its.analysis examples

University of Exeter

Patrick English

15/02/2019

Load the package

```
library(its.analysis)
```

Build variables

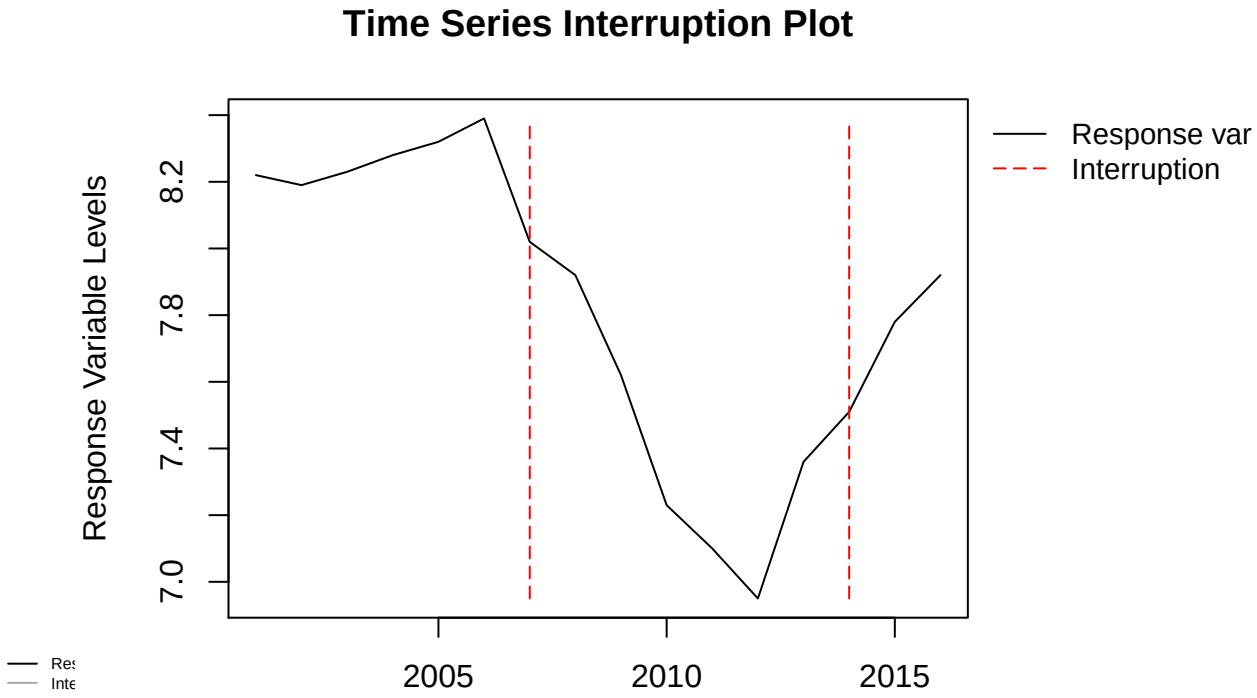
```
year <- c(2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008,
          2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016)
depv <- c(8.22, 8.19, 8.23, 8.28, 8.32, 8.39, 8.02,
          7.92, 7.62, 7.23, 7.1, 6.95, 7.36, 7.51, 7.78, 7.92)
interruption <- c(0, 0, 0, 0, 0, 0, 1, 1, 1, 1, 1, 1, 1, 0, 0, 0)
cov1 <- c(3.1, 3.3, 5.1, 5.2, 5.4, 4.5, 4.7, 4.9, 5.3,
          5.6, 5.8, 4.8, 5.2, 4.5, 4.6, 5.1)

x <- as.data.frame(cbind(year, depv, interruption, cov1))
```

First example model

This model should show a significant result with alpha < 0.01 on a sum-square estimation of 0.376. The lagged covariate should also be significant at alpha $= 0$. R-squared should be 0.89.

```
itsa.model(data=x, time="year", depvar="depv", interrupt_var = "interruption", alpha=0.01)
```

