# H1 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

| | |
|---|---|
| **Dependent Variable** | TCC |
| | Trend-Cycle Component |

## H1 INTERRUPTED TIME SERIES MODEL
## KY 2010-2016 HOSP Data

### The AUTOREG Procedure

| Ordinary Least Squares Estimates | | | |
|---|---|---|---|
| **SSE** | 39793.7172 | **DFE** | 68 |
| **MSE** | 585.20172 | **Root MSE** | 24.19094 |
| **SBC** | 676.099284 | **AIC** | 666.992619 |
| **MAE** | 19.9583636 | **AICC** | 667.589634 |
| **MAPE** | 4.10165942 | **HQC** | 670.618009 |
| **Durbin-Watson** | 0.1253 | **Total R-Square** | 0.3401 |

| Parameter Estimates | | | | | |
|---|---|---|---|---|---|
| **Variable** | **DF** | **Estimate** | **Standard Error** | **t Value** | **Approx Pr > \|t\|** |
| **Intercept** | 1 | 500.7032 | 7.0607 | 70.91 | <.0001 |
| **PRESLOPE** | 1 | -0.4726 | 0.1676 | -2.82 | 0.0063 |
| **INTERVENTION** | 1 | 64.3653 | 18.5780 | 3.46 | 0.0009 |
| **POSTSLOPE** | 1 | -0.9847 | 3.1230 | -0.32 | 0.7535 |

| Estimates of Autocorrelations | | | |
|---|---|---|---|
| **Lag** | **Covariance** | **Correlation** | -1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1 |
| **0** | 552.7 | 1.000000 | \| \|******************** \| |
| **1** | 506.8 | 0.917035 | \| \|****************** \| |
| **2** | 453.0 | 0.819675 | \| \|**************** \| |
| **3** | 398.6 | 0.721261 | \| \|************** \| |
| **4** | 344.4 | 0.623212 | \| \|************ \| |
| **5** | 292.0 | 0.528290 | \| \|*********** \| |
| **6** | 242.5 | 0.438770 | \| \|********* \| |
| **7** | 187.6 | 0.339503 | \| \|******* \| |
| **8** | 125.6 | 0.227170 | \| \|***** \| |
| **9** | 59.8066 | 0.108210 | \| \|** \| |

| | |
|---|---|
| **Preliminary MSE** | 82.0632 |

| Estimates of Autoregressive Parameters | | | |
|---|---|---|---|
| **Lag** | **Coefficient** | **Standard Error** | **t Value** |
| **1** | -0.941015 | 0.048704 | -19.32 |
| **9** | 0.105561 | 0.048704 | 2.17 |

| Expected Autocorrelations | |
|---|---|
| **Lag** | **Autocorr** |
| **0** | 1.0000 |
| **1** | 0.9203 |
| **2** | 0.8332 |
| **3** | 0.7392 |
| **4** | 0.6392 |

| Expected Autocorrelations | |
|---|---|
| **Lag** | **Autocorr** |
| 5 | 0.5340 |
| 6 | 0.4245 |
| 7 | 0.3115 |
| 8 | 0.1960 |
| 9 | 0.0789 |

**Coefficients for First NLAG Observations**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.3772087866 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | -0.887514236 | 0.9643484785 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0.0876124279 | -0.9718014 | 0.9683201565 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.0876555305 | -1.83158E-16 | -0.967844007 | 0.9722794956 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0.0884206262 | -6.20929E-17 | 1.756048E-16 | -0.963866449 | 0.9762917723 | 0 | 0 | 0 | 0 |
| 6 | 0.0899397053 | -4.10727E-16 | 3.579476E-16 | 3.08583E-16 | -0.959802231 | 0.9804258133 | 0 | 0 | 0 |
| 7 | 0.0922783059 | -3.29621E-16 | -3.9457E-16 | 6.29505E-16 | 5.49854E-18 | -0.955578973 | 0.9847588847 | 0 | 0 |
| 8 | 0.0955426791 | 5.16068E-16 | -2.40239E-16 | -4.75736E-16 | 5.270659E-16 | 2.290195E-17 | -0.951112973 | 0.9893828706 | 0 |
| 9 | 0.0998923068 | -5.67527E-16 | 5.261927E-16 | -3.16363E-16 | -2.09848E-16 | 6.882152E-16 | -1.62045E-16 | -0.946302004 | 0.9944128607 |

ERROR: The estimation did not converge in the maximum iterations. Continuing assuming convergence.

# H1 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

| Maximum Likelihood Estimates | | | |
|---|---|---|---|
| SSE | 477.761484 | DFE | 66 |
| MSE | 7.23881 | Root MSE | 2.69050 |
| SBC | 373.657449 | AIC | 359.997453 |
| MAE | 2.06452569 | AICC | 361.28976 |
| MAPE | 0.42522773 | HQC | 365.435538 |
| Log Likelihood | -173.99873 | Transformed Regression R-Square | 0.0361 |
| Durbin-Watson | 0.9444 | Total R-Square | 0.9921 |
| | | Observations | 72 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | 478.4502 | 12.1229 | 39.47 | <.0001 |
| PRESLOPE | 1 | 0.1180 | 0.2995 | 0.39 | 0.6949 |
| INTERVENTION | 1 | 2.5475 | 2.8642 | 0.89 | 0.3770 |
| POSTSLOPE | 1 | -2.1452 | 1.8932 | -1.13 | 0.2613 |
| AR1 | 1 | -1.0607 | 0.0129 | -82.20 | <.0001 |
| AR9 | 1 | 0.1455 | 0.009990 | 14.56 | <.0001 |

