Untitled

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```
d<-read.csv(file = "/Users/Nitij singh/Documents/gdpcoun.csv")
#########################
#Descriptive Statistics########
########################
#Creating separate table for developed countries
d1<-subset(d,d$D.E.De == 1)
#View the new table
View(d1)
# Dropping the variable country name
d1$X<-NULL
# Dropping the variable years
d1$X.1<-NULL
#Summary Statisitc of Developed Countries
summary(d1)
```

```
##      D.E.De    GDP.Growth        Lab.Qual         Lab.Quant
##  Min.   :1   Min.   :-8.631   Min.   :-1.2487   Min.   :-9.9211
##  1st Qu.:1   1st Qu.: 1.528   1st Qu.: 0.1684   1st Qu.:-0.1009
##  Median :1   Median : 2.582   Median : 0.3080   Median : 0.9513
##  Mean   :1   Mean   : 2.307   Mean   : 0.3683   Mean   : 0.8325
##  3rd Qu.:1   3rd Qu.: 3.700   3rd Qu.: 0.5316   3rd Qu.: 1.9577
##  Max.   :1   Max.   :10.234   Max.   : 1.6147   Max.   : 5.6898
##   ICT.Capital       NICT.Capital      Cl.Quality         Cl.Quant
##  Min.   : 0.5678   Min.   :-2.459   Min.   :-0.8349   Min.   :-6.26626
##  1st Qu.: 7.9922   1st Qu.: 1.482   1st Qu.: 0.1181   1st Qu.:-0.06874
##  Median :11.3690   Median : 2.182   Median : 0.1900   Median : 0.60905
##  Mean   :11.1155   Mean   : 2.324   Mean   : 0.2296   Mean   : 0.49789
##  3rd Qu.:14.0709   3rd Qu.: 2.880   3rd Qu.: 0.3420   3rd Qu.: 1.24928
##  Max.   :24.4539   Max.   : 7.957   Max.   : 1.0359   Max.   : 3.20281
##    ContriICT         ContriNICT
##  Min.   :0.02453   Min.   :-0.7256
##  1st Qu.:0.33692   1st Qu.: 0.4360
##  Median :0.52180   Median : 0.6500
##  Mean   :0.54836   Mean   : 0.7778
##  3rd Qu.:0.73754   3rd Qu.: 0.9742
##  Max.   :1.32499   Max.   : 3.0919
##  Export.of.goods.and.services....of.GDP.
##  Min.   : 9.038
##  1st Qu.:25.354
##  Median :36.226
##  Mean   :36.643
##  3rd Qu.:44.418
##  Max.   :96.588
```

```
#Creating separate table for emerging countries
d2<-subset(d,d$D.E.De == 2)
```

```r
#Viewing the new table
View(d2)
#Dropping the variable country name
d2$X<-NULL
#Dropping the variable years
d2$X.1<-NULL
##Summary statisitc of Emerging Countries
summary(d2)
```

```
##      D.E.De    GDP.Growth         Lab.Qual         Lab.Quant
##  Min.   :2   Min.   :-11.426   Min.   :-2.7864   Min.   :-11.910
##  1st Qu.:2   1st Qu.:  1.793   1st Qu.: 0.2281   1st Qu.: -0.443
##  Median :2   Median :  3.931   Median : 0.4248   Median :  1.358
##  Mean   :2   Mean   :  3.354   Mean   : 0.4584   Mean   :  1.228
##  3rd Qu.:2   3rd Qu.:  5.565   3rd Qu.: 0.6386   3rd Qu.:  2.850
##  Max.   :2   Max.   : 10.148   Max.   : 4.4470   Max.   : 16.589
##   ICT.Capital        NICT.Capital      Cl.Quality          Cl.Quant
##  Min.   : 0.09741   Min.   :-1.790   Min.   :-2.05119   Min.   :-4.8904
##  1st Qu.:11.57976   1st Qu.: 2.280   1st Qu.: 0.08582   1st Qu.:-0.2250
##  Median :16.62387   Median : 3.639   Median : 0.21221   Median : 0.6730
##  Mean   :17.02244   Mean   : 4.000   Mean   : 0.24183   Mean   : 0.5562
##  3rd Qu.:22.23989   3rd Qu.: 5.259   3rd Qu.: 0.33372   3rd Qu.: 1.3740
##  Max.   :40.35037   Max.   :13.969   Max.   : 3.21971   Max.   : 5.5855
##    ContriICT           ContriNICT
##  Min.   :-0.003895   Min.   :-1.0760
##  1st Qu.: 0.404869   1st Qu.: 0.9215
##  Median : 0.613752   Median : 1.5248
##  Mean   : 0.722123   Mean   : 1.6892
##  3rd Qu.: 0.924292   3rd Qu.: 2.2489
##  Max.   : 2.561978   Max.   : 5.0004
##  Export.of.goods.and.services....of.GDP.
##  Min.   :  6.706
##  1st Qu.: 23.967
##  Median : 33.846
##  Mean   : 40.620
##  3rd Qu.: 53.078
##  Max.   :121.312
```

