Country spending too much or too little on defense data and Investment spending

src

October 16, 2015

Load packages and support files

```
## Loading required package: Hmisc
## Loading required package: grid
## Loading required package: lattice
## Loading required package: survival
## Loading required package: splines
## Loading required package: Formula
## Loading required package: ggplot2
##
## Attaching package: 'Hmisc'
##
## The following objects are masked from 'package:base':
##
##     format.pval, round.POSIXt, trunc.POSIXt, units
##
## Loading required package: texreg
## Version:  1.34
## Date:     2014-10-31
## Author:   Philip Leifeld (University of Konstanz)
##
## Please cite the JSS article in your publications -- see citation("texreg").
## Loading required package: plm
## Loading required package: reshape


## Warning in library(package, lib.loc = lib.loc, character.only = TRUE,
## logical.return = TRUE, : there is no package called 'reshape'


## Loading required package: plyr
##
## Attaching package: 'plyr'
##
## The following objects are masked from 'package:Hmisc':
##
##     is.discrete, summarize
##
## Loading required package: quantmod
## Loading required package: xts
## Loading required package: zoo
##
## Attaching package: 'zoo'
##
## The following objects are masked from 'package:base':
##
```

```
##     as.Date, as.Date.numeric
##
## Loading required package: TTR
## Version 0.4-0 included new data defaults. See ?getSymbols.
##
## Attaching package: 'quantmod'
##
## The following object is masked from 'package:Hmisc':
##
##     Lag
```

Load and subset the data we want

```
## Loading required package: reshape2
## Loading required package: stringr
```

```
## Warning: attributes are not identical across measure variables; they will
## be dropped
```

```
## Warning in CompilePubOpDataOmnibus(): NAs introduced by coercion
```

```
## Warning in CompilePubOpDataOmnibus(): NAs introduced by coercion
```

load and subset the data we want

OLS model adding each variable individually

```
EquEUDefSpreadResults1 <- lm(EquSpendDelt ~ DefSpread, EuropeDefSpread_lag0)
summary(EquEUDefSpreadResults1)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread, data = EuropeDefSpread_lag0)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.75769 -0.13729 -0.06451  0.07660  2.65723
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept) 0.0254211  0.0613992    0.414    0.680
## DefSpread   0.0002575  0.0023495    0.110    0.913
##
## Residual standard error: 0.4164 on 60 degrees of freedom
##    (1 observation deleted due to missingness)
## Multiple R-squared:  0.0002002,  Adjusted R-squared:  -0.01646
## F-statistic: 0.01201 on 1 and 60 DF,  p-value: 0.9131
```

```
EquEUDefSpreadResults2 <- lm(EquSpendDelt ~ DefSpread_lag1, EuropeDefSpread_lag1)
summary(EquEUDefSpreadResults2)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag1, data = EuropeDefSpread_lag1)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.84318 -0.12843 -0.06471  0.09432  2.58705
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.000480   0.066927   0.007    0.994
## DefSpread_lag1 -0.002076   0.002761  -0.752    0.456
##
## Residual standard error: 0.4244 on 51 degrees of freedom
## Multiple R-squared:  0.01096,    Adjusted R-squared:  -0.00843
## F-statistic: 0.5653 on 1 and 51 DF,  p-value: 0.4556
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2),
          custom.model.names=c("PubOp_df1","PubOp_df2"))
```

```
##
## ====================================
##                PubOp_df1  PubOp_df2
## ------------------------------------
## (Intercept)      0.03       0.00
##                 (0.06)     (0.07)
## DefSpread        0.00
##                 (0.00)
## DefSpread_lag1             -0.00
##                            (0.00)
## ------------------------------------
## R^2              0.00       0.01
## Adj. R^2        -0.02      -0.01
## Num. obs.        62         53
## ====================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
EquEUDefSpreadResults3 <- lm(EquSpendDelt ~ DefSpread_lag2, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults3)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.59362 -0.08256  0.03446  0.09248  0.47095
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.054971   0.034622   1.588   0.1200
## DefSpread_lag2 0.005163   0.001610   3.207   0.0026 **
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2068 on 41 degrees of freedom
## Multiple R-squared:  0.2005, Adjusted R-squared:  0.181
## F-statistic: 10.28 on 1 and 41 DF,  p-value: 0.002602
```

```r
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3),
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3"))
```

```
##
## =================================================
##                 PubOp_df1  PubOp_df2  PubOp_df3
## -------------------------------------------------
## (Intercept)       0.03       0.00       0.05
##                  (0.06)     (0.07)     (0.03)
## DefSpread         0.00
##                  (0.00)
## DefSpread_lag1               -0.00
##                             (0.00)
## DefSpread_lag2                          0.01 **
##                                        (0.00)
## -------------------------------------------------
## R^2               0.00       0.01       0.20
## Adj. R^2         -0.02      -0.01       0.18
## Num. obs.        62         53         43
## =================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```r
##use 2 lag

EquEUDefSpreadResults4 <- lm(EquSpendDelt ~ DefSpread_lag2 + IntAt, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults4)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + IntAt, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.61720 -0.06368  0.02514  0.09063  0.44901
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.067603   0.038959   1.735  0.09102 .
## DefSpread_lag2 0.004889   0.001651   2.962  0.00532 **
## IntAt          0.002329   0.051117   0.046  0.96390
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2055 on 37 degrees of freedom
##   (3 observations deleted due to missingness)
## Multiple R-squared:  0.1945, Adjusted R-squared:  0.151
## F-statistic: 4.467 on 2 and 37 DF,  p-value: 0.01829
```

