# Pooled OLS

```
. reg productionchange receivedchange deductionchange incomechange laborchange stockchange, vce(cluster no)
```

```
Linear regression                              Number of obs    =        329
                                               F(5, 46)         =    1157.53
                                               Prob > F         =     0.0000
                                               R-squared        =     0.9558
                                               Root MSE         =     .00515
```

```
                              (Std. Err. adjusted for 47 clusters in no)
```

| productioncha~e | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| receivedchange | .0005188 | .0001524 | 3.40 | 0.001 | .000212 | .0008257 |
| deductionchange | .00052 | .0000934 | 5.57 | 0.000 | .0003319 | .000708 |
| incomechange | 1.009899 | .0142837 | 70.70 | 0.000 | .9811477 | 1.038651 |
| laborchange | .0013945 | .0125946 | 0.11 | 0.912 | -.023957 | .0267461 |
| stockchange | -.020248 | .0155356 | -1.30 | 0.199 | -.0515196 | .0110236 |
| _cons | -.002131 | .0003791 | -5.62 | 0.000 | -.0028941 | -.0013679 |

# Fixed Effect Model

```
. xtreg productionchange receivedchange deductionchange incomechange laborchange stockchange, fe
```

```
Fixed-effects (within) regression              Number of obs    =        329
Group variable: no                             Number of groups =         47

R-sq:                                          Obs per group:
     within  = 0.9583                                      min =          7
     between = 0.9112                                      avg =        7.0
     overall = 0.9558                                      max =          7

                                               F(5,277)         =    1272.70
corr(u_i, Xb)  = -0.0180                        Prob > F         =     0.0000
```

| productioncha~e | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| receivedchange | .0005603 | .0001574 | 3.56 | 0.000 | .0002504 | .0008701 |
| deductionchange | .0005425 | .000099 | 5.48 | 0.000 | .0003475 | .0007374 |
| incomechange | 1.011524 | .0139802 | 72.35 | 0.000 | .9840027 | 1.039045 |
| laborchange | .0001639 | .0136326 | 0.01 | 0.990 | -.0266728 | .0270006 |
| stockchange | -.0302828 | .0200035 | -1.51 | 0.131 | -.0696611 | .0090954 |
| _cons | -.0022233 | .0004393 | -5.06 | 0.000 | -.0030881 | -.0013585 |
| sigma_u | .00169027 | | | | | |
| sigma_e | .0052595 | | | | | |
| rho | .09361299 | (fraction of variance due to u_i) | | | | |

```
F test that all u_i=0: F(46, 277) = 0.71                    Prob > F = 0.9175
```

# Random Effect Model

```
. xtreg productionchange receivedchange deductionchange incomechange laborchange stockchange, re

Random-effects GLS regression                  Number of obs      =        329
Group variable: no                             Number of groups   =         47

R-sq:                                          Obs per group:
    within  = 0.9582                                        min =          7
    between = 0.9134                                        avg =        7.0
    overall = 0.9558                                        max =          7

                                               Wald chi2(5)       =    6988.94
corr(u_i, X)   = 0 (assumed)                   Prob > chi2        =     0.0000

------------------------------------------------------------------------------
productioncha~e |     Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------+-------------------------------------------------------------
 receivedchange |   .0005188   .0001445     3.59   0.000     .0002356     .000802
deductionchange |     .00052   .0000944     5.51   0.000      .000335    .0007049
   incomechange |   1.009899   .0132186    76.40   0.000     .9839913    1.035807
    laborchange |   .0013945   .0126286     0.11   0.912     -.023357    .0261461
    stockchange |   -.020248   .0160057    -1.27   0.206    -.0516186    .0111226
          _cons |   -.002131   .0004229    -5.04   0.000    -.0029598   -.0013021
----------------+-------------------------------------------------------------
        sigma_u |          0
        sigma_e |  .0052595
            rho |          0   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

## Hausman Test

```
. hausman fixed random

                 ---- Coefficients ----
             |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
             |     fixed        random        Difference         S.E.
-------------+----------------------------------------------------------------
receivedch~e |   .0005603      .0005188        .0000415          .0000624
deductionc~e |   .0005425        .00052        .0000225          .0000299
incomechange |   1.011524      1.009899        .0016244          .0045514
 laborchange |   .0001639      .0013945       -.0012306          .0051349
 stockchange |  -.0302828      -.020248       -.0100348          .0119983
-------------+----------------------------------------------------------------
                b = consistent under Ho and Ha; obtained from xtreg
          B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

              chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =         1.86
            Prob>chi2 =       0.8683
```

## Breusch & Pagan Test

```
. xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        productionchange[no,t] = Xb + u[no] + e[no,t]

