Projet Micro-économetrie

Analyse des determinants socio-économiques de l'esperance de vie (Panel 2000-2025)

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Contents

1 Présentation de la problématique Recherche

Dans ce projet, nous cherchons à repondre à la question de recherche suivante : **Quels sont les déterminants socio-économiques et sanitaires de l'esperance de vie , et comment la richesse nationale, l'éducation et le statut de developpement influencent-ils la longevité des populations** ?

L'objectif principal est de comprendre les facteurs majeurs qui allongent ou réduisent la durée de vie et d'évaluer .Cette analyse

Pour répondre à cette question, nous utilisons

2 Presentation des données

La base de données a été obtenu via la plateforme **kaggle**(**Life Expectancy (WHO)**).Ce jeu de données rassemble des indicateurs produits par le Global Health Observatory(GHO) de l'organisation Mondiale de la santé (OMS) et par les Nations Unies .

Ce panel couvre une période de 16 ans , de 2000 à 2015.Léchantillon comporte 2938 observation reparties sur 193 pays.

## 2.1 Variables retenues pour l'analyse
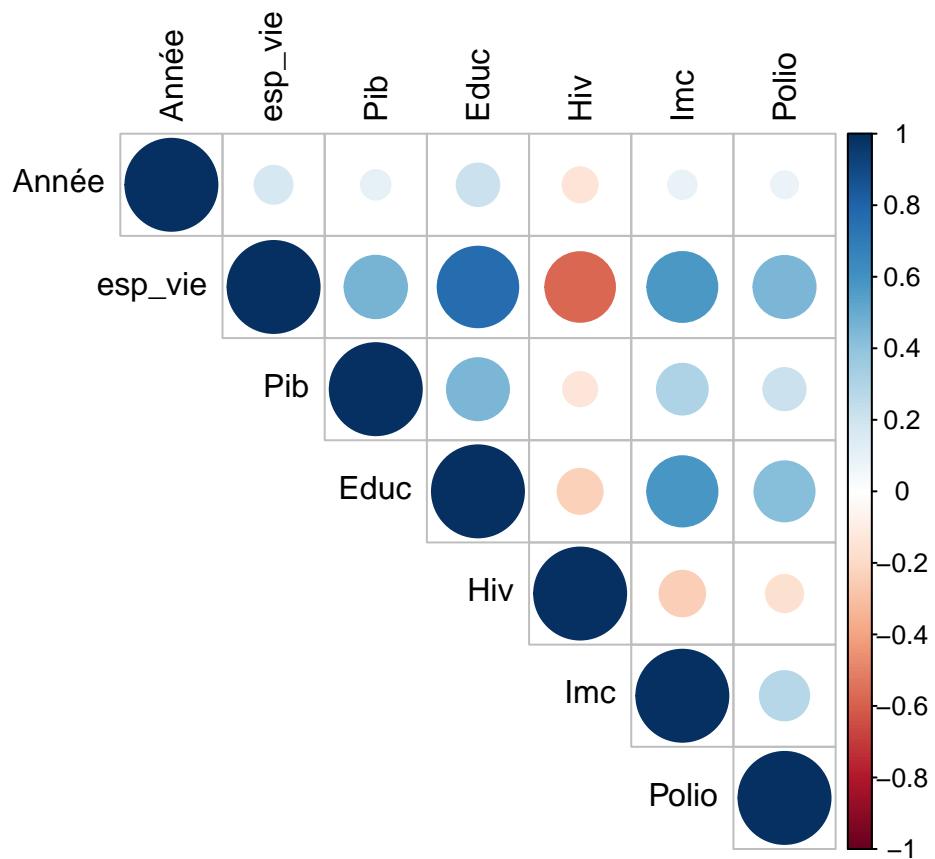
Afin d'etudier l'impact de l'economie et de la santé sur l'esperance de vie , nous avons retenues les variables suivantes :

- Pays :
- Année :
- esp_vie : Esperance de vie à la naissance
- Pib :
- Educ :
- Hiv :
- Inc :
- Polio :
- Statut : Statut de developpement économique (0 = Pays en developpement et 1 = Pays developpé)