```r
#Creating separate table for developing countries
d3<-subset(d,d$D.E.De == 3)
#Dropping the variables country name
d3$X<-NULL
#Dropping the variable year
d3$X.1<-NULL
#Summary statistics of Developing countries
summary(d3)
```

```
##      D.E.De    GDP.Growth         Lab.Qual         Lab.Quant
##  Min.   :3   Min.   :-14.072   Min.   :-0.1247   Min.   :-17.487
##  1st Qu.:3   1st Qu.:  3.300   1st Qu.: 0.1505   1st Qu.:  1.522
##  Median :3   Median :  4.802   Median : 0.2866   Median :  2.715
##  Mean   :3   Mean   :  4.872   Mean   : 0.2603   Mean   :  2.788
##  3rd Qu.:3   3rd Qu.:  6.137   3rd Qu.: 0.3435   3rd Qu.:  3.907
```

```
##  Max.   :3   Max.   : 19.349   Max.   : 0.7314   Max.   : 20.593
##   ICT.Capital       NICT.Capital       Cl.Quality          Cl.Quant
##  Min.   :-0.4625   Min.   :-0.4561   Min.   :-0.06235   Min.   :-9.3315
##  1st Qu.:11.2184   1st Qu.: 2.4931   1st Qu.: 0.06817   1st Qu.: 0.7133
##  Median :15.5674   Median : 3.4708   Median : 0.14361   Median : 1.2593
##  Mean   :17.1562   Mean   : 4.3258   Mean   : 0.12141   Mean   : 1.3639
##  3rd Qu.:22.1123   3rd Qu.: 5.8583   3rd Qu.: 0.16369   3rd Qu.: 1.9813
##  Max.   :43.7080   Max.   :11.2052   Max.   : 0.30076   Max.   :10.9890
##    ContriICT          ContriNICT
##  Min.   :-0.01064   Min.   :-0.2892
##  1st Qu.: 0.34028   1st Qu.: 1.1429
##  Median : 0.58623   Median : 1.6457
##  Mean   : 0.77307   Mean   : 2.0708
##  3rd Qu.: 0.89637   3rd Qu.: 2.8490
##  Max.   : 8.38740   Max.   : 6.3529
##  Export.of.goods.and.services....of.GDP.
##  Min.   : 9.707
##  1st Qu.:19.875
##  Median :26.441
##  Mean   :28.232
##  3rd Qu.:35.669
##  Max.   :56.506
```

```
############################
####### Modelling###########
#Installing plm package
# Loading the pannel data package in the memory
library(plm)
```

```
## Loading required package: Formula
```

```
# Loading the formula package in the memory
library(Formula)
#############################################################################
##### Evaluating impact of ICT on GDP growth in developed countries#######
#############################################################################
# Attaching data set for developed countries
d4<-subset(d,d$D.E.De == 1)
attach(d4)
d4$X<-NULL
# Defining dependent and indenpendt variable
Y <- cbind(d4$GDP.Growth)
X <- cbind(d4$ContriICT, d4$ContriNICT)
# Descriptive statistics
summary(Y)
```

```
##        V1
##  Min.   :-8.631
##  1st Qu.: 1.528
##  Median : 2.582
##  Mean   : 2.307
##  3rd Qu.: 3.700
##  Max.   :10.234
```

```r
summary(X)
```

```
##        V1                V2
##  Min.   :0.02453   Min.   :-0.7256
##  1st Qu.:0.33692   1st Qu.: 0.4360
##  Median :0.52180   Median : 0.6500
##  Mean   :0.54836   Mean   : 0.7778
##  3rd Qu.:0.73754   3rd Qu.: 0.9742
##  Max.   :1.32499   Max.   : 3.0919
```

