Conference on Seasonality, Seasonal Adjustment and their implications for Short-Term Analysis and Forecasting

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Advances in Seasonal Adjustment Software at the U. S. Census Bureau

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Overview

• Outline the next two major releases of seasonal adjustment software
  » Version 0.3 of X-12-ARIMA
  » X-13A-S

• Updated features and recent work

• Demonstration of RunX12
Next Major Release

• Version 0.3
  » Available by the end of June 2006
  » Reformatted Documentation, with indexing

• Windows Interface to X-12 (RunX12)
  » Developed by Roxanne Feldpausch of the Time Series Methods Staff

• Updated version of X-12-Graph (Hood 2002)
Version 0.3 will include

- A new automatic model selection procedure
  - Based on the procedure in TRAMO
  - Specified with the `automdl` spec
  - Previous procedure can be accessed in `pickmdl` spec
• Does not always duplicate TRAMO’s model selections
  » Different estimation procedures in the two programs
• Version 0.3 produces more “mixed” models than TRAMO, e.g. (2 0 1)(0 1 1)
  » Option to avoid “mixed” models
New force spec (annual totals)

- Forces annual totals of adjusted series to conform to benchmarked annual totals of the “original” series
  - Statistics Canada Regression method (Quennewilie, Cholette, Huot, Chiu, and Fonzo 2004)
- Smaller revisions at the end of the forced seasonally adjusted series than the Denton method
  - Hood (2005)
Version 0.2.10 spec file

series{ title = "US Imports"
    format="datevalue" file="m0.dat" name="m0"
}
transform { function=log }
regression { variables = ( td ao1997.oct ) }
arima{ model=(0 1 1)(0 1 1) }
forecast{ maxlead = 24 }
x11 { force = totals save = saa }
Version 0.3 spec file

series{  title = "US Imports"
    format="datevalue"  file="m0.dat"  name="m0"  }
transform {  function=log  }
regression {  variables = ( td ao1997.oct )  }
arima{  model=(0 1 1)(0 1 1)  }
forecast{  maxlead = 24  }
x11 {  }
force {  type = regression  rho = 0.95
    lambda = 1.0  target = calendaradj
    save = saa  }
Unified diagnostics summary file

- All summary diagnostics now stored in unified diagnostics file (.udg)
  - Additional seasonal adjustment and model diagnostics stored
  - Updated version of X-12-Graph will read new and old diagnostic files
Optional HTML Output

- Conversion Utility for X-12-ARIMA Output
  » Will produce HTML for the output, log and error file
  » Will allow output to be accessible to visually impaired users
  » Integrated into the Windows Interface
What’s after Version 0.3?

X-13A-S =
X-13ARIMA-SEATS =
    X-12-ARIMA + SEATS

All enhancements from Version 0.3 are carried over into X-13A-S
What is X-13A-S?

• An experimental program that produces model-based seasonal adjustments from the SEATS seasonal adjustment procedure.

• Collaboration between the U. S. Census Bureau and the current developers of SEATS, Agustin Maravall of the Bank of Spain and Gianluca Caporello.
Why X-13A-S?

• Allows users to
  » generate X-11 and SEATS seasonal adjustments using the same interface
  » compare X-11 and SEATS seasonal adjustments using a common set of diagnostics
Sample X-13A-S spec file

series{  title = "US Imports"
    format="datevalue"  file="m0.dat"  name="m0"  }
transform {  function=log  }
regression {  variables = ( td ao1997.oct )  }
arima{  model=(0 1 1)(0 1 1)  }
forecast{  maxlead = 24  }
#  x11 {  save = d11  }
seats {  save = s11  }
slidingspans {  savelog = pct  }
history {  estimates = (sadj trend fcst)  }
Sample X-13A-S spec file

```plaintext
series{ title = "US Imports"
    format="datevalue" file="m0.dat" name="m0" } 
transform { function=log }
regression { variables = ( td ao1997.oct ) }
arima{ model=(0 1 1)(0 1 1) }
forecast{ maxlead = 24 }
x11 { save = d11 }
# seats { save = s11 }
slidingspans { savelog = pct }
history { estimates = (sadj trend fcst) }
```
Seasonal Adjustment Diagnostics

• Sliding Spans and Revisions History
  » Default lengths of sliding spans for SEATS set as in Findley (2003)

• Spectral Diagnostics
  » SEATS residuals, seasonally adjusted series and irregular

• Graphical Diagnostics
  » X-12-Graph (Hood 2002)
Spectrum of the Differenced Logged Seasonally Adjusted Series

Decibels

Cycles/Month

Seasonal Frequencies

Trading Day Frequencies
Seasonal Factors

ABS retail turnover (easter2[5], SEATS 3A)

Seasonal Factors

ABS retail turnover (easter2[5], X=11 3A)
Original Series and Trend

HStMWlu and HStMWlu - SEATS default adjustment

Grid lines at January

HStMWlu:  
- Original Series
- Trend

HStMWlu - SEATS default adjustment:  
- Trend
New Finite Sample Diagnostics

- Uses matrix formulas rather than infinite length Wiener-Kolmogorov filter
  » Originally in Bell and Hillmer (1988), further developed in McElroy (2005)
  » Evaluation study by Findley, Gagnon and McElroy (2006)
Finite filter diagnostics

• X-13A-S also generates
  » Gain and time delay graphs for the finite concurrent signal extraction filter
  » Filter weights for the finite concurrent adjustment filter

• For details, see Findley and Martin (2006 JOS)
Seasonal Outlier

- Seasonal Level Shift outlier from Bell (1983), discussed in Maravall and Kaiser (2001)
- Currently implemented in TRAMO modeling software

```plaintext
regression{ variables = so1997.jul  save = so  }
```
Future plans

• Release a beta version of X-13A-S to selected users for evaluation this summer

• Standardize program output
  » Make SEATS output look more like X-12
  » Make X-13A-S accessible
Future plans (continued)

• Release a new version of regCMPNT (with documentation)
  » Software that fits regComponent models
  » Developed by Bill Bell and Richard Gagnon

• Further research on growth rates (McElroy 2006)
Longer Range Plans

- Fully test our implementation of TRAMO Pulse regressors
- Develop an X-12 DLL
- Develop XML output/input for X-12/X-13
Windows Interface to X-12-ARIMA

• Visual Basic program by Roxanne Feldpausch, U.S. Census Bureau

• Includes spec wizard
  » Writes a spec file incorporating the most common specs and arguments
Software Demonstration
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