**Expected Autocorrelations**

| Lag | Autocorr |
|---|---|
| 0 | 1.0000 |
| 1 | 0.9886 |
| 2 | 0.9609 |
| 3 | 0.9173 |
| 4 | 0.8587 |
| 5 | 0.7859 |
| 6 | 0.7001 |
| 7 | 0.6028 |
| 8 | 0.4955 |
| 9 | 0.3801 |

**Coefficients for First NLAG Observations**

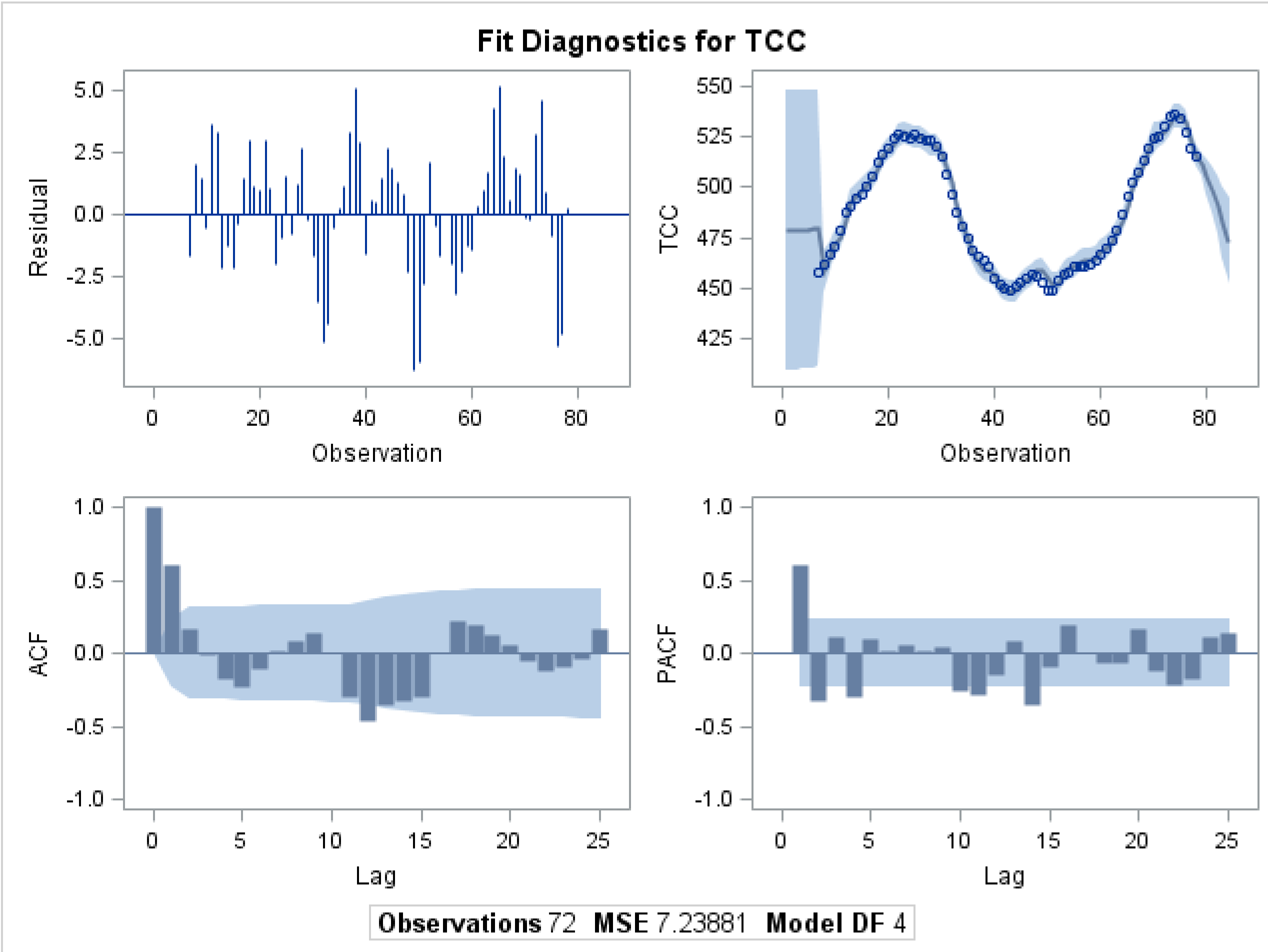
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.0819246261 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | -0.53775238 | 0.5439570452 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 0.5712938944 | -1.344617873 | 0.7888383743 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4 | 0.3702364058 | -2.2904E-14 | -1.21721835 | 0.8714017311 | 0 | 0 | 0 | 0 | 0 |
| 5 | 0.2782337348 | -1.1417E-15 | -2.31082E-14 | -1.159545391 | 0.9147431269 | 0 | 0 | 0 | 0 |
| 6 | 0.2260987161 | 2.13289E-14 | -2.30862E-14 | -1.80666E-14 | -1.125669358 | 0.9422715201 | 0 | 0 | 0 |
| 7 | 0.193199248 | 2.066448E-15 | 1.572733E-14 | -1.89932E-14 | -2.23158E-14 | -1.102728831 | 0.9618739871 | 0 | 0 |