3 Statistiques descriptives
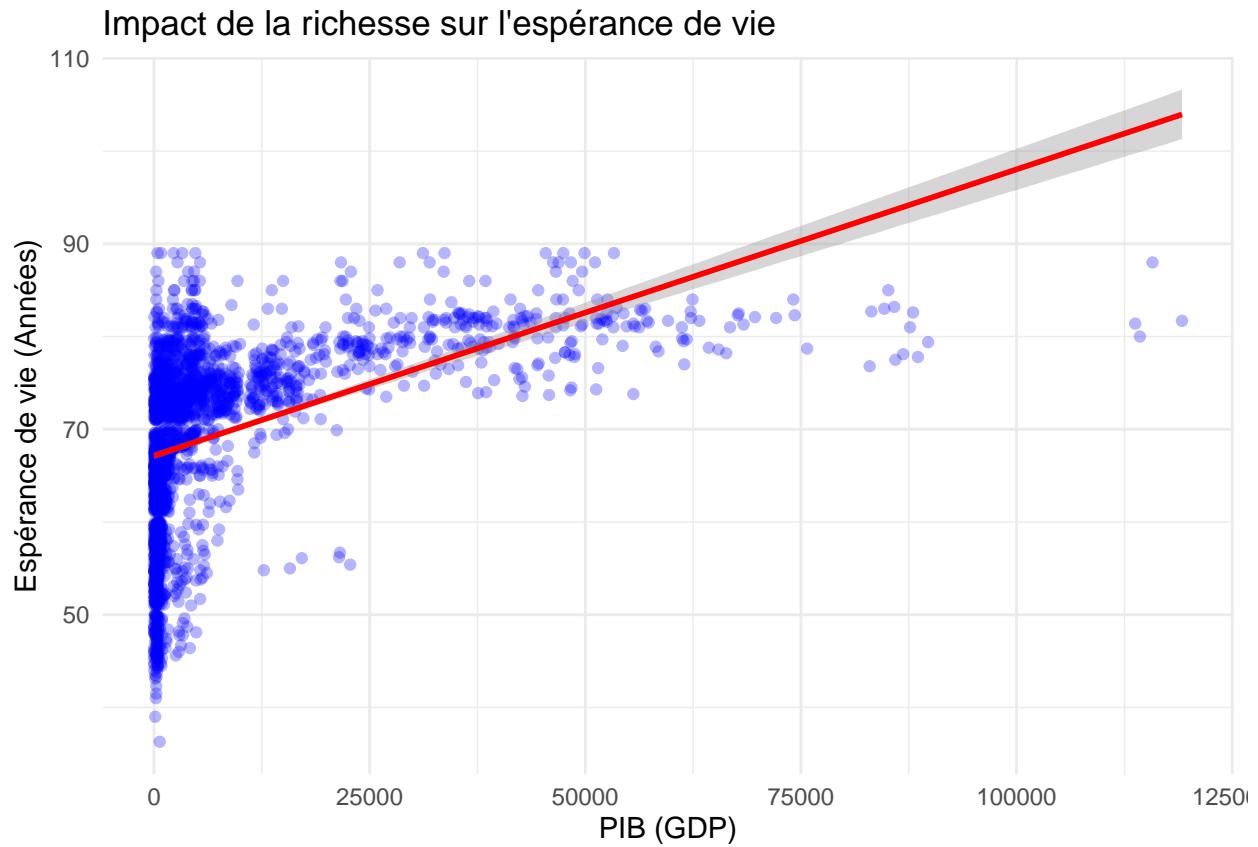
```
##      Pays                Année          esp_vie            Pib
## Length:2450        Min.   :2000    Min.   :36.30    Min.    :1.681e+00
## Class :character   1st Qu.:2004    1st Qu.:63.42    1st Qu.:4.652e+02
## Mode  :character   Median :2007    Median :72.30    Median :1.815e+03
##                    Mean   :2007    Mean   :69.48    Mean    :7.586e+03
##                    3rd Qu.:2011    3rd Qu.:76.00    3rd Qu.:6.266e+03
##                    Max.   :2015    Max.   :89.00    Max.    :1.192e+05
##      Educ           Hiv               Imc            Polio
## Min.   : 0.00   Min.   : 0.100   Min.   : 1.40   Min.    : 3.00
## 1st Qu.:10.20   1st Qu.: 0.100   1st Qu.:19.20   1st Qu.:78.00
## Median :12.50   Median : 0.100   Median :43.80   Median :93.00
## Mean   :12.18   Mean   : 1.901   Mean   :38.35   Mean    :82.73
## 3rd Qu.:14.50   3rd Qu.: 0.800   3rd Qu.:56.20   3rd Qu.:97.00
## Max.   :20.70   Max.   :50.600   Max.   :77.60   Max.    :99.00
##    Statut
## Length:2450
## Class :character
## Mode  :character
##
##
##
```

