**STATISTICS BOOK PROPOSAL**

**Chapman & Hall/CRC**

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| **TITLE AND AUTHOR(S)** |
| **1. Provisional title of your book.** |
| Seasonal adjustment with X-13ARIMA-SEATS in R: A practical guide |
| **2. Authors and affiliations.** |
| Christoph Sax (University of Basel, cynkra LLC)  James Livsey (US Census Bureau) |
| **SUBJECT, AIMS AND FEATURES** |
| **3. Please describe in detail the subject of your book and indicate its academic level.** |
| This text will focus on seasonal adjustment and its implementation in R. It will be the first textbook to concentrate on performing seasonal adjustment with X-13ARIMA-SEATS in R.  Specifically, the audience will be both R users who want to learn about seasonal adjustment as well as seasonal adjustment practitioners, who are interested in using R. The book will be tailored to the practical applications of seasonal adjustment within R. It presents background material and references for the theoretically minded reader. However, the main focus is on concrete problems and examples.  We will showcase methods through detailed examples with associated code. This presentation allows the academic level to be quite broad; understood by undergraduates all the way through advanced Ph.D. students. |
| **4. Please describe your motivation for writing the book; why it is important.** |
| X-13ARIMA-SEATS is one of, if not the most, widely used seasonal adjustment software within federal and statistical agencies. Moreover, there is a movement in statistical agencies toward the use of R and open-source products. This text is motivated to unify these two positions.  Additionally, it also serves the following:  1. Guide to seasonal adjustment with R  To make the entry to the world of seasonal adjustment more accessible for those with an understanding of R. We leverage the users R knowledge to more easily understand the input/output of the X-13ARIMA-SEATS program. We also will give an overview of other possibilities of seasonal adjustment in R (e.g. stl, JDemetra).  2. Focus on practitioner’s problem  To bridge an important gap in the training for many seasonal adjustment practitioners. The book addresses practical problems and shows how they can be addressed in X-13ARIMA-SEATS. The use of R allows them to have reproducible examples at hand. |
| **5. Please list up to six key features of your proposed book.** |
| * Each chapter includes a concrete practical problem and shows how X-13ARIMA-SEATS can be used to address it * Teach-by-example format * Continuous connection of X-13ARIMA-SEATS input with R input (and vice-versa) * Fundamental theoretical material is referenced throughout (mainly as a supplemental reading option) * For each example given, the book will give answers, code and provide data |
| **6. Will your book feature any supplementary material, e.g. code and datasets online, or a solutions manual?** |
| All material from the text will be made available to the reader. This includes but is not limited to:   * R Package to accompany the book, containing all data and examples * Interactive website, on which the examples can be run (similar to www.seasonal.website) |
| **AUDIENCE AND RELATED BOOKS** |
| **7. Please give details of the primary audience for the book. Will it be used for teaching, research or both? Are there any secondary markets?** |
| There are two primary audiences:  1. Current practitioners of seasonal adjustment who are interested in learning how to implement in R. This audience includes researchers from statistical agencies who want to include the scripting language features of R to evaluate properties of their seasonal adjustments.  2. Current R users who want to learn seasonal adjustment. We are able to leverage the readers knowledge of R to make learning seasonal adjustment easier. We will feature interesting applications outside of official statistics, such as the seasonal adjustment of business data. |
| **8. If your book is a textbook, for which courses will it be the primary text? For which will it be supplementary reading?** |
| While the book is not intended as a primary textbook for a university course, it is highly applicable for a module in a time series or econometrics class.  The book could be the primary text for many seasonal adjustment classes taught at Federal agencies and companies; e.g., at the yearly seasonal adjustment class at the U.S. Census Bureau. |
| **9. What competitive and/or related books are available? (If possible, please indicate author, title, publisher and publication year).** |
| There are no directly relevant competitors to the proposed textbook.  There is a book that serves as a primary reference to the X-11 method, one type of seasonal adjustment:  Ladiray D, Quenneville B (2012). Seasonal Adjustment with the X-11 Method, Volume 158. Springer-Verlag.  The following book covers the SEATS method:  Dagum EB, Bianconcini S (2016). “Seasonal Adjustment Based on ARIMA Model Decomposition: TRAMO-SEATS.” In Seasonal Adjustment Methods and Real Time Trend-Cycle Estimation, pp. 115–145. Springer-Verlag.  There are various documents by statistical agencies on topics of the book:  Monsell B (2007). “The X-13ARIMA-SEATS Seasonal Adjustment Program.” In Proceedings of the 2007 Federal Committee on Statistical Methodology Research Conference. URL http://www. fcsm.gov/07papers/Monsell.II-B.pdf.  Caporello G, Maravall A, Sánchez FJ (2001). “Program TSW Reference Manual.” Technical Report 0112, Banco de España Madrid. URL https://ideas.repec.org/p/bde/wpaper/ 0112.html.  National Bank of Belgium, Deutsche Bundesbank, Eurostat (2017). JDemetra+: Econometric Software for Seasonal Adjustment and Other Time Series Methods. Eurostat. URL https: //ec.europa.eu/eurostat/cros/content/download.  UK Office for National Statistics (2007). Guide to Seasonal Adjustment with X-12-ARIMA. URL http://www.ons.gov.uk/ons/guide-method/method-quality/ general-methodology/time-series-analysis/guide-to-seasonal-adjustment.pdf.  This book relies on the 'seasonal' package to access X-13ARIMA-SEATS, which is described in:  Sax C, Eddelbuettel D (2018). “Seasonal Adjustment by X-13ARIMA-SEATS  in R.” Journal of Statistical Software, 87(11), 1-17. (URL: https://doi.org/10.18637/jss.v087.i11). |