4

```r
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "IntAt"))
```

```
##
## ========================================================
##                PubOp_df1  PubOp_df2  PubOp_df3  IntAt
## --------------------------------------------------------
## (Intercept)      0.03       0.00       0.05       0.07
##                 (0.06)     (0.07)     (0.03)     (0.04)
## DefSpread        0.00
##                 (0.00)
## DefSpread_lag1             -0.00
##                           (0.00)
## DefSpread_lag2                         0.01 **    0.00 **
##                                       (0.00)     (0.00)
## IntAt                                             0.00
##                                                  (0.05)
## --------------------------------------------------------
## R^2              0.00       0.01       0.20       0.19
## Adj. R^2        -0.02      -0.01       0.18       0.15
## Num. obs.       62         53         43         40
## ========================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```r
#intAT not significant won't include

EquEUDefSpreadResults5 <- lm(EquSpendDelt ~ DefSpread_lag2 + CivilWar, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults5)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + CivilWar, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.57961 -0.06863  0.01324  0.08676  0.48493
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.041132   0.034964   1.176  0.24638
## DefSpread_lag2 0.005167   0.001578   3.275  0.00219 **
## CivilWar       0.198893   0.121295   1.640  0.10890
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2026 on 40 degrees of freedom
## Multiple R-squared:  0.2509, Adjusted R-squared:  0.2134
## F-statistic: 6.699 on 2 and 40 DF,  p-value: 0.003096
```

```r
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "CivilWar"))
```

```
## 
## =========================================================
##                 PubOp_df1  PubOp_df2  PubOp_df3  CivilWar
## ---------------------------------------------------------
## (Intercept)      0.03       0.00       0.05       0.04
##                 (0.06)     (0.07)     (0.03)     (0.03)
## DefSpread        0.00
##                 (0.00)
## DefSpread_lag1             -0.00
##                            (0.00)
## DefSpread_lag2                         0.01 **    0.01 **
##                                       (0.00)     (0.00)
## CivilWar                                          0.20
##                                                  (0.12)
## ---------------------------------------------------------
## R^2              0.00       0.01       0.20       0.25
## Adj. R^2        -0.02      -0.01       0.18       0.21
## Num. obs.       62         53         43         43
## =========================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
##civilwar isn't significant, won't include
```

```
EquEUDefSpreadResults6 <- lm(EquSpendDelt ~ DefSpread_lag2 + IntlCnf, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults6)
```

```
## 
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + IntlCnf, data = EuropeDefSpread_lag2)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.58048 -0.07153  0.01550  0.09082  0.48345
## 
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.046060   0.034750   1.325  0.19255
## DefSpread_lag2 0.005268   0.001591   3.311  0.00198 **
## IntlCnf        0.211785   0.148006   1.431  0.16022
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 0.2042 on 40 degrees of freedom
## Multiple R-squared:  0.2395, Adjusted R-squared:  0.2014
## F-statistic: 6.298 on 2 and 40 DF,  p-value: 0.004191
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "IntCnf"))
```

```
## 
## =========================================================
##                 PubOp_df1  PubOp_df2  PubOp_df3  IntCnf
```

```
## -----------------------------------------------------------
## (Intercept)         0.03         0.00         0.05         0.05
##                    (0.06)       (0.07)       (0.03)       (0.03)
## DefSpread           0.00
##                    (0.00)
## DefSpread_lag1                  -0.00
##                                 (0.00)
## DefSpread_lag2                               0.01 **     0.01 **
##                                              (0.00)      (0.00)
## IntlCnf                                                   0.21
##                                                          (0.15)
## -----------------------------------------------------------
## R^2                 0.00         0.01         0.20         0.24
## Adj. R^2           -0.02        -0.01         0.18         0.20
## Num. obs.          62           53           43           43
## ===========================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
## IntCnf not significant won't include
```

```
EquEUDefSpreadResults7 <- lm(EquSpendDelt ~ DefSpread_lag2 + GDPpCapDelt, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults7)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + GDPpCapDelt, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.58163 -0.11702  0.02803  0.09482  0.50943
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.027956   0.038857   0.719  0.47604
## DefSpread_lag2 0.004946   0.001595   3.101  0.00353 **
## GDPpCapDelt    0.829192   0.568645   1.458  0.15260
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.204 on 40 degrees of freedom
## Multiple R-squared:  0.2409, Adjusted R-squared:  0.2029
## F-statistic: 6.347 on 2 and 40 DF,  p-value: 0.004037
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "GDPpc"))
```

```
##
## ===========================================================
##               PubOp_df1  PubOp_df2  PubOp_df3  GDPpc
## -----------------------------------------------------------
## (Intercept)      0.03         0.00         0.05         0.03
##                 (0.06)       (0.07)       (0.03)       (0.04)
```

```
## DefSpread          0.00
##               (0.00)
## DefSpread_lag1            -0.00
##                       (0.00)
## DefSpread_lag2                      0.01 **    0.00 **
##                                     (0.00)     (0.00)
## GDPpCapDelt                                     0.83
##                                                (0.57)
## -------------------------------------------------------------
## R^2            0.00       0.01       0.20       0.24
## Adj. R^2      -0.02      -0.01       0.18       0.20
## Num. obs.       62         53         43         43
## =============================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
##GDP doesn't increase r^2 by more htan .02 points and is not statistically significant, won't be inclu