3.1   Corrélation
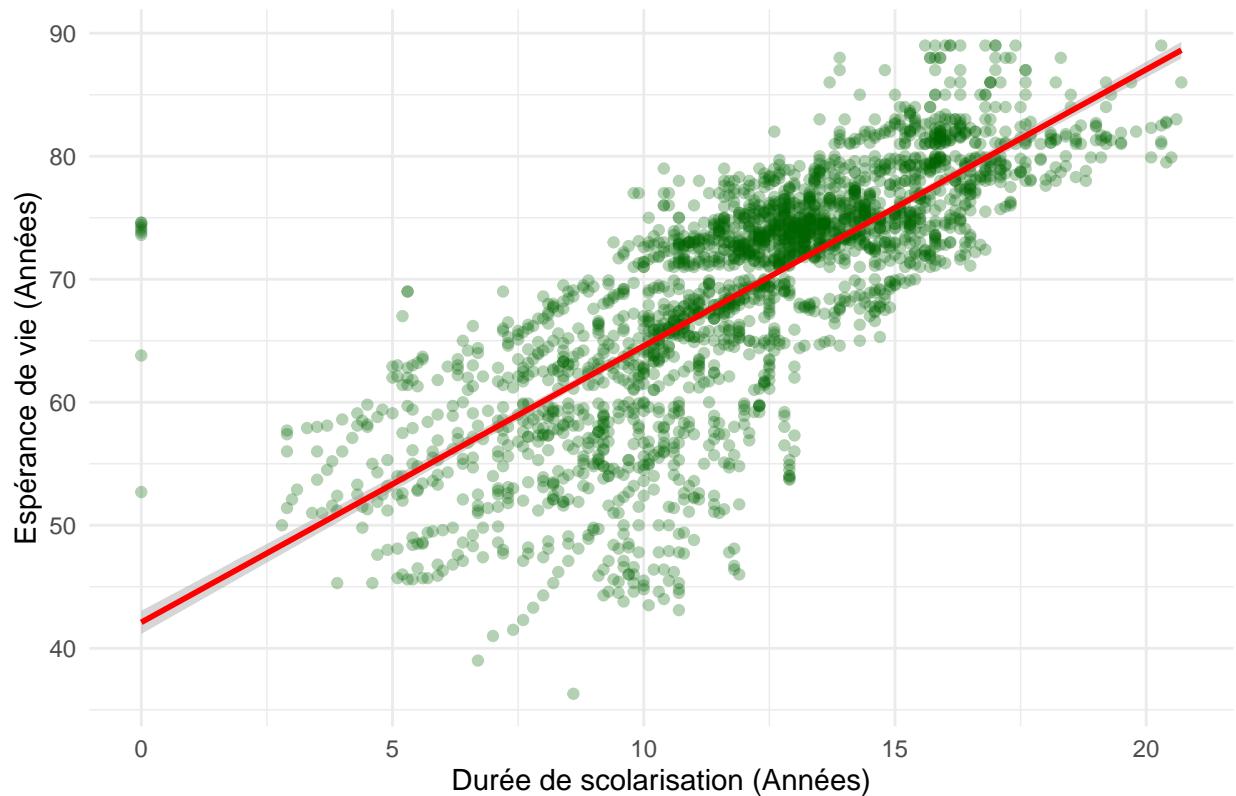
3.2 Visualisation

3.2.1 Relation entre PIB et Esperance de Vie

Impact de la richesse sur l'espérance de vie

3.2.2 Nuage de points : Éducation vs Espérance de vie

Lien Éducation / Santé

4 Méthodes d'Estimations

4.1 Modèle Poolé

On applique le Mco normalement sans tenir compte des données de panel et aux différentes dimensions.

```
modele_poolé<- plm(esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base,model ="pooling", effect =
summary(modele_poolé)
```

```
## Pooling Model
##
## Call:
## plm(formula = esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base,
##     effect = "individual", model = "pooling", index = c("Pays",
##        "Année"))
##
## Unbalanced Panel: n = 155, T = 8-16, N = 2450
##
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
## -25.89967  -2.83325   0.14435   3.08337  23.50793
```

```
## 
## Coefficients:
##                   Estimate  Std. Error  t-value  Pr(>|t|)
## (Intercept)      4.7975e+01  6.1865e-01  77.5479  < 2.2e-16 ***
## Pib              7.1404e-05  7.6043e-06   9.3899  < 2.2e-16 ***
## Educ             1.5737e+00  3.7298e-02  42.1939  < 2.2e-16 ***
## Hiv             -7.0392e-01  1.7444e-02 -40.3524  < 2.2e-16 ***
## Polio            5.2492e-02  4.4281e-03  11.8542  < 2.2e-16 ***
## StatutDeveloping -1.4839e+00  2.9778e-01  -4.9833  6.69e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Total Sum of Squares:     227600
## Residual Sum of Squares: 51146
## R-Squared:        0.77527
## Adj. R-Squared: 0.77481
## F-statistic: 1686.3 on 5 and 2444 DF, p-value: < 2.22e-16
```