| Coefficients for First NLAG Observations | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 8 | 0.1711688556 | 1.344402E-14 | -1.5583E-14 | 2.121077E-14 | -2.35458E-14 | -1.94314E-14 | -1.085672568 | 0.9769853347 | 0 |
| 9 | 0.1559839136 | 1.261917E-14 | 9.293927E-15 | -1.21173E-14 | 1.669508E-14 | -2.04984E-14 | -2.07977E-14 | -1.072094281 | 0.9893590478 |

| Autoregressive parameters assumed given | | | | | |
|---|---|---|---|---|---|
| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
| Intercept | 1 | 478.4502 | 10.4167 | 45.93 | <.0001 |
| PRESLOPE | 1 | 0.1180 | 0.2496 | 0.47 | 0.6380 |
| INTERVENTION | 1 | 2.5475 | 2.7774 | 0.92 | 0.3624 |
| POSTSLOPE | 1 | -2.1452 | 1.4481 | -1.48 | 0.1433 |

# H1 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure



## H2 INTERRUPTED TIME SERIES MODEL
## KY 2010-2016 HOSP Data

### The AUTOREG Procedure

| | |
|---|---|
| **Dependent Variable** | TCC |
| | Trend-Cycle Component |

# H2 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

| Ordinary Least Squares Estimates | | | |
|---|---|---|---|
| SSE | 5474.59017 | DFE | 68 |
| MSE | 80.50868 | Root MSE | 8.97266 |
| SBC | 533.280687 | AIC | 524.174022 |
| MAE | 7.24002084 | AICC | 524.771037 |
| MAPE | 9.09948508 | HQC | 527.799412 |
| Durbin-Watson | 0.1588 | Total R-Square | 0.5965 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | 94.3262 | 2.6189 | 36.02 | <.0001 |
| PRESLOPE | 1 | -0.4238 | 0.0622 | -6.82 | <.0001 |
| INTERVENTION | 1 | 26.2844 | 6.8908 | 3.81 | 0.0003 |
| POSTSLOPE | 1 | 1.9479 | 1.1584 | 1.68 | 0.0972 |

**Estimates of Autocorrelations**

| Lag | Covariance | Correlation | -1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1 |
|---|---|---|---|
| 0 | 76.0360 | 1.000000 | \|                    \|********************\| |
| 1 | 67.7791 | 0.891408 | \|                    \|******************  \| |
| 2 | 59.1527 | 0.777957 | \|                    \|****************    \| |

| Preliminary MSE | 15.5146 |
|---|---|

**Estimates of Autoregressive Parameters**

| Lag | Coefficient | Standard Error | t Value |
|---|---|---|---|
| 1 | -0.963672 | 0.122686 | -7.85 |
| 2 | 0.081067 | 0.122686 | 0.66 |

**Expected Autocorrelations**

| Lag | Autocorr |
|---|---|
| 0 | 1.0000 |
| 1 | 0.8914 |
| 2 | 0.7780 |

**Coefficients for First NLAG Observations**

| | 1 | 2 |
|---|---|---|
| 1 | 0.4517105923 | 0 |
| 2 | -0.888473771 | 0.9967086335 |

Algorithm converged.

# H2 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

**Maximum Likelihood Estimates**

| | | | |
|---|---|---|---|
| SSE | 54.5683334 | DFE | 66 |
| MSE | 0.82679 | Root MSE | 0.90928 |
| SBC | 216.866622 | AIC | 203.206625 |
| MAE | 0.71961981 | AICC | 204.498933 |
| MAPE | 0.91354465 | HQC | 208.64471 |
| Log Likelihood | -95.603312 | Transformed Regression R-Square | 0.0145 |
| Durbin-Watson | 2.1790 | Total R-Square | 0.9960 |
| | | Observations | 72 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | 81.1517 | 10.4191 | 7.79 | <.0001 |
| PRESLOPE | 1 | -0.0309 | 0.2425 | -0.13 | 0.8991 |
| INTERVENTION | 1 | -0.7915 | 0.9603 | -0.82 | 0.4128 |
| POSTSLOPE | 1 | 0.9172 | 1.2254 | 0.75 | 0.4568 |
| AR1 | 1 | -1.8639 | 0.0608 | -30.66 | <.0001 |
| AR2 | 1 | 0.8858 | 0.0611 | 14.49 | <.0001 |