```r
# Set data as pannel data
pdata <- plm.data(d4,index=c("D.E.De", "X.1"))
```

```
## serie D.E.De  is constant and has been removed
```

```r
# Pooled OLS Estimater
pooling <- plm(Y ~ X, data=pdata, model= "pooling")
```

```
## series D.E.De is constant and has been removed
```

```r
summary(pooling)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y ~ X, data = pdata, model = "pooling")
##
## Unbalanced Panel: n=16, T=19-19, N=304
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.    Max.
## -10.200  -0.696   0.300   1.120   4.680
##
## Coefficients :
##             Estimate Std. Error t-value  Pr(>|t|)
## (Intercept) 0.015952   0.275789  0.0578    0.9539
## X1          1.740230   0.435956  3.9918 8.246e-05 ***
## X2          1.718388   0.220382  7.7973 1.042e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    1731
## Residual Sum of Squares: 1284.2
## R-Squared      :  0.25809
##       Adj. R-Squared :  0.25554
## F-statistic: 52.3552 on 2 and 301 DF, p-value: < 2.22e-16
```

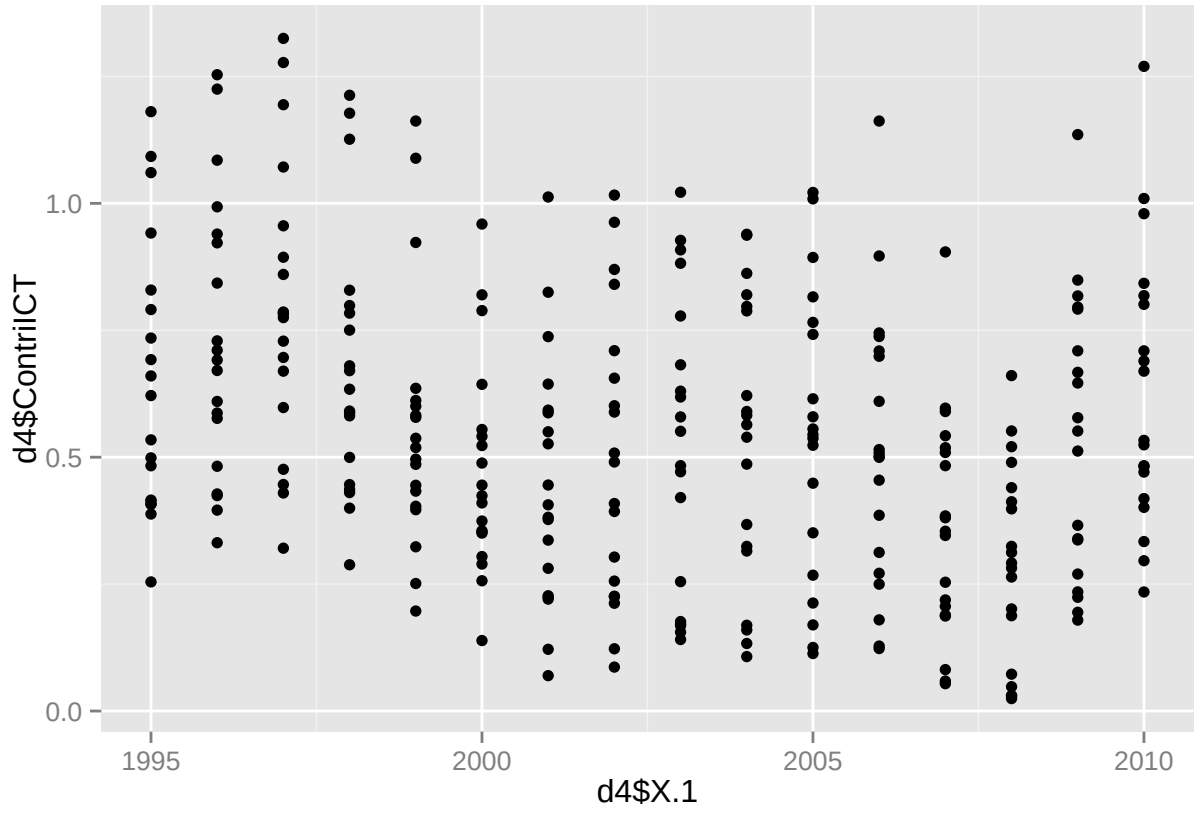
```r
# Putting control variable for Export % of GDP
Y1 <- cbind(d4$GDP.Growth)
X1 <- cbind(d4$ContriICT, d4$ContriNICT, d4$Export.of.goods.and.services....of.GDP.)
# Pooled OLS Esitmater with control variable for developed countries
pool <- plm(Y1 ~ X1, data=pdata, model= "pool")
```