| **10. What advantages does your book have over those mentioned above, i.e. identify the niche that your book fills?** |
| There are 3 main advantages that make our text unique:  1. This textbook will focus on R and include all code and data for users to get ‘hands-on’ with.  2. This is the first book on seasonal adjustment that focuses on practical problems, rather than theory.  3. It is the only book that covers all aspects of X-13ARIMA-SEATS, i.e. both X-11 and SEATS. |
| **ADDITIONAL DETAILS** |
| **11. Approximately how many printed pages will your book contain? Approximately how many figures?** |
| Judged from our proposed outline, and the heavy use of practical examples in R, we estimate between 40 and 80 figures. Including these figures, the content may result in 120 to 180 pages. |
| **12. When would you hope to be able to submit the final draft of the book to us? And in which format, Latex or Word?** |
| End of summer 2020.  We will write the document as an RMarkdown document that includes reproducible examples.  This will translate to a LaTeX document that we can provide. |
| **13. Please give the names and e-mail addresses of four people who would be qualified to give an opinion on your proposed book. (We will not necessarily contact these people).** |
| * Brian Monsell, bcmonsell@gmail.com * Dirk Eddelbuettel, dirk@eddelbuettel.com * Osbert C. Pang, Osbert.C.Pang@census.gov * Steve Matthews, steve.matthews@canada.ca   Dirk Eddelbuettel has also informally expressed his interest and would be available for collaboration. |
| **TABLE OF CONTENTS** |
| **14. Please include a full table of contents, including chapter sub-headings and/or chapter abstracts.**  **PART I: Basics of Seasonal Adjustment**  This section focuses on explaining the basics of seasonal adjustment and gets the reader involved with a minimal working example. It keeps the technical jargon to a minimum. Finally, the layout of the book and future sections is clearly spelled out.  **Introduction**   * What is Seasonal Adjustment? * What is X-13ARIMA-SEATS (X13)? * Who uses X13? * Available alternatives in and outside of R (some topics are covered in chapter VI)   Start with a concrete example as quick as possible and use it to explain the basic idea of seasonal adjustment:  library(seasonal) m <- seas(AirPassengers) plot(m)  **How to use the book**   * Overview of the book * The book gives concrete advice for seasonal adjustment problems practitioners incur. * Ideally, we want to have a quick check list that gives readers a starting point where to look for further advice. That could be something like a Cheat Sheet (<https://www.rstudio.com/resources/cheatsheets/>) with quick advice and chapter references. * For each section, we want to provide a concrete and informative case study. Some examples are provided in the outline.   **PART II: X-13ARIMA-SEATS**  This section gets readers familiar with X-13ARIMA-SEATS. It begins by explaining the history and pedagogy of the software. This leads directly into discussing the principal elements of X-13ARIMA-SEATS.  **Overview of the software**   * History of the software * Elements of the software * Overview of main choices a user needs to make   **Transform**   * Discuss multiplicative vs additive adjustment * How to use the transform spec * Case Study idea: Decide between log vs non-log transformation   **SEATS**   * How to use the SEATS spec * SEATS vs X-11 * Case Study: Compare SEATS and X-11 seasonally adjusted series   **X11**   * How to use the X11 spec * Case Study: Changing the length of trend and/or seasonal filter   **regARIMA Model**   * Idea of regARIMA * How to use the regression spec * Case studies: Decide if you should include AO in May 2014. Construct a simple user defined regressor to handle a specific issue.   **PART III: Data Problems**  In part III we look more in-depth at practical issues with seasonal adjustment. The focus is on concrete solutions to each situation presented. Each subsection will prominently feature a case study dedicated to each problem.  **Irregular holidays**   * Why should we adjust for holiday effects? * Easter adjustment * User defined adjustments (Chinese New Year, Diwali) * Case Study: How to adjust for Ramadan (which is connected with some additional challenges)   **Trading days**   * Why should we adjust for trading day effects? * Seven or two coefficient trading day * Using country specific calendars * Case Study: Movie tickets (or another series with very clear trading day effects)   **Outliers**   * Why care about outliers? * Additive outliers, level shifts, temporary changes * Case Study: Effect of outliers on seasonal adjustment   **Seasonal breaks**   * Why to care about seasonal breaks? * Detection of seasonal breaks * Correction for seasonal breaks * Case Study: Examine seasonal break for 2008 U.S. economic recession     **PART IV: Other Issues**  Part IV investigates more holistic issues that practitioners face. The main focus is to give fundamental methodology to answer their problems. Since these types of issues can be highly specialized, we concentrate on known solutions to the topics.  **Should a series be seasonally adjusted at all?**   * How to test for the presence of seasonality   **Annual constraining**   * Should the annual values be constrained? * How to use the force spec   **Indirect vs direct adjustment**   * Should the subcomponents of a series be adjusted separately?   **PART V: Quality assessment**  This section focuses on diagnostic tools for seasonal adjustment. This will be written as a stand-alone section as well as a continuance of prior sections. The idea here is that many readers may be interested in checking the quality of their adjustments but not need help performing it.  **Quality measures**   * What is a good seasonal adjustment? * M statistics * Other statistics available in X-13ARIMA-SEATS   **Revisions**   * How to measure revisions? * Should a model be re-estimated each period? * How to use the slidingspan and history spec   **PART VI: The future of seasonal adjustment**  This short section outlines the future projects in the seasonal adjustment field. Daily, high frequency and multivariate seasonal adjustment plays a major role here. Ideally, examples of how to solve these problems are given.   * Daily adjustment * Multivariate seasonal adjustment * Other methods |