```

```
EquEUDefSpreadResults8 <- lm(EquSpendDelt ~ DefSpread_lag2 + Cab_left_right, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults8)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + Cab_left_right,
##      data = EuropeDefSpread_lag2)
##
## Residuals:
##       Min       1Q   Median       3Q      Max
## -0.58098 -0.08451  0.03149  0.10111  0.46269
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.091376   0.127506   0.717  0.47776
## DefSpread_lag2  0.005143   0.001629   3.156  0.00303 **
## Cab_left_right -0.006560   0.022092  -0.297  0.76806
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2091 on 40 degrees of freedom
## Multiple R-squared:  0.2023, Adjusted R-squared:  0.1624
## F-statistic: 5.072 on 2 and 40 DF,  p-value: 0.01088
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "Cableftright"))
```

```
##
## =============================================================
##               PubOp_df1  PubOp_df2  PubOp_df3  Cableftright
## -------------------------------------------------------------
## (Intercept)      0.03       0.00       0.05       0.09
##                 (0.06)     (0.07)     (0.03)     (0.13)
## DefSpread        0.00
##                 (0.00)
## DefSpread_lag1            -0.00
```

```
##                               (0.00)
## DefSpread_lag2                               0.01 **     0.01 **
##                                             (0.00)      (0.00)
## Cab_left_right                                           -0.01
##                                                          (0.02)
## -------------------------------------------------------------------
## R^2                    0.00       0.01       0.20        0.20
## Adj. R^2              -0.02      -0.01       0.18        0.16
## Num. obs.               62         53         43          43
## ===================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
##cableft right not significant will not include

EquEUDefSpreadResults9 <- lm(EquSpendDelt ~ DefSpread_lag2 + Cab_liberty_authority, EuropeDefSpread_lag2
summary(EquEUDefSpreadResults9)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + Cab_liberty_authority,
##     data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.59169 -0.08237  0.03441  0.09332  0.46936
##
## Coefficients:
##                        Estimate Std. Error t value Pr(>|t|)
## (Intercept)            0.059761   0.103727   0.576  0.56775
## DefSpread_lag2         0.005154   0.001638   3.147  0.00312 **
## Cab_liberty_authority -0.000901   0.018364  -0.049  0.96111
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2093 on 40 degrees of freedom
## Multiple R-squared:  0.2006, Adjusted R-squared:  0.1606
## F-statistic: 5.018 on 2 and 40 DF,  p-value: 0.01136
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "lib_authority"))
```

```
##
## =======================================================================
##                   PubOp_df1  PubOp_df2  PubOp_df3  lib_authority
## -----------------------------------------------------------------------
## (Intercept)          0.03       0.00       0.05        0.06
##                     (0.06)     (0.07)     (0.03)      (0.10)
## DefSpread            0.00
##                     (0.00)
## DefSpread_lag1                  -0.00
##                               (0.00)
## DefSpread_lag2                             0.01 **     0.01 **
##                                           (0.00)      (0.00)
```

```
## Cab_liberty_authority                                        -0.00
##                                                              (0.02)
## -------------------------------------------------------------------------
## R^2                     0.00        0.01        0.20        0.20
## Adj. R^2               -0.02       -0.01        0.18        0.16
## Num. obs.              62          53          43          43
## =========================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
##cab liberty authority not significant won't be included

EquEUDefSpreadResults10 <- lm(EquSpendDelt ~ DefSpread_lag2 + Cab_eu_anti_pro, EuropeDefSpread_lag2)
summary(EquEUDefSpreadResults10)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + Cab_eu_anti_pro,
##     data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.59398 -0.08074  0.02760  0.10584  0.48311
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -0.088882   0.172129  -0.516   0.6084
## DefSpread_lag2  0.005374   0.001634   3.289   0.0021 **
## Cab_eu_anti_pro 0.019731   0.023123   0.853   0.3986
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2074 on 40 degrees of freedom
## Multiple R-squared:  0.2148, Adjusted R-squared:  0.1756
## F-statistic: 5.472 on 2 and 40 DF,  p-value: 0.007929
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadRes
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "euAntiPro"))
```

```
##
## ================================================================
##                 PubOp_df1  PubOp_df2  PubOp_df3  euAntiPro
## ----------------------------------------------------------------
## (Intercept)       0.03       0.00       0.05       -0.09
##                  (0.06)     (0.07)     (0.03)      (0.17)
## DefSpread         0.00
##                  (0.00)
## DefSpread_lag1              -0.00
##                             (0.00)
## DefSpread_lag2                          0.01 **    0.01 **
##                                        (0.00)      (0.00)
## Cab_eu_anti_pro                                     0.02
##                                                    (0.02)
## ----------------------------------------------------------------
```

```
## R^2                       0.00          0.01          0.20          0.21
## Adj. R^2                  -0.02         -0.01          0.18          0.18
## Num. obs.                    62            53            43            43
## =============================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

##not significant, won't be included eu anti pro