4.2 Effets Fixes

4.2.1 Least Square Dummy Variable Model (LSDV)

```r
LSDV<-lm(esp_vie ~ Pib + Educ + Hiv + Polio +factor(Pays) - 1, data = base)
summary(LSDV)
```

```
## 
## Call:
## lm(formula = esp_vie ~ Pib + Educ + Hiv + Polio + factor(Pays) -
##     1, data = base)
## 
## Residuals:
##      Min      1Q   Median      3Q      Max
## -24.1609  -0.8850  -0.1531   0.5846  10.6443
## 
## Coefficients:
##                                Estimate Std. Error t value Pr(>|t|)
## Pib                           1.265e-05  4.482e-06   2.822 0.004809 **
## Educ                          8.624e-01  3.887e-02  22.189  < 2e-16 ***
## Hiv                          -4.316e-01  1.572e-02 -27.459  < 2e-16 ***
## Polio                         8.076e-03  2.440e-03   3.310 0.000948 ***
## factor(Pays)Afghanistan       5.076e+01  6.140e-01  82.668  < 2e-16 ***
## factor(Pays)Albania           6.391e+01  7.258e-01  88.056  < 2e-16 ***
## factor(Pays)Algeria           6.192e+01  7.358e-01  84.155  < 2e-16 ***
## factor(Pays)Angola            4.271e+01  6.135e-01  69.611  < 2e-16 ***
## factor(Pays)Antigua and Barbuda 6.658e+01 6.533e-01 101.907  < 2e-16 ***
## factor(Pays)Argentina         6.012e+01  8.383e-01  71.715  < 2e-16 ***
## factor(Pays)Armenia           6.253e+01  7.118e-01  87.855  < 2e-16 ***
## factor(Pays)Australia         6.344e+01  9.457e-01  67.079  < 2e-16 ***
## factor(Pays)Austria           6.713e+01  8.096e-01  82.924  < 2e-16 ***
## factor(Pays)Azerbaijan        6.033e+01  6.937e-01  86.966  < 2e-16 ***
## factor(Pays)Bahrain           6.266e+01  7.748e-01  80.876  < 2e-16 ***
## factor(Pays)Bangladesh        6.113e+01  6.439e-01  94.938  < 2e-16 ***
```

```
## factor(Pays)Barbados                   6.082e+01  7.870e-01  77.285  < 2e-16 ***
## factor(Pays)Belarus                    5.645e+01  7.879e-01  71.654  < 2e-16 ***
## factor(Pays)Belgium                    6.524e+01  8.486e-01  76.879  < 2e-16 ***
## factor(Pays)Belize                     5.789e+01  7.321e-01  79.073  < 2e-16 ***
## factor(Pays)Benin                      5.012e+01  6.376e-01  78.604  < 2e-16 ***
## factor(Pays)Bhutan                     5.676e+01  6.768e-01  83.869  < 2e-16 ***
## factor(Pays)Bosnia and Herzegovina     6.481e+01  7.164e-01  90.463  < 2e-16 ***
## factor(Pays)Botswana                   5.188e+01  7.927e-01  65.453  < 2e-16 ***
## factor(Pays)Brazil                     6.034e+01  7.765e-01  77.706  < 2e-16 ***
## factor(Pays)Brunei Darussalam          6.333e+01  7.756e-01  81.654  < 2e-16 ***
## factor(Pays)Bulgaria                   6.023e+01  7.628e-01  78.964  < 2e-16 ***
## factor(Pays)Burkina Faso               5.121e+01  5.803e-01  88.252  < 2e-16 ***
## factor(Pays)Burundi                    4.972e+01  6.267e-01  79.333  < 2e-16 ***
## factor(Pays)Cabo Verde                 6.152e+01  7.197e-01  85.476  < 2e-16 ***
## factor(Pays)Cambodia                   5.566e+01  6.613e-01  84.171  < 2e-16 ***
## factor(Pays)Cameroon                   4.842e+01  6.538e-01  74.070  < 2e-16 ***
## factor(Pays)Canada                     6.698e+01  8.204e-01  81.641  < 2e-16 ***
## factor(Pays)Central African Republic   4.667e+01  6.020e-01  77.528  < 2e-16 ***
## factor(Pays)Chad                       