

Program used:

X-12-ARIMA monthly regARIMA model estim Method,  
Release Version 0.3 Build 141

This is not the most recent build, but the basic routines that I utilized are not changed in current builds. This software is publicly available, and is an automatic procedure for doing seasonal adjustment of economic time series, though it can do other things too like forecasting. The "spec" files that I generated, which determine which parameters of the program will be used on a given series, were the following:

```
series{
File = "mn3001.dat"
start = 1990.1 }
transform{function=auto}
automdl{ }
outlier{ }
estimate{ maxiter = 1000 print = (+iterations +rts) }
forecast{ maxlead = 18 }
```

Only the file name got changed for each series. The "transform" spec allows for automatic Box-Cox transform of the series (usually a logarithm of the data is selected). The "automdl" spec basically refers to the TRAMO procedure of the TRAMO-SEATS program of the Bank of Spain, which is essentially implemented in X-12-ARIMA. That is, the model selection aspect of automdl is essentially the TRAMO algorithm, but the actual maximum likelihood estimation procedure is a bit different from that of TRAMO. The "outlier" spec allows for automatic detection of certain outlier regression effects such as additive outliers, level shifts, and such. There are automatic thresholds for determining the significance and so forth. The "estimate" spec does the maximum likelihood estimation of model parameters. The maxiter parameter gives a breaking point in how many iterations are allowed. The default is 500 iterations, but I increased it to 1000 since there weren't many series to process, and a few problem series failed to converge (the mle algorithm did not converge) with 500 iterations. (The series number 005 did not converge at 1000 iterations, so I manually changed its spec file to 2000 iterations, and then it converged.) The "forecast" spec output forecasts along with standard errors, which are translated back into the original data scale if a Box-Cox transform was utilized. You didn't ask for uncertainty estimates on the forecasts, but these can be provided. These comments should be viewed as informal; more detailed info on the program can be found in the official documentation found at

<http://www.census.gov/srd/www/x12a/>

Notes on the results:

It took approximately 45 seconds to run the 111 series.

Series 28, 85: White Noise model (!) identified with outlier

Series 33, 45: nonseasonal model (012) and the forecasts are almost constant

Series 8, 26, 35, 38, 83, 86, 99, 108: nonseasonal model (011) and the forecasts are constant

Series 42, 94: nonseasonal (110) model and forecasts are constant

Series 49: nonseasonal (100) model and forecasts are almost constant

Series 44: produced some negative forecasts!!!

These series mentioned were the "problem" series; the first 50 series had a much smaller sample size, and so model fitting is more difficult. Typically we like to have 10 years (120 observations) of data to get reasonable model fits with these type of SARIMA models.

By the way, it would help me if I had some sort of email from you with a more official-sounding request for these results.

(See attached file: nn3\_reduced\_tuckermcelroy.xls)

Tucker McElroy  
Mathematical Statistician  
Statistical Research Division  
U.S. Census Bureau