```
EquEUDefSpreadResults11 <- lm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, EuropeDefSpread_lag
summary(EquEUDefSpreadResults11)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread,
##     data = EuropeDefSpread_lag2)
##
## Residuals:
##       Min       1Q   Median       3Q       Max
## -0.55730 -0.10380  0.02237  0.12385  0.37110
##
## Coefficients:
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)          0.157319   0.054126   2.907  0.00593 **
## DefSpread_lag2       0.004753   0.001535   3.096  0.00358 **
## left_right_ls_spread -0.012233   0.005145  -2.378  0.02230 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1959 on 40 degrees of freedom
## Multiple R-squared:  0.2995, Adjusted R-squared:  0.2645
## F-statistic: 8.552 on 2 and 40 DF,  p-value: 0.0008087
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "leftrightLS"))
```

```
##
## =======================================================================
##                       PubOp_df1  PubOp_df2  PubOp_df3  leftrightLS
## ---------------------------------------------------------------------
## (Intercept)              0.03       0.00       0.05       0.16 **
##                         (0.06)     (0.07)     (0.03)     (0.05)
## DefSpread                0.00
##                         (0.00)
## DefSpread_lag1                     -0.00
##                                    (0.00)
## DefSpread_lag2                                 0.01 **    0.00 **
##                                               (0.00)     (0.00)
## left_right_ls_spread                                     -0.01 *
##                                                          (0.01)
## ---------------------------------------------------------------------
## R^2                      0.00       0.01       0.20       0.30
## Adj. R^2                -0.02      -0.01       0.18       0.26
## Num. obs.                  62         53         43         43
```