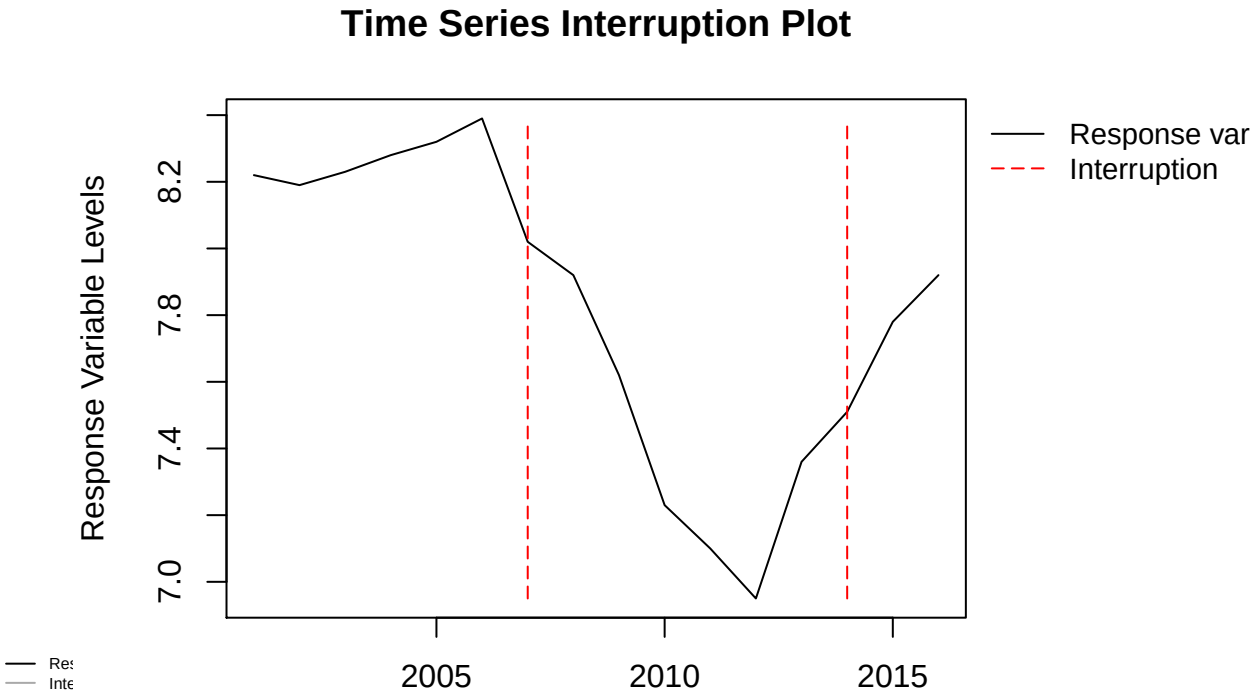



```
##
## Mean Values of Dependent Variable Between Time Periods:
##   interrupt_var count     mean      s.d.
## 1             0     9 8.093333 0.2930017
## 2             1     7 7.457143 0.4089301
##
##
## Analysis of Variances:
## Anova Table (Type II tests)
##
## Response: depvar
##                Sum Sq Df F value    Pr(>F)
## interrupt_var 0.37608  1  16.019  0.001754
## lag_depvar    1.39036  1  59.221 5.581e-06
## Residuals     0.28173 12
##
## Model Adjusted R-Squared: 0.8943
##
## Result: Significant variation between time periods with chosen alpha ( < 0.01 )
##
##
```

Second example: add a covariate

This model should again show a significant difference at $p < 0.01$, on a sum-square calculation of 0.326. The covariate should not be significant ($p = 0.927$) but again the lagged dependent variable should be significant at alpha = 0. R-squared should be 0.885.

```
itsa.model(data=x, time="year", depvar="depv", interrupt_var = "interruption",
           covariates = "cov1", alpha=0.05)
```