        Estimated results:
                      |       Var      sd = sqrt(Var)
             ---------+-----------------------------
             product~e |    .0005914        .0243189
                     e |    .0000277        .0052595
                     u |           0               0

        Test:   Var(u) = 0
                             chibar2(01) =       0.00
                           Prob > chibar2 =    1.0000
```

## Data From 2008 to 2017（Pooled OLS）[1]

```
. reg productionchange receivedchange deductionchange incomechange laborchange stockchange if year >= 26, vce(cluster no)

Linear regression                               Number of obs     =        141
                                                F(5, 46)          =     283.01
                                                Prob > F          =     0.0000
                                                R-squared         =     0.9453
                                                Root MSE          =     .00492

                                (Std. Err. adjusted for 47 clusters in no)
-----------------------------------------------------------------------------
                 |              Robust
productioncha~e  |     Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
-----------------+-----------------------------------------------------------
  receivedchange | -.0000512   .0002392   -0.21   0.831   -.0005328    .0004303
 deductionchange |   .001431   .0002883    4.96   0.000    .0008507    .0020113
    incomechange |  1.027603   .0314433   32.68   0.000    .9643106    1.090895
     laborchange |  .0340111   .0331662    1.03   0.311    -.032749    .1007712
     stockchange | -.0621518   .0193224   -3.22   0.002   -.1010457   -.0232579
           _cons | -.0017217   .0006288   -2.74   0.009   -.0029873    -.000456
-----------------------------------------------------------------------------
```

## Public Affair・Education・Health & Social Welfare (Pooled OLS)

```
. reg publicchange receivedchange deductionchange incomechange laborchange stockchange, vce(cluster no)

Linear regression                               Number of obs     =        329
                                                F(5, 46)          =       2.66
                                                Prob > F          =     0.0342
                                                R-squared         =     0.0310
                                                Root MSE          =     .02565

                                (Std. Err. adjusted for 47 clusters in no)
-----------------------------------------------------------------------------
                 |              Robust
     publicchange |     Coef.   Std. Err.      t    P>|t|    [95% Conf. Interval]
-----------------+-----------------------------------------------------------
  receivedchange |  .0007245   .0006893    1.05   0.299    -.000663    .0021119
 deductionchange | -.0011786   .0004028   -2.93   0.005   -.0019893   -.0003679
    incomechange |  -.134224   .0663884   -2.02   0.049   -.2678568   -.0005911
     laborchange |  .0812369   .0510371    1.59   0.118   -.0214954    .1839693
     stockchange |  .1028774   .0710815    1.45   0.155   -.0402022     .245957
           _cons | -.0020001   .0026739   -0.75   0.458   -.0073823    .0033821
-----------------------------------------------------------------------------
```

---

[1] ijijiijij

```
. reg educchange receivedchange deductionchange incomechange laborchange stockchange, vce(cluster no)

Linear regression                                Number of obs   =        329
                                                 F(5, 46)        =       1.42
                                                 Prob > F        =     0.2338
                                                 R-squared       =     0.0262
                                                 Root MSE        =     .01705

                                    (Std. Err. adjusted for 47 clusters in no)
-------------------------------------------------------------------------------
              |               Robust
   educchange |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+----------------------------------------------------------------
receivedchange| -.0000539    .0004142   -0.13   0.897    -.0008877    .0007799
deductionchange|  .0002641   .0002507    1.05   0.298    -.0002405    .0007686
  incomechange|  .0804786     .046269    1.74   0.089     -.012656    .1736133
   laborchange| -.0476403    .0373116   -1.28   0.208    -.1227445     .027464
   stockchange| -.1055897    .0723652   -1.46   0.151    -.2512534    .0400739
        _cons|   .005647    .0013589    4.16   0.000     .0029117    .0083823
-------------------------------------------------------------------------------

. reg socialchange receivedchange deductionchange incomechange laborchange stockchange, vce(cluster no)

Linear regression                                Number of obs   =        329
                                                 F(5, 46)        =      17.45
                                                 Prob > F        =     0.0000
                                                 R-squared       =     0.2345
                                                 Root MSE        =     .01551

                                    (Std. Err. adjusted for 47 clusters in no)
-------------------------------------------------------------------------------
              |               Robust
  socialchange|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+----------------------------------------------------------------
receivedchange| -.0002337     .000352   -0.66   0.510    -.0009421    .0004748
deductionchange|  .0017989   .0002709    6.64   0.000     .0012536    .0023442
  incomechange|  .3252519    .0429514    7.57   0.000     .2387952    .4117086
   laborchange| -.0027069    .0367804   -0.07   0.942     -.076742    .0713282
   stockchange|  -.106921    .0520691   -2.05   0.046    -.2117306   -.0021113
        _cons|  .0098601     .00117    8.43   0.000     .0075049    .0122153
-------------------------------------------------------------------------------
```

## Public Affairs（Pooled OLS/Without capital stock）