```
## ============================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05

##let_right_ls spread is significant, will be included

EquEUDefSpreadResults12 <- lm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread + liberty_authority_l
summary(EquEUDefSpreadResults12)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread +
##     liberty_authority_ls_spread, data = EuropeDefSpread_lag2)
##
## Residuals:
##       Min       1Q   Median       3Q      Max
## -0.55120 -0.10662  0.01942  0.12244  0.37189
##
## Coefficients:
##                               Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  0.1598274  0.0599251   2.667  0.01108 *
## DefSpread_lag2               0.0047913  0.0015990   2.996  0.00473 **
## left_right_ls_spread        -0.0116550  0.0076373  -1.526  0.13506
## liberty_authority_ls_spread -0.0007459  0.0072046  -0.104  0.91807
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1984 on 39 degrees of freedom
## Multiple R-squared:  0.2997, Adjusted R-squared:  0.2459
## F-statistic: 5.564 on 3 and 39 DF,  p-value: 0.002817
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "leftrightLS", "libauthLS"))
```

```
##
## =========================================================================================
##                              PubOp_df1  PubOp_df2  PubOp_df3  leftrightLS  libauthLS
## -----------------------------------------------------------------------------------------
## (Intercept)                    0.03       0.00       0.05       0.16 **      0.16 *
##                               (0.06)     (0.07)     (0.03)     (0.05)       (0.06)
## DefSpread                      0.00
##                               (0.00)
## DefSpread_lag1                           -0.00
##                                          (0.00)
## DefSpread_lag2                                       0.01 **    0.00 **      0.00 **
##                                                     (0.00)     (0.00)       (0.00)
## left_right_ls_spread                                           -0.01 *      -0.01
##                                                                (0.01)       (0.01)
## liberty_authority_ls_spread                                                 -0.00
##                                                                             (0.01)
## -----------------------------------------------------------------------------------------
## R^2                            0.00       0.01       0.20       0.30         0.30
## Adj. R^2                      -0.02      -0.01       0.18       0.26         0.25
## Num. obs.                     62         53         43         43           43
```

```
## ================================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05

##libauthLS isn't signficicant won't be included

EquEUDefSpreadResults13 <- lm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread + eu_anti_pro_ls_spre
summary(EquEUDefSpreadResults13)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread +
##     eu_anti_pro_ls_spread, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.55619 -0.10230  0.02632  0.12000  0.36721
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           0.174779   0.077844   2.245   0.0305 *
## DefSpread_lag2        0.005133   0.001966   2.610   0.0128 *
## left_right_ls_spread -0.012310   0.005210  -2.363   0.0232 *
## eu_anti_pro_ls_spread -0.002728   0.008647  -0.316   0.7541
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1982 on 39 degrees of freedom
## Multiple R-squared:  0.3013, Adjusted R-squared:  0.2476
## F-statistic: 5.606 on 3 and 39 DF,  p-value: 0.002701
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
          custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "leftrightLS", "euantiproLS"))
```

```
##
## =========================================================================================
##                       PubOp_df1  PubOp_df2  PubOp_df3  leftrightLS  euantiproLS
## -----------------------------------------------------------------------------------------
## (Intercept)            0.03       0.00       0.05       0.16 **      0.17 *
##                       (0.06)     (0.07)     (0.03)     (0.05)       (0.08)
## DefSpread              0.00
##                       (0.00)
## DefSpread_lag1                   -0.00
##                                  (0.00)
## DefSpread_lag2                              0.01 **     0.00 **      0.01 *
##                                             (0.00)     (0.00)       (0.00)
## left_right_ls_spread                                   -0.01 *      -0.01 *
##                                                        (0.01)       (0.01)
## eu_anti_pro_ls_spread                                                -0.00
##                                                                     (0.01)
## -----------------------------------------------------------------------------------------
## R^2                    0.00       0.01       0.20       0.30         0.30
## Adj. R^2              -0.02      -0.01       0.18       0.26         0.25
## Num. obs.             62         53         43         43           43
```

13