**Expected Autocorrelations**

| Lag | Autocorr |
|---|---|
| 0 | 1.0000 |
| 1 | 0.9884 |
| 2 | 0.9564 |

**Coefficients for First NLAG Observations**

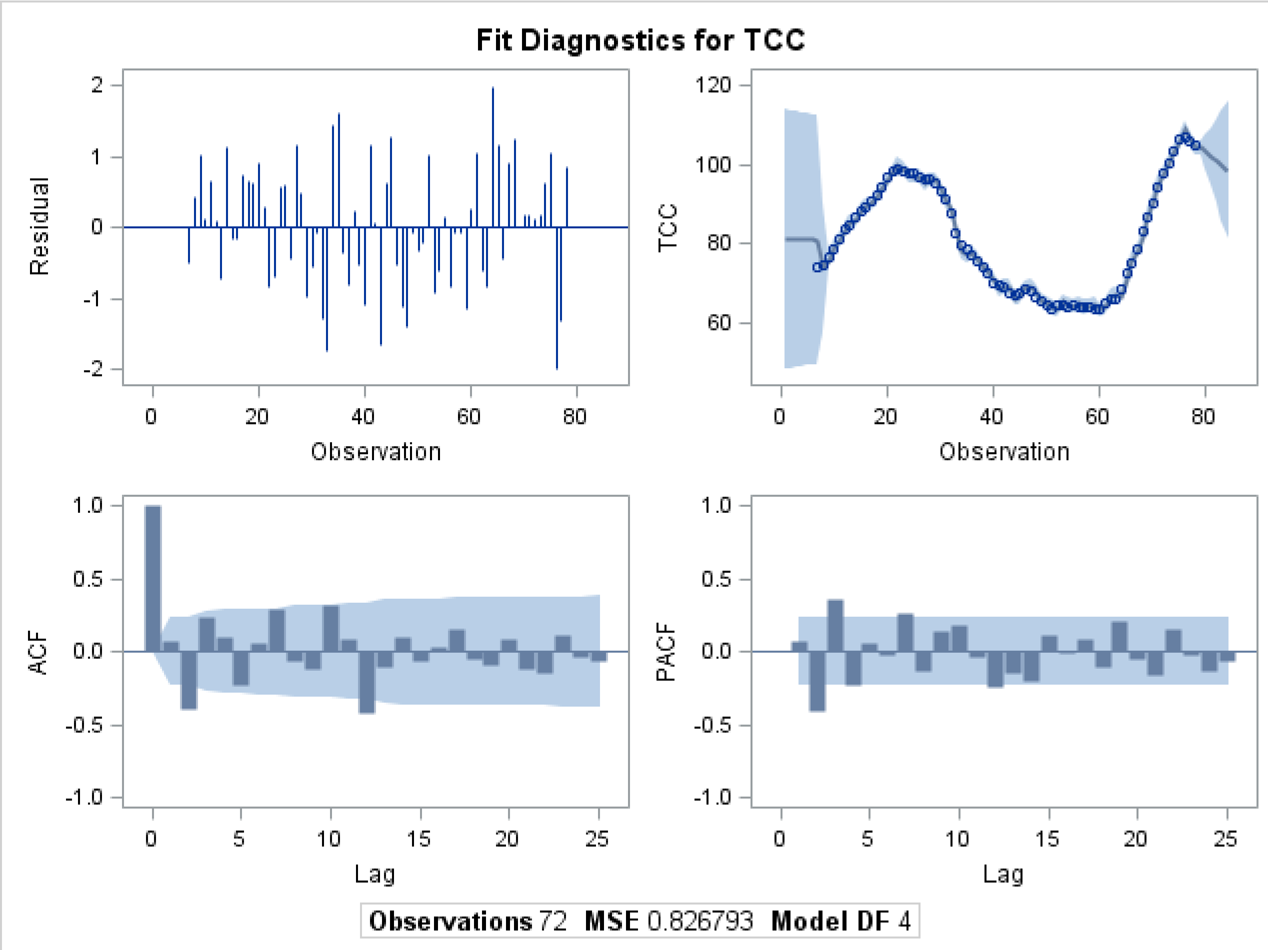
| | 1 | 2 |
|---|---|---|
| 1 | 0.0705476044 | 0 |
| 2 | -0.458584242 | 0.4639789554 |

**Autoregressive parameters assumed given**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | 81.1517 | 10.0415 | 8.08 | <.0001 |
| PRESLOPE | 1 | -0.0309 | 0.2254 | -0.14 | 0.8915 |
| INTERVENTION | 1 | -0.7915 | 0.8990 | -0.88 | 0.3818 |
| POSTSLOPE | 1 | 0.9172 | 1.0512 | 0.87 | 0.3861 |

# H2 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure



# H3 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

| | |
|---|---|
| **Dependent Variable** | TCC |
| | Trend-Cycle Component |

# H3 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

## The AUTOREG Procedure

| Ordinary Least Squares Estimates | | | |
|---|---|---|---|
| SSE | 193.600273 | DFE | 68 |
| MSE | 2.84706 | Root MSE | 1.68732 |
| SBC | 292.651135 | AIC | 283.54447 |
| MAE | 1.40152388 | AICC | 284.141485 |
| MAPE | 24.3570329 | HQC | 287.16986 |
| Durbin-Watson | 0.1016 | Total R-Square | 0.9773 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | -3.9894 | 0.4925 | -8.10 | <.0001 |
| PRESLOPE | 1 | 0.4735 | 0.0117 | 40.50 | <.0001 |
| INTERVENTION | 1 | 3.1970 | 1.2958 | 2.47 | 0.0161 |
| POSTSLOPE | 1 | 0.7236 | 0.2178 | 3.32 | 0.0014 |

**Estimates of Autocorrelations**

| Lag | Covariance | Correlation | -1 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 1 |
|---|---|---|---|
| 0 | 2.6889 | 1.000000 | \| \|********************\| |
| 1 | 2.5235 | 0.938481 | \| \|******************* \| |
| 2 | 2.2716 | 0.844818 | \| \|*****************   \| |
| 3 | 1.9600 | 0.728941 | \| \|***************     \| |
| 4 | 1.5900 | 0.591310 | \| \|************        \| |
| 5 | 1.1984 | 0.445668 | \| \|*********           \| |

| Preliminary MSE | 0.2696 |
|---|---|

**Estimates of Autoregressive Parameters**

| Lag | Coefficient | Standard Error | t Value |
|---|---|---|---|
| 1 | -1.109673 | 0.123663 | -8.97 |
| 2 | 0.092078 | 0.145678 | 0.63 |
| 5 | 0.143374 | 0.062381 | 2.30 |