```
. reg publicchange receivedchange deductionchange incomechange laborchange, vce(cluster no)

Linear regression                                Number of obs   =        376
                                                 F(4, 46)        =       4.82
                                                 Prob > F        =     0.0025
                                                 R-squared       =     0.0210
                                                 Root MSE        =     .02611

                                    (Std. Err. adjusted for 47 clusters in no)
-------------------------------------------------------------------------------
              |               Robust
  publicchange|      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
--------------+----------------------------------------------------------------
receivedchange|   .000908    .0006916    1.31   0.196    -.0004842    .0023001
deductionchange| -.0012166   .0002932   -4.15   0.000    -.0018069   -.0006264
  incomechange| -.0952485    .0508441   -1.87   0.067    -.1975924    .0070954
   laborchange|   .082259    .0490315    1.68   0.100    -.0164364    .1809543
        _cons| -.0017244    .0016124   -1.07   0.290    -.0049701    .0015212
-------------------------------------------------------------------------------
```

## Education（Pooled OLS / Without input labor force）

```
. reg educchange receivedchange deductionchange incomechange stockchange, vce(cluster no)

Linear regression                                Number of obs    =        329
                                                 F(4, 46)         =       1.41
                                                 Prob > F         =     0.2441
                                                 R-squared        =     0.0222
                                                 Root MSE         =     .01706

                                         (Std. Err. adjusted for 47 clusters in no)
-----------------------------------------------------------------------------------
                 |               Robust
      educchange |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------+-----------------------------------------------------------------
   receivedchange |   -.000071   .0004057    -0.18   0.862    -.0008876    .0007456
  deductionchange |   .0000817   .0002156     0.38   0.706    -.0003522    .0005156
     incomechange |   .0684718   .0441965     1.55   0.128    -.0204911    .1574347
      stockchange |  -.1035875   .0728218    -1.42   0.162    -.2501702    .0429952
            _cons |   .0060057   .0013252     4.53   0.000     .0033381    .0086732
-----------------------------------------------------------------------------------
```

## Public Health & Social Welfare（Pooled OLS / Without input labor force）

```
. reg socialchange receivedchange deductionchange incomechange stockchange, vce(cluster no)

Linear regression                                Number of obs    =        329
                                                 F(4, 46)         =      21.59
                                                 Prob > F         =     0.0000
                                                 R-squared        =     0.2345
                                                 Root MSE         =     .01549

                                         (Std. Err. adjusted for 47 clusters in no)
-----------------------------------------------------------------------------------
                 |               Robust
     socialchange |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------+-----------------------------------------------------------------
   receivedchange |  -.0002346   .0003502    -0.67   0.506    -.0009395    .0004703
  deductionchange |   .0017885   .0002138     8.36   0.000     .0013581     .002219
     incomechange |   .3245697   .0409738     7.92   0.000     .2420938    .4070456
      stockchange |  -.1068072   .0522345    -2.04   0.047    -.2119499   -.0016645
            _cons |   .0098805   .0010949     9.02   0.000     .0076767    .0120843
-----------------------------------------------------------------------------------
```

## Organized table（+Pooled OLS）

```
. est table public educ social pols, star

-------------------------------------------------------------------------
    Variable |    public         educ          social          pols
-------------+-----------------------------------------------------------
  receivedch~e |  .00072448     -.0000539     -.00023366     .00051882**
  deductionc~e | -.00117861**    .00026407     .00179891***   .00051996***
  incomechange | -.13422397*     .08047862      .3252519***   1.0098993***
   laborchange |  .08123695     -.04764025    -.00270689      .00139453
   stockchange |  .10287739     -.10558974    -.10692097*    -.02024798
         _cons | -.00200011      .00564702***   .0098601***   -.00213096***
-------------------------------------------------------------------------
                        legend: * p<0.05; ** p<0.01; *** p<0.001
```

## Organized table + Pooled OLS (exclude capital stock)

```
. est table public educ social pols_excludestock, star

-----------------------------------------------------------------------
    Variable |    public          educ         social     pols_exclud~k
-------------+---------------------------------------------------------
 receivedch~e |   .00072448     -.0000539     -.00023366    .00049007***
 deductionc~e | -.00117861**     .00026407    .00179891***   .00055722***
 incomechange | -.13422397*      .08047862     .3252519***   1.0144671***
  laborchange |   .08123695     -.04764025    -.00270689      6.477e-06
  stockchange |   .10287739     -.10558974    -.10692097*
        _cons | -.00200011      .00564702***  .0098601***   -.00238486***
-----------------------------------------------------------------------
                       legend: * p<0.05; ** p<0.01; *** p<0.001
```