```
## series D.E.De is constant and has been removed
```

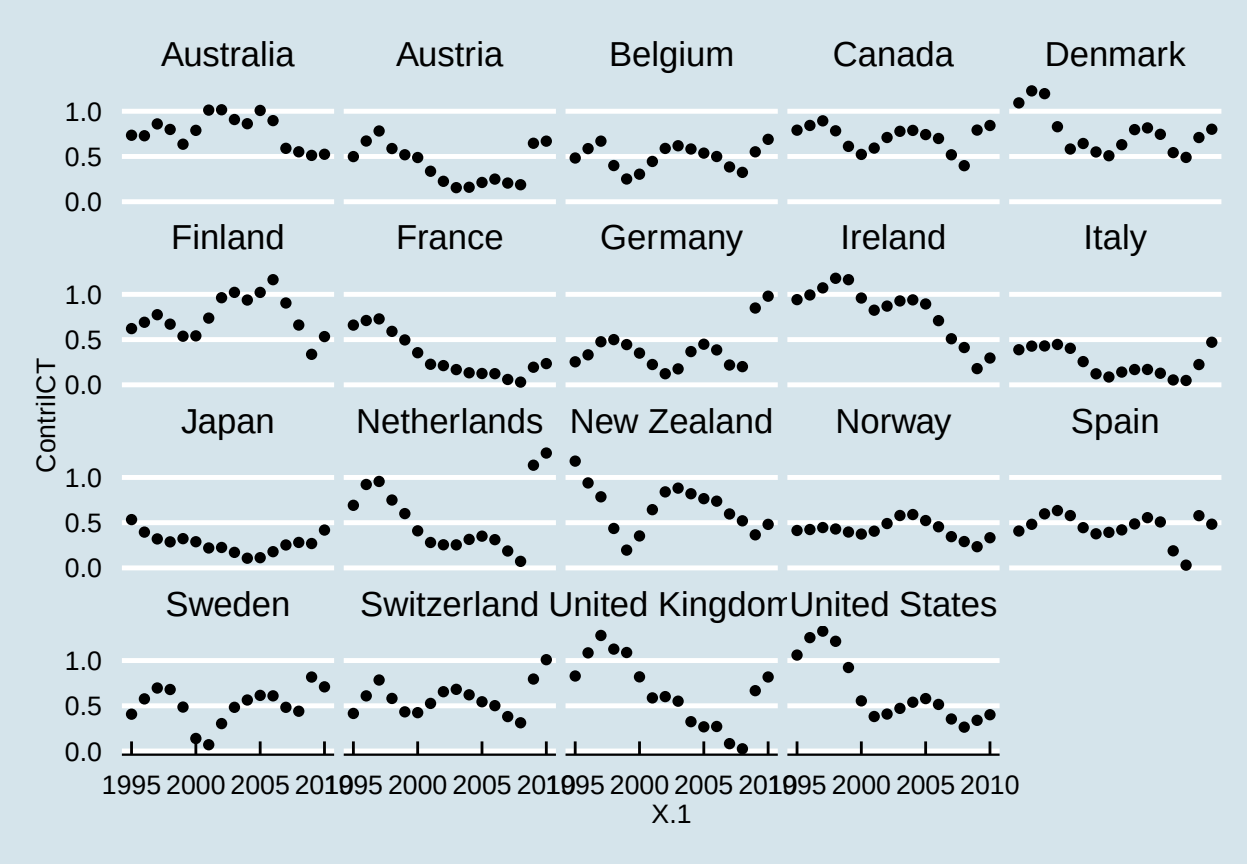
```
summary(pool)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y1 ~ X1, data = pdata, model = "pool")
##
## Unbalanced Panel: n=16, T=19-19, N=304
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.    Max.
## -10.200  -0.656   0.322   1.140   4.330
##
## Coefficients :
##               Estimate Std. Error t-value  Pr(>|t|)
## (Intercept) -0.3149601  0.3408630 -0.9240 0.3562249
## X11          1.6511962  0.4380934  3.7691 0.0001973 ***
## X12          1.6728464  0.2215031  7.5522 5.192e-13 ***
## X13          0.0113297  0.0068949  1.6432 0.1013905
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    1731
## Residual Sum of Squares: 1272.8
## R-Squared      :  0.26471
##       Adj. R-Squared :  0.26123
## F-statistic: 36.0007 on 3 and 300 DF, p-value: < 2.22e-16
```