**Expected Autocorrelations**

| Lag | Autocorr |
|---|---|
| 0 | 1.0000 |
| 1 | 0.9377 |
| 2 | 0.8440 |
| 3 | 0.7292 |
| 4 | 0.5970 |
| 5 | 0.4519 |

**Coefficients for First NLAG Observations**

**Coefficients for First NLAG Observations**

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 0.3192593119 | 0 | 0 | 0 | 0 |
| 2 | -0.861903504 | 0.9191322854 | 0 | 0 | 0 |
| 3 | 0.2820152673 | -1.166018183 | 0.9614243439 | 0 | 0 |
| 4 | 0.1710663949 | 0.0789748528 | -1.134152909 | 0.9765246953 | 0 |
| 5 | 0.1607589686 | -0.013339359 | 0.0930389655 | -1.121256905 | 0.9896685943 |

Algorithm converged.

# H3 INTERRUPTED TIME SERIES MODEL
# KY 2010-2016 HOSP Data

### The AUTOREG Procedure

| Maximum Likelihood Estimates | | | |
|---|---|---|---|
| SSE | 8.44833639 | DFE | 65 |
| MSE | 0.12997 | Root MSE | 0.36052 |
| SBC | 83.7842809 | AIC | 67.8476181 |
| MAE | 0.26570917 | AICC | 69.5976181 |
| MAPE | 3.34899783 | HQC | 74.1920507 |
| Log Likelihood | -26.923809 | Transformed Regression R-Square | 0.8919 |
| Durbin-Watson | 1.8285 | Total R-Square | 0.9990 |
| | | Observations | 72 |

**Parameter Estimates**

| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | -3.9252 | 1.1584 | -3.39 | 0.0012 |
| PRESLOPE | 1 | 0.4764 | 0.0274 | 17.36 | <.0001 |
| INTERVENTION | 1 | 0.4337 | 0.3689 | 1.18 | 0.2440 |
| POSTSLOPE | 1 | 0.9699 | 0.2353 | 4.12 | 0.0001 |
| AR1 | 1 | -1.4506 | 0.1223 | -11.86 | <.0001 |
| AR2 | 1 | 0.4512 | 0.1502 | 3.00 | 0.0038 |
| AR5 | 1 | 0.0854 | 0.0530 | 1.61 | 0.1119 |

**Expected Autocorrelations**

| Lag | Autocorr |
|---|---|
| 0 | 1.0000 |
| 1 | 0.9624 |
| 2 | 0.8793 |
| 3 | 0.7662 |
| 4 | 0.6325 |
| 5 | 0.4864 |

**Coefficients for First NLAG Observations**

| | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1 | 0.2057138132 | 0 | 0 | 0 | 0 |
| 2 | -0.728345231 | 0.7568387866 | 0 | 0 | 0 |
| 3 | 0.6193921214 | -1.53723735 | 0.9779834093 | 0 | 0 |
| 4 | 0.1441729195 | 0.3994689968 | -1.462541469 | 0.9885531749 | 0 |
| 5 | 0.1243635652 | -0.038683686 | 0.4528723403 | -1.455932054 | 0.9963451591 |

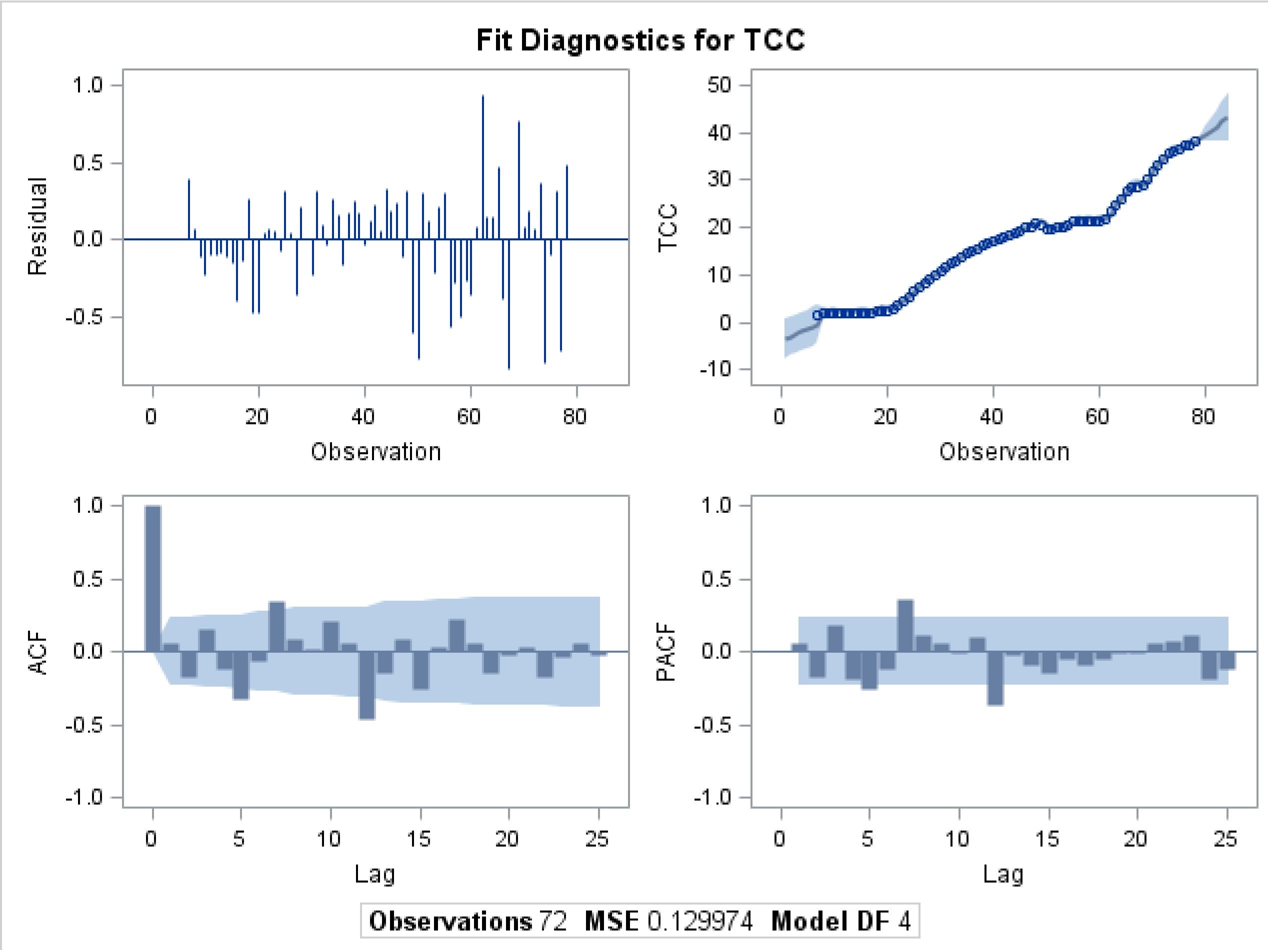
**Autoregressive parameters assumed given**