```
## ================================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
##eu anti pro isn't signficicant won't be included
```

results 11 is final model.

interaction with left_right_ls_spread and Defspread

```
##center variables
```

```
EuropeDefSpread_lag2$left_right_ls_spreadC <- ((EuropeDefSpread_lag2$left_right_ls_spread) - mean(Europe
```

```
EuropeDefSpread_lag2$DefSpread_lag2C <- ((EuropeDefSpread_lag2$DefSpread_lag2) - mean(EuropeDefSpread_la
```

```
EuropeDefSpread_lag2$intrleft_right_ls_DefSread <- (EuropeDefSpread_lag2$DefSpread_lag2C * EuropeDefSpr
```

```
EquEUDefSpreadResults14 <- lm(EquSpendDelt ~ DefSpread_lag2C + left_right_ls_spreadC + intrleft_right_l
summary(EquEUDefSpreadResults14)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2C + left_right_ls_spreadC +
##     intrleft_right_ls_DefSread, data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.56256 -0.10145  0.02106  0.12408  0.36877
##
## Coefficients:
##                              Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 8.501e-03  3.052e-02   0.279  0.78205
## DefSpread_lag2C             4.742e-03  1.556e-03   3.048  0.00413 **
## left_right_ls_spreadC      -1.232e-02  5.242e-03  -2.350  0.02390 *
## intrleft_right_ls_DefSread -4.726e-05  3.119e-04  -0.152  0.88034
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1984 on 39 degrees of freedom
## Multiple R-squared:  0.2999, Adjusted R-squared:  0.2461
## F-statistic:  5.57 on 3 and 39 DF,  p-value: 0.002801
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "leftrightLS", "interaction"))
```

```
##
## ================================================================================
##                      PubOp_df1  PubOp_df2  PubOp_df3  leftrightLS  interaction
## --------------------------------------------------------------------------------
## (Intercept)             0.03       0.00       0.05       0.16 **      0.01
##                        (0.06)     (0.07)     (0.03)     (0.05)       (0.03)
```

14

```
## DefSpread                           0.00
##                                    (0.00)
## DefSpread_lag1                                   -0.00
##                                                 (0.00)
## DefSpread_lag2                                            0.01 **    0.00 **
##                                                          (0.00)     (0.00)
## left_right_ls_spread                                               -0.01 *
##                                                                    (0.01)
## DefSpread_lag2C                                                              0.00 **
##                                                                             (0.00)
## left_right_ls_spreadC                                                       -0.01 *
##                                                                             (0.01)
## intrleft_right_ls_DefSread                                                  -0.00
##                                                                             (0.00)
## -------------------------------------------------------------------------------
## R^2                            0.00        0.01        0.20        0.30        0.30
## Adj. R^2                      -0.02       -0.01        0.18        0.26        0.25
## Num. obs.                       62          53          43          43          43
## ===============================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05

##interaction term is not significant and will not be used.
```

Tests of within and pooling we should explain this in the

```
EquEUDefSpreadResults11 <- lm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, EuropeDefSpread_lag
summary(EquEUDefSpreadResults11)
```

```
##
## Call:
## lm(formula = EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread,
##     data = EuropeDefSpread_lag2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.55730 -0.10380  0.02237  0.12385  0.37110
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           0.157319   0.054126   2.907  0.00593 **
## DefSpread_lag2        0.004753   0.001535   3.096  0.00358 **
## left_right_ls_spread -0.012233   0.005145  -2.378  0.02230 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1959 on 40 degrees of freedom
## Multiple R-squared:  0.2995, Adjusted R-squared:  0.2645
## F-statistic: 8.552 on 2 and 40 DF,  p-value: 0.0008087
```

```
screenreg(list(EquEUDefSpreadResults1,EquEUDefSpreadResults2, EquEUDefSpreadResults3, EquEUDefSpreadResu
         custom.model.names=c("PubOp_df1","PubOp_df2", "PubOp_df3", "leftrightLS"))
```