4.674e+01  5.798e-01  80.608  < 2e-16 ***
## factor(Pays)Chile                      6.589e+01  7.886e-01  83.554  < 2e-16 ***
## factor(Pays)China                      6.366e+01  7.063e-01  90.125  < 2e-16 ***
## factor(Pays)Colombia                   6.206e+01  7.195e-01  86.253  < 2e-16 ***
## factor(Pays)Comoros                    5.256e+01  6.586e-01  79.804  < 2e-16 ***
## factor(Pays)Costa Rica                 6.695e+01  7.278e-01  91.995  < 2e-16 ***
## factor(Pays)Croatia                    6.330e+01  7.674e-01  82.480  < 2e-16 ***
## factor(Pays)Cuba                       6.451e+01  7.913e-01  81.523  < 2e-16 ***
## factor(Pays)Cyprus                     6.709e+01  7.596e-01  88.321  < 2e-16 ***
## factor(Pays)Denmark                    6.334e+01  8.607e-01  73.595  < 2e-16 ***
## factor(Pays)Djibouti                   5.746e+01  5.788e-01  99.279  < 2e-16 ***
## factor(Pays)Dominican Republic         6.131e+01  7.303e-01  83.949  < 2e-16 ***
## factor(Pays)Ecuador                    6.292e+01  7.367e-01  85.412  < 2e-16 ***
## factor(Pays)El Salvador                6.026e+01  7.295e-01  82.604  < 2e-16 ***
## factor(Pays)Equatorial Guinea          4.995e+01  6.236e-01  80.103  < 2e-16 ***
## factor(Pays)Eritrea                    5.523e+01  6.573e-01  84.037  < 2e-16 ***
## factor(Pays)Estonia                    6.038e+01  8.225e-01  73.405  < 2e-16 ***
## factor(Pays)Ethiopia                   5.401e+01  5.938e-01  90.960  < 2e-16 ***
## factor(Pays)Fiji                       5.570e+01  7.767e-01  71.714  < 2e-16 ***
## factor(Pays)Finland                    6.474e+01  8.647e-01  74.865  < 2e-16 ***
## factor(Pays)France                     6.742e+01  8.263e-01  81.596  < 2e-16 ***
## factor(Pays)Gabon                      5.446e+01  7.348e-01  74.125  < 2e-16 ***
## factor(Pays)Georgia                    6.194e+01  7.291e-01  84.942  < 2e-16 ***
## factor(Pays)Germany                    6.583e+01  8.434e-01  78.052  < 2e-16 ***
## factor(Pays)Ghana                      5.300e+01  6.587e-01  80.462  < 2e-16 ***
## factor(Pays)Greece                     6.657e+01  8.213e-01  81.054  < 2e-16 ***
## factor(Pays)Grenada                    5.938e+01  8.028e-01  73.961  < 2e-16 ***
## factor(Pays)Guatemala                  6.278e+01  6.582e-01  95.378  < 2e-16 ***
## factor(Pays)Guinea                     5.034e+01  5.997e-01  83.953  < 2e-16 ***
## factor(Pays)Guinea-Bissau              4.969e+01  6.382e-01  77.861  < 2e-16 ***
## factor(Pays)Guyana                     5.606e+01  6.893e-01  81.332  < 2e-16 ***
## factor(Pays)Haiti                      5.332e+01  6.254e-01  85.262  < 2e-16 ***
## factor(Pays)Honduras                   6.317e+01  6.962e-01  90.740  < 2e-16 ***
## factor(Pays)Hungary                    5.992e+01  8.023e-01  74.686  < 2e-16 ***
## factor(Pays)Iceland                    6.572e+01  8.882e-01  73.992  < 2e-16 ***
## factor(Pays)India                      5.635e+01  6.600e-01  85.379  < 2e-16 ***
```

```