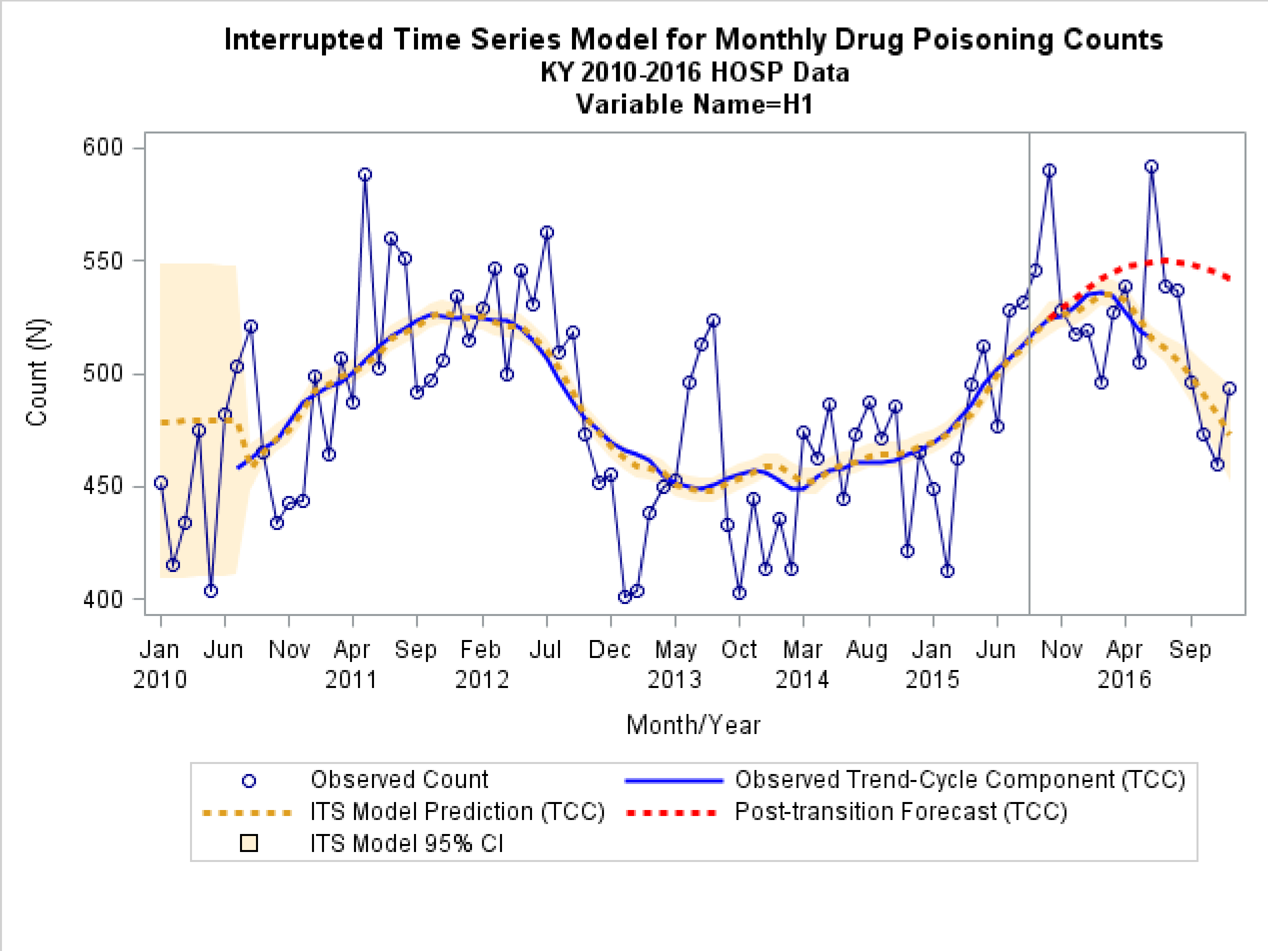
| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
|---|---|---|---|---|---|
| Intercept | 1 | -3.9252 | 1.1514 | -3.41 | 0.0011 |
| PRESLOPE | 1 | 0.4764 | 0.0270 | 17.63 | <.0001 |