```
##
```

```
## =====================================================================
##                      PubOp_df1   PubOp_df2   PubOp_df3   leftrightLS
## ---------------------------------------------------------------------
## (Intercept)            0.03        0.00        0.05        0.16 **
##                       (0.06)      (0.07)      (0.03)      (0.05)
## DefSpread              0.00
##                       (0.00)
## DefSpread_lag1                    -0.00
##                                   (0.00)
## DefSpread_lag2                                 0.01 **     0.00 **
##                                               (0.00)      (0.00)
## left_right_ls_spread                                      -0.01 *
##                                                           (0.01)
## ---------------------------------------------------------------------
## R^2                    0.00        0.01        0.20        0.30
## Adj. R^2              -0.02       -0.01        0.18        0.26
## Num. obs.             62          53          43          43
## =====================================================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
DefSpreadPooled <- plm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, data = EuropeDefSpread_lag
```

```
## series NATOally, xUnit.Currency, xCabinetChecksum, xOppositionChecksum are constants and have been r
```

```
DefSpreadWithin <- plm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, data =  EuropeDefSpread_lag
```

```
## series NATOally, xUnit.Currency, xCabinetChecksum, xOppositionChecksum are constants and have been r
```

```
pFtest(DefSpreadWithin, DefSpreadPooled)
```

```
##
##   F test for individual effects
##
## data:  EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread
## F = 2.9074, df1 = 9, df2 = 31, p-value = 0.01289
## alternative hypothesis: significant effects
```

```
##p = .01289  reject the null that the pooling model works (all coefficients for each country should be
```

Fixed Effects model (within)

```
EUequSpreadResultsA <- plm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, data = EuropeDefSpread_
```

```
## series NATOally, xUnit.Currency, xCabinetChecksum, xOppositionChecksum are constants and have been r
```

```
summary(EUequSpreadResultsA)
```

```
## Oneway (individual) effect Within Model
##
## Call:
```

```
## plm(formula = EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread,
##     data = EuropeDefSpread_lag2, model = "within", index = c("Country",
##         "Year"))
##
## Unbalanced Panel: n=10, T=3-5, N=43
##
## Residuals :
##     Min.  1st Qu.   Median  3rd Qu.      Max.
## -0.28200 -0.10200  0.00998  0.09180  0.36300
##
## Coefficients :
##                       Estimate Std. Error t-value Pr(>|t|)
## DefSpread_lag2        0.0044972  0.0018575  2.4211  0.02152 *
## left_right_ls_spread -0.0165218  0.0066478 -2.4853  0.01855 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    1.1368
## Residual Sum of Squares: 0.83277
## R-Squared      :  0.26746
##       Adj. R-Squared :  0.19282
## F-statistic: 5.65922 on 2 and 31 DF, p-value: 0.0080334
```

```
screenreg(list(EquEUDefSpreadResults11, EUequSpreadResultsA))
```

```
##
## =======================================
##                     Model 1    Model 2
## ---------------------------------------
## (Intercept)           0.16 **
##                      (0.05)
## DefSpread_lag2        0.00 **    0.00 *
##                      (0.00)     (0.00)
## left_right_ls_spread -0.01 *    -0.02 *
##                      (0.01)     (0.01)
## ---------------------------------------
## R^2                   0.30       0.27
## Adj. R^2              0.26       0.19
## Num. obs.            43         43
## =======================================
## *** p < 0.001, ** p < 0.01, * p < 0.05
```

```
#testing for fixed effects
pFtest(EUequSpreadResultsA, EquEUDefSpreadResults11)
```

```
##
##  F test for individual effects
##
## data:  EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread
## F = 2.9074, df1 = 9, df2 = 31, p-value = 0.01289
## alternative hypothesis: significant effects
```

```
##p = .1358,, cannot reject null hypothesis that there are not significcnat effects, use pooled
```

Compare Fixed effects to random effects Hausman test. null hypothesist that RE model is true,
alternative = fixed effects model

```
EUDefSpreadResultsWithin <- plm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, data = EuropeDefSp
```

```
## series NATOally, xUnit.Currency, xCabinetChecksum, xOppositionChecksum are constants and have been re
```

```
EUDefSpreadResultsRandom <- plm(EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread, data = EuropeDefSp
```

```
## series NATOally, xUnit.Currency, xCabinetChecksum, xOppositionChecksum are constants and have been re
```

```
phtest(EUDefSpreadResultsWithin, EUDefSpreadResultsRandom)
```

```
##
##  Hausman Test
##
## data:  EquSpendDelt ~ DefSpread_lag2 + left_right_ls_spread
## chisq = 0.2036, df = 2, p-value = 0.9032
## alternative hypothesis: one model is inconsistent
```

```
##p .9032 cannot reject null
```