```
########### Visualization#######################
#### Installing GGP Plots and GG Themes #######
library(ggplot2)
library(ggthemes)
qplot(d4$X.1,d4$ContriICT)
```




```
j <- ggplot(subset(d,d$D.E.De==1), aes(x = X.1, y = ContriICT))
j<-j +  geom_point()
j<-j + facet_wrap(~ X) +theme_economist()
j
```




```
# Attaching data set for emerging countrie
d5<-subset(d,d$D.E.De == 2)
attach(d5)
```

```
## The following object is masked _by_ .GlobalEnv:
##
##     X
##
## The following objects are masked from d4:
##
##     Cl.Quality, Cl.Quant, ContriICT, ContriNICT, D.E.De,
##     Export.of.goods.and.services....of.GDP., GDP.Growth,
##     ICT.Capital, Lab.Qual, Lab.Quant, NICT.Capital, X, X.1
```

```
d5$X<-NULL
# Defining dependent and indenpendt variable
Y2 <- cbind(d5$GDP.Growth)
X2 <- cbind(d5$ContriICT, d5$ContriNICT)
# Descriptive statistics
summary(Y2)
```

```
##        V1
##  Min.   :-11.426
##  1st Qu.:  1.793
##  Median :  3.931
```

```
##  Mean   :  3.354
##  3rd Qu.:  5.565
##  Max.   : 10.148
```

```
summary(X2)
```

```
##        V1                  V2
##  Min.   :-0.003895   Min.   :-1.0760
##  1st Qu.: 0.404869   1st Qu.: 0.9215
##  Median : 0.613752   Median : 1.5248
##  Mean   : 0.722123   Mean   : 1.6892
##  3rd Qu.: 0.924292   3rd Qu.: 2.2489
##  Max.   : 2.561978   Max.   : 5.0004
```

```
# Set data as pannel data
pdata <- plm.data(d5,index=c("D.E.De", "X.1"))
```

```
## serie D.E.De  is constant and has been removed
```

```
# Pooled OLS Estimater
pooling <- plm(Y2 ~ X2, data=pdata, model= "pooling")
```