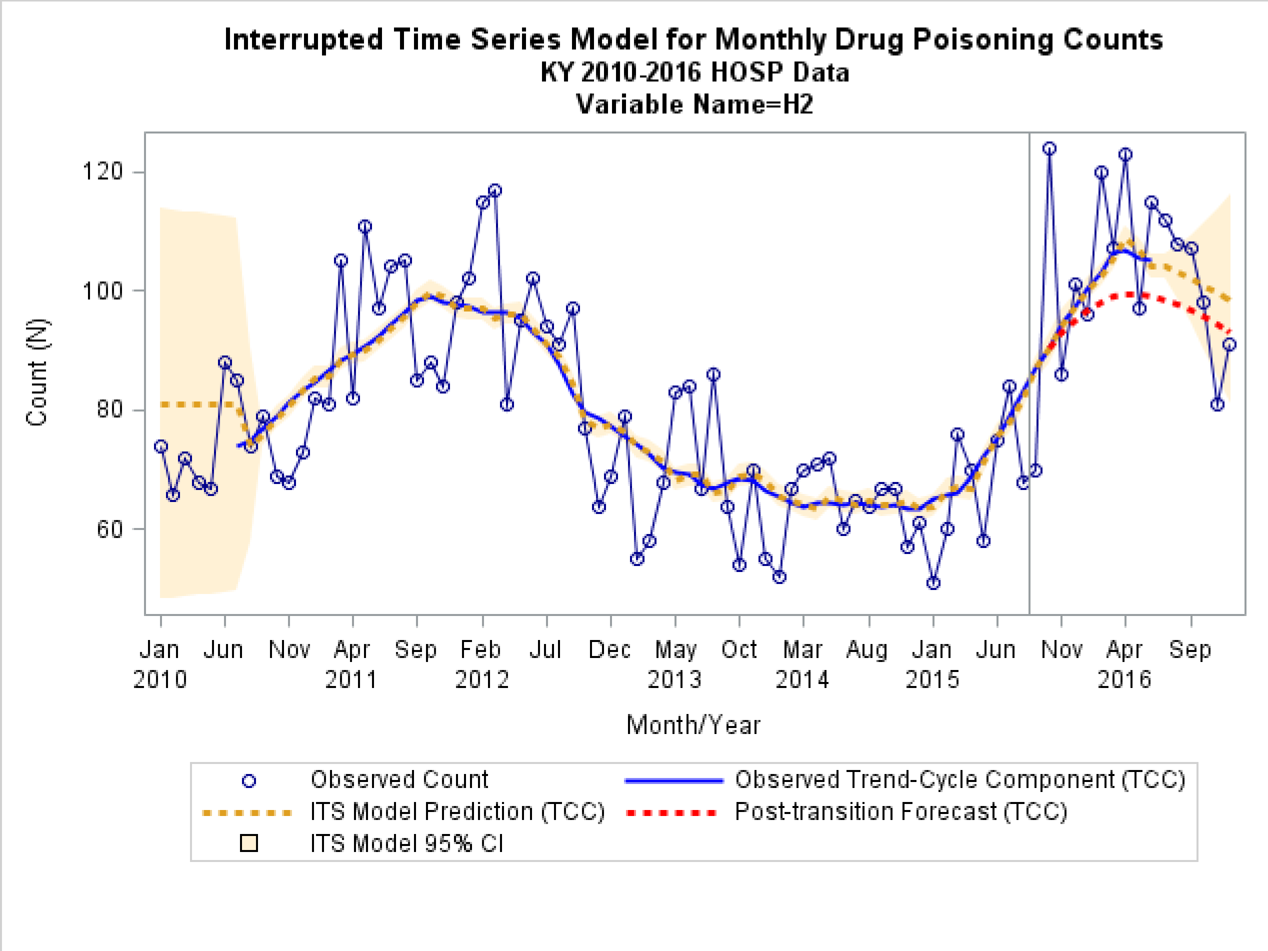
| Autoregressive parameters assumed given | | | | | |
|---|---|---|---|---|---|
| Variable | DF | Estimate | Standard Error | t Value | Approx Pr > \|t\| |
| INTERVENTION | 1 | 0.4337 | 0.3628 | 1.20 | 0.2363 |
| POSTSLOPE | 1 | 0.9699 | 0.2219 | 4.37 | <.0001 |

