```
R version 3.0.1 (2013-05-16) -- "Good Sport"
> install.packages("plm")
> library(plm)  Loading required package: nlme ...
> data(Grunfeld)
> head(Grunfeld)
firm year   inv  value capital |> summary(Grunfeld)
   1 1935 317.6 3078.5     2.8 |      firm          year          inv              value           capital
   1 1936 391.8 4661.7    52.6 | Min.   : 1.0  Min.   :1935  Min.   :   0.93  Min.   :  58.12  Min.   :   0.80
   1 1937 410.6 5387.1   156.9 | 1st Qu.: 3.0  1st Qu.:1940  1st Qu.:  33.56  1st Qu.: 199.97  1st Qu.:  79.17
   1 1938 257.7 2792.2   209.2 | Median : 5.5  Median :1944  Median :  57.48  Median : 517.95  Median : 205.60
   1 1939 330.8 4313.2   203.4 | Mean   : 5.5  Mean   :1944  Mean   : 145.96  Mean   :1081.68  Mean   : 276.02
   1 1940 461.2 4643.9   207.2 | 3rd Qu.: 8.0  3rd Qu.:1949  3rd Qu.: 138.04  3rd Qu.:1679.85  3rd Qu.: 358.10
                               | Max.   :10.0  Max.   :1954  Max.   :1486.70  Max.   :6241.70  Max.   :2226.30

> vcmfML<-lmList(inv~value+capital|year,data=Grunfeld) #Variable coeffcients, "within" plm p.44
> coef(vcmfML)
      (Intercept)      value      capital       value Pr(>|t|  capital Pr(>|t|)
1935    0.3560335 0.10249786 -0.001994772     2.821848e-03    0.996536081
1936   15.2189424 0.08370736 -0.053641246     1.785969e-04    0.899287732
1937   -3.3864702 0.07651380  0.217722370     4.702279e-05    0.582090879
1938  -17.5819018 0.06801777  0.269114634     4.788130e-02    0.404080267
1939  -21.1542290 0.06552194  0.198664570     6.564605e-03    0.482083718
1940  -27.0470687 0.09539899  0.202290565     2.328544e-05    0.472785960
1941  -16.5194901 0.11476375  0.177465020     1.212807e-06    0.509182484
1942  -17.6182810 0.14282514  0.071024035     9.498889e-06    0.774527355
1943  -22.7637943 0.11860950  0.105411928     6.204563e-06    0.647496743
1944  -15.8281383 0.11816421  0.072207166     1.228336e-06    0.732479953
1945  -10.5196744 0.10847089  0.050220832     9.763134e-07    0.801500261
1946   -5.9906590 0.13794818  0.005413393     1.668821e-09    0.976521034
1947   -3.7324861 0.16392695 -0.003707209     1.640302e-05    0.982440036
1948    8.5388116 0.17866729 -0.042555528     5.598809e-05    0.782630549
1949    5.1782822 0.16159618 -0.036965104     1.496333e-04    0.807913095
1950  -12.1746788 0.17621675 -0.022095639     2.972162e-05    0.876016775
1951   26.1381617 0.18314051 -0.112056960     7.992691e-08    0.404031592
1952    7.2928451 0.19892081 -0.067495013     2.897338e-07    0.616744430
1953  -50.1525452 0.18267386  0.098753342     1.065592e-06    0.456473108
1954 -133.3930999 0.13451161  0.331374645     1.211699e-03    0.003541993
> quantile(coef(vcmfML)[,2])
        0%        25%        50%        75%       100%
0.06552194 0.10072314 0.12656056 0.16699940 0.19892081
> quantile(coef(vcmfML)[,3])
         0%          25%         50%         75%        100%
-0.11205696 -0.02581301  0.06062243  0.18276491  0.33137464

> ?pvcm #pvcm {plm}R Documentation Variable Coefficients Models for Panel Data
> vcmf<-pvcm(inv~value+capital,data=Grunfeld,model="within",effect="time")
> summary(vcmf)
Oneway (time) effect No-pooling model
Call: pvcm(formula = inv ~ value + capital, data = Grunfeld, effect = "time",  model = "within")
Balanced Panel: n=10, T=20, N=200
Residuals:
    Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
-342.800  -20.100    0.727    0.000   23.650  258.500
Coefficients:
  (Intercept)           value            capital
 Min.   :-133.393   Min.   :0.06552   Min.   :-0.11206
 1st Qu.: -18.502   1st Qu.:0.10072   1st Qu.:-0.02581
 Median : -11.347   Median :0.12656   Median : 0.06062
 Mean   : -14.757   Mean   :0.13060   Mean   : 0.07296
 3rd Qu.:   1.562   3rd Qu.:0.16700   3rd Qu.: 0.18276
 Max.   :  26.138   Max.   :0.19892   Max.   : 0.33137

Total Sum of Squares: 474010000 Residual Sum of Squares: 1205800 Multiple R-Squared: 0.99746

##### Random Effects, plm p.43  ###########
> reGLS<-plm(inv~value+capital,data=Grunfeld,model="random")
>  reML<-lme(inv~value+capital,data=Grunfeld,random=~1|firm)
>  coef(reGLS)
(Intercept)       value     capital
-57.8344149   0.1097812   0.3081130
> summary(reML)$coef$fixed
(Intercept)       value     capital
-57.8644245   0.1097897   0.3081881
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```
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