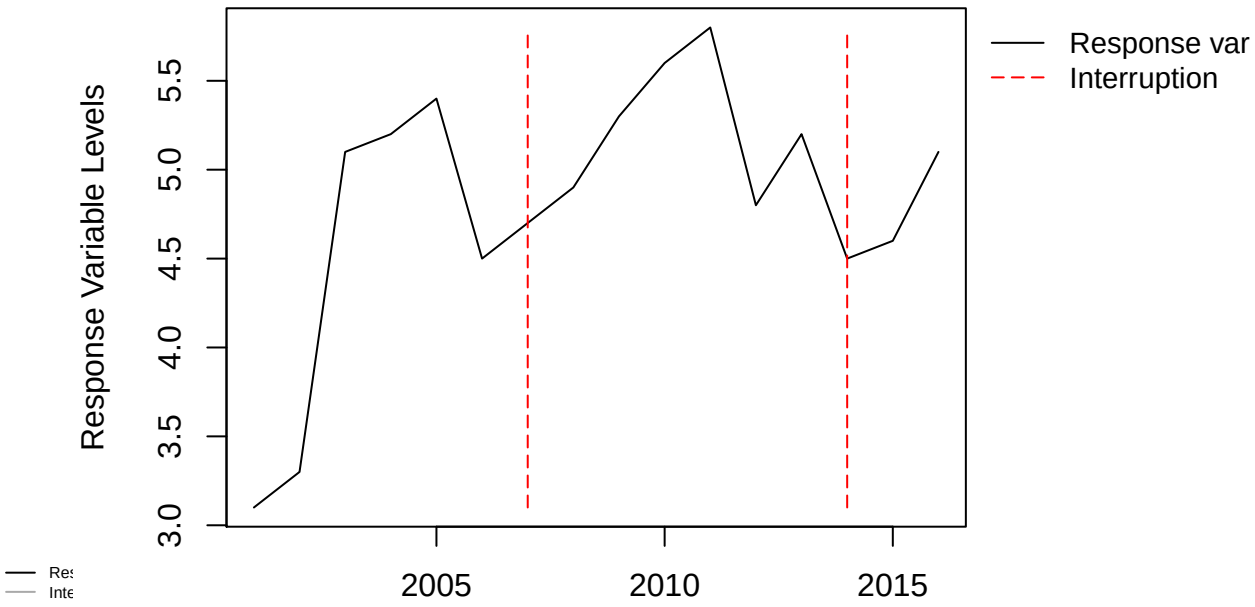



```
##
## Mean Values of Dependent Variable Between Time Periods:
##   interrupt_var count     mean      s.d.
## 1             0     9 8.093333 0.2930017
## 2             1     7 7.457143 0.4089301
##
##
## Analysis of Variances:
## Anova Table (Type II tests)
##
## Response: depvar
##                Sum Sq Df F value    Pr(>F)
## interrupt_var 0.32600  1 12.7388  0.004402
## cov1          0.00023  1  0.0089  0.926634
## lag_depvar    1.36675  1 53.4073 1.527e-05
## Residuals     0.28150 11
##
## Model Adjusted R-Squared: 0.8848
##
## Result: Significant variation between time periods with chosen alpha ( < 0.05 )
##
##
```

Example no significant result

The final example should not show a significant result from the interruption variable. The p-value should be 0.345 on a sum-square of 0.258. The R-squared should be 0.237, and the lagged dependent variable should be significant at alpha = 0.1.

```
itsa.model(data=x, time="year", depvar="cov1", interrupt_var = "interruption", alpha=0.05)
```




```
##
## Mean Values of Dependent Variable Between Time Periods:
##   interrupt_var count     mean      s.d.
## 1             0     9 4.533333 0.8231039
## 2             1     7 5.185714 0.4140393
##
##
## Analysis of Variances:
## Anova Table (Type II tests)
##
## Response: depvar
##               Sum Sq Df F value  Pr(>F)
## interrupt_var 0.2579  1  0.9514 0.34861
## lag_depvar    0.8851  1  3.2660 0.09585
## Residuals     3.2522 12
##
## Model Adjusted R-Squared: 0.2371
##
## Result: No significant variation between time periods with chosen alpha ( < 0.05 )
##
##
```