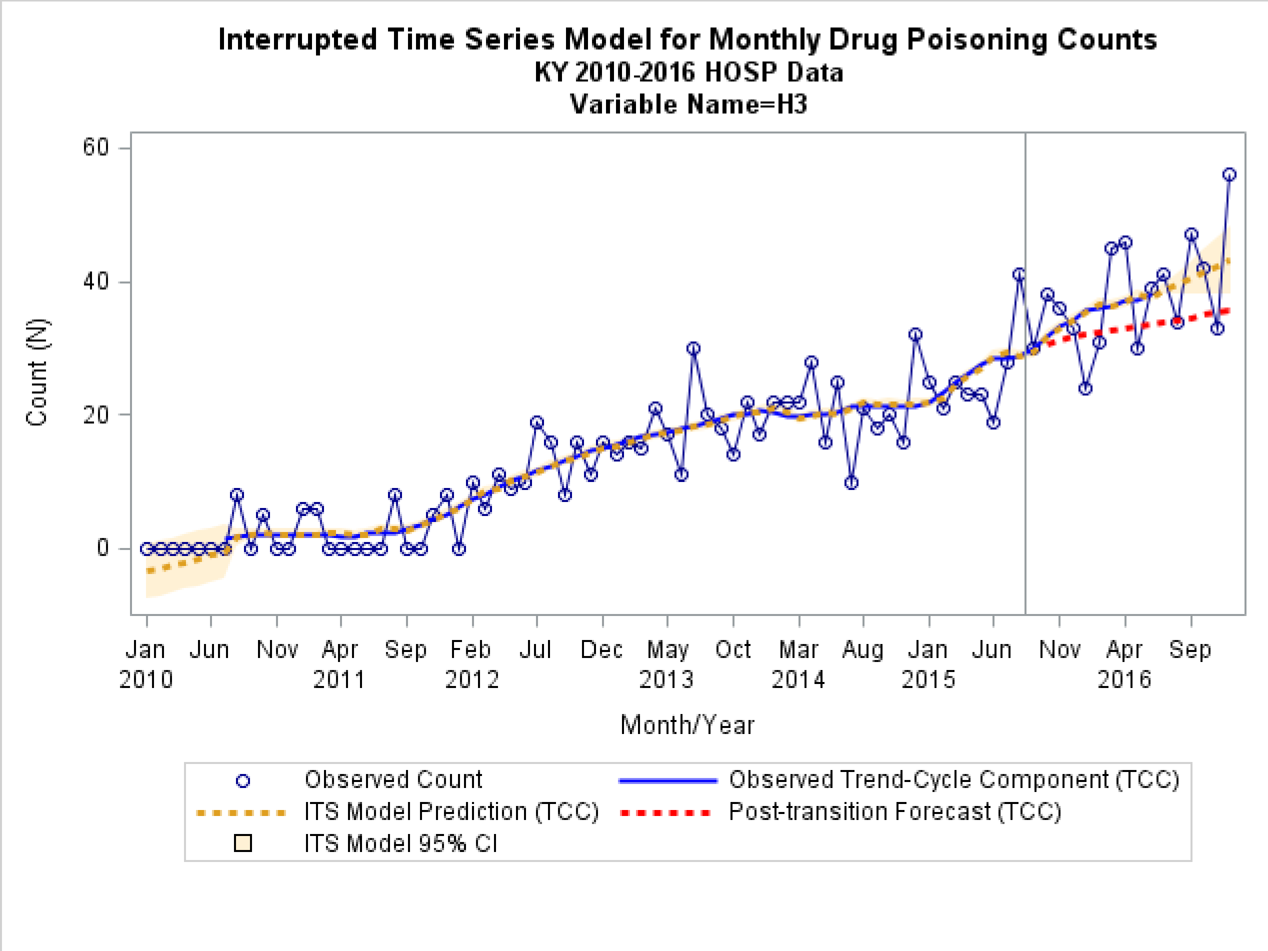
## H3 INTERRUPTED TIME SERIES MODEL
## KY 2010-2016 HOSP Data

### The AUTOREG Procedure




Interrupted Time Series Model for Monthly Drug Poisoning Counts
KY 2010-2016 HOSP Data
Variable Name=H1
Count (N)
600
550
500
450
400
Jan 2010
Jun
Nov
Apr 2011
Sep
Feb 2012
Jul
Dec
May 2013
Oct
Mar 2014
Aug
Jan 2015
Jun
Nov
Apr 2016
Sep
Month/Year
Observed Count
Observed Trend-Cycle Component (TCC)
ITS Model Prediction (TCC)
Post-transition Forecast (TCC)
ITS Model 95% CI


Interrupted Time Series Model for Monthly Drug Poisoning Counts
KY 2010-2016 HOSP Data
Variable Name=H2
Count (N)
120
100
80
60
Jan 2010
Jun
Nov
Apr 2011
Sep
Feb 2012
Jul
Dec
May 2013
Oct
Mar 2014
Aug
Jan 2015
Jun
Nov
Apr 2016
Sep
Month/Year
Observed Count
Observed Trend-Cycle Component (TCC)
ITS Model Prediction (TCC)
Post-transition Forecast (TCC)
ITS Model 95% CI


Interrupted Time Series Model for Monthly Drug Poisoning Counts
KY 2010-2016 HOSP Data
Variable Name=H3
Count (N)
60
40
20
0
Jan 2010
Jun
Nov
Apr 2011
Sep
Feb 2012
Jul
Dec
May 2013
Oct
Mar 2014
Aug
Jan 2015
Jun
Nov
Apr 2016
Sep
Month/Year
Observed Count
Observed Trend-Cycle Component (TCC)
ITS Model Prediction (TCC)
Post-transition Forecast (TCC)
ITS Model 95% CI