has implemented EZS noise infusion. During our routine quarterly review of model outliers, we observed the emergence of a few outliers in the 2023Q4 data processing. To understand the potential impact of noise infusion, we conducted a comparative analysis between series with and without noise infusion. This comparison was performed on both unadjusted and seasonally adjusted series.

Our findings indicate that the relative differences between the noise-infused and non-noise-infused series are generally minimal, with variations for the twelve adjusted series typically remaining within a 1% threshold, except for a few exceptions. These small differences suggest that the noise infusion process may not significantly affect the integrity of the seasonal adjustments.

However, these observations raise an important question: Is there an optimal approach to modeling multiplicative noise-infused data for seasonal adjustment? This topic is presented as a work in progress. We are particularly interested in exploring existing literature on the seasonal adjustment of noise-infused data and engaging in discussions with experts in time series privacy. Additionally, we are keen to explore the use of simulated data to derive a more generalized methodology.

Identifying Seasonality Across Numerous Small Area Time Series: An Investigation into Agricultural Employment Across U. S. Counties, Andrew Forrester, U. S. Bureau of Labor Statistics (Lightning)

Abstract: Numerous statistical and graphical techniques are available to detect seasonality in time series economic data, often focused on detailed analysis of a single or a few series. This research examines standard seasonality tests from the X-13ARIMA-SEATS software pooled across U.S. county agricultural employment, examining their performance in detecting seasonal employment patterns and its strength. Results will show common patterns in seasonality tests across levels of geography and time. Further discussion is given for producing composite seasonality tests for small areas and producing small area forecasts using the X-13 software.

Concurrent Session 5b

Training Panel Session

Transitioning to Virtual Seasonal Adjustment Training, Brian Monsell, NSR Solutions, Inc. and U. S. Bureau of Labor Statistics; Catherine Harvill Hood, Catherine Hood Consulting; Kathy McDonald-Johnson, U. S. Census Bureau; and Wendy L. Martinez, moderator, U. S. Census Bureau

Abstract: Seasonal adjustment training covers general concepts and statistical methods as well as how to use technical seasonal adjustment software, for example, X-13ARIMA-SEATS and JDemetra+. In recent years, we have moved toward providing training using virtual means as customers and workforces have moved away from traditional in-person environments. The COVID-19 pandemic accelerated that move.

We follow up on ideas we expressed in the 2023 Seasonal Adjustment Practitioners panel discussion on virtual training, including goals, challenges, and next steps.