## factor(Pays)Indonesia              5.710e+01  6.944e-01  82.238  < 2e-16 ***
## factor(Pays)Iraq                   6.101e+01  7.229e-01  84.396  < 2e-16 ***
## factor(Pays)Ireland                6.384e+01  8.737e-01  73.072  < 2e-16 ***
## factor(Pays)Israel                 6.679e+01  8.168e-01  81.770  < 2e-16 ***
## factor(Pays)Italy                  6.745e+01  8.244e-01  81.812  < 2e-16 ***
## factor(Pays)Jamaica                6.349e+01  7.258e-01  87.473  < 2e-16 ***
## factor(Pays)Japan                  6.858e+01  7.993e-01  85.797  < 2e-16 ***
## factor(Pays)Jordan                 6.081e+01  7.525e-01  80.809  < 2e-16 ***
## factor(Pays)Kazakhstan             5.387e+01  7.727e-01  69.722  < 2e-16 ***
## factor(Pays)Kenya                  5.209e+01  6.855e-01  75.992  < 2e-16 ***
## factor(Pays)Kiribati               5.449e+01  7.021e-01  77.608  < 2e-16 ***
## factor(Pays)Kuwait                 6.085e+01  7.712e-01  78.905  < 2e-16 ***
## factor(Pays)Latvia                 5.948e+01  8.126e-01  73.194  < 2e-16 ***
## factor(Pays)Lebanon                6.176e+01  7.520e-01  82.123  < 2e-16 ***
## factor(Pays)Lesotho                4.895e+01  7.927e-01  61.746  < 2e-16 ***
## factor(Pays)Liberia                4.952e+01  6.567e-01  75.403  < 2e-16 ***
## factor(Pays)Libya                  5.848e+01  8.583e-01  68.131  < 2e-16 ***
## factor(Pays)Lithuania              5.813e+01  8.244e-01  70.518  < 2e-16 ***
## factor(Pays)Luxembourg             6.760e+01  7.871e-01  85.886  < 2e-16 ***
## factor(Pays)Madagascar             5.443e+01  6.420e-01  84.796  < 2e-16 ***
## factor(Pays)Malawi                 4.755e+01  7.468e-01  63.670  < 2e-16 ***
## factor(Pays)Malaysia               6.212e+01  7.346e-01  84.567  < 2e-16 ***
## factor(Pays)Maldives               6.439e+01  7.221e-01  89.176  < 2e-16 ***
## factor(Pays)Mali                   4.967e+01  5.914e-01  83.989  < 2e-16 ***
## factor(Pays)Malta                  6.722e+01  7.751e-01  86.716  < 2e-16 ***
## factor(Pays)Mauritania             5.648e+01  6.053e-01  93.310  < 2e-16 ***
## factor(Pays)Mauritius              6.024e+01  7.591e-01  79.364  < 2e-16 ***
## factor(Pays)Mexico                 6.430e+01  7.279e-01  88.330  < 2e-16 ***
## factor(Pays)Mongolia               5.419e+01  7.384e-01  73.387  < 2e-16 ***
## factor(Pays)Montenegro             6.185e+01  8.779e-01  70.454  < 2e-16 ***
## factor(Pays)Morocco                6.252e+01  6.828e-01  91.562  < 2e-16 ***
## factor(Pays)Mozambique             5.086e+01  6.572e-01  77.389  < 2e-16 ***
## factor(Pays)Myanmar                5.665e+01  6.268e-01  90.372  < 2e-16 ***
## factor(Pays)Namibia                5.566e+01  7.510e-01  74.107  < 2e-16 ***
## factor(Pays)Nepal                  5.699e+01  6.697e-01  85.095  < 2e-16 ***
## factor(Pays)Netherlands            6.524e+01  8.618e-01  75.703  < 2e-16 ***
## factor(Pays)New Zealand            6.420e+01  9.060e-01  70.859  < 2e-16 ***
## factor(Pays)Nicaragua              6.324e+01  6.957e-01  90.895  < 2e-16 ***
## factor(Pays)Niger                  5.359e+01  5.537e-01  96.773  < 2e-16 ***
## factor(Pays)Nigeria                4.533e+01  6.381e-01  71.039  < 2e-16 ***
## factor(Pays)Norway                 6.567e+01  8.685e-01  75.615  < 2e-16 ***
## factor(Pays)Oman                   6.345e+01  7.276e-01  87.210  < 2e-16 ***
## factor(Pays)Pakistan               5.822e+01  5.944e-01  97.958  < 2e-16 ***
## factor(Pays)Panama                 6.477e+