```
## series D.E.De is constant and has been removed
```

```
summary(pooling)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y2 ~ X2, data = pdata, model = "pooling")
##
## Unbalanced Panel: n=16, T=18-18, N=288
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.    Max.
## -13.100  -1.260   0.451   2.010   8.290
##
## Coefficients :
##             Estimate Std. Error t-value  Pr(>|t|)
## (Intercept)  0.72337    0.42587  1.6986  0.090491 .
## X21          1.19629    0.40872  2.9269  0.003699 **
## X22          1.04567    0.16753  6.2418 1.563e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    3595.1
## Residual Sum of Squares: 3027.1
## R-Squared      :  0.15801
##       Adj. R-Squared :  0.15636
## F-statistic: 26.741 on 2 and 285 DF, p-value: 2.2729e-11
```

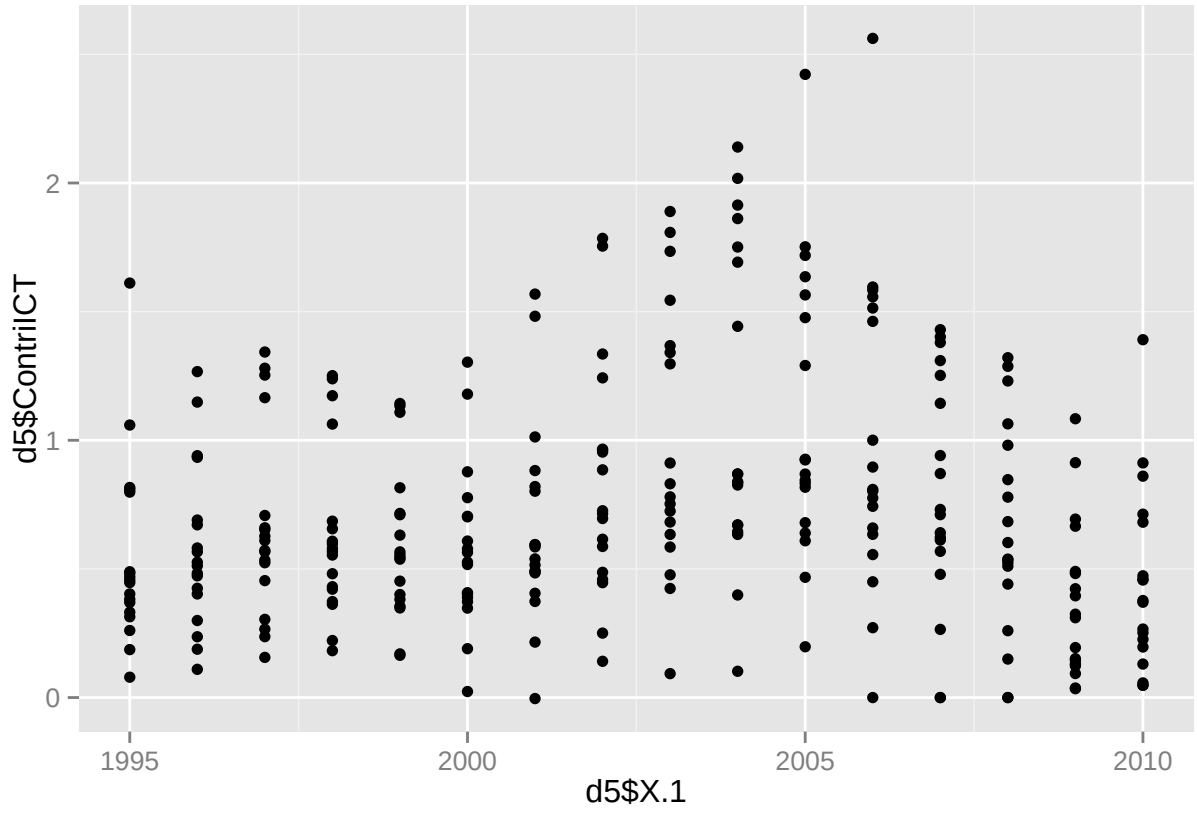
```r
# Putting control variable for Export % of GDP
Y3 <- cbind(d5$GDP.Growth)
X3 <- cbind(d5$ContriICT, d5$ContriNICT, d5$Export.of.goods.and.services....of.GDP.)
# Pooled OLS Esitmater with control variable for developed countries
pooling <- plm(Y3 ~ X3, data=pdata, model= "pooling")
```

```
## series D.E.De is constant and has been removed
```

```r
summary(pooling)
```

```
## Oneway (individual) effect Pooling Model
##
## Call:
## plm(formula = Y3 ~ X3, data = pdata, model = "pooling")
##
## Unbalanced Panel: n=16, T=18-18, N=288
##
## Residuals :
##    Min. 1st Qu.  Median 3rd Qu.    Max.
## -13.100  -1.080   0.499   1.870   8.620
##
## Coefficients :
##              Estimate Std. Error t-value  Pr(>|t|)
## (Intercept) 0.0884727  0.5321355  0.1663  0.868071
## X31         1.0689291  0.4117564  2.5960  0.009922 **
## X32         1.0902521  0.1682095  6.4815 4.004e-10 ***
## X33         0.0160406  0.0081328  1.9723  0.049542 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    3595.1
## Residual Sum of Squares: 2986.2
## R-Squared      :  0.16938
##       Adj. R-Squared :  0.16703
## F-statistic: 19.3048 on 3 and 284 DF, p-value: 2.0248e-11
```

```r
qplot(d5$X.1,d5$ContriICT)
```




```
k <- ggplot(subset(d,d$D.E.De==2), aes(x = X.1, y = ContriICT))
k<-k +  geom_point()
k<-k + facet_wrap(~ X) +theme_economist()
k
```


Argentina
Brazil
Bulgaria
Chile
Colombia
Costa Rica
Czech Republic
Ecuador
Hungary
Malaysia
Mexico
Poland
Portugal
Slovak Republic
Slovenia
South Africa
Thailand
Turkey
ContrilCT
0
1
2
1995 2000 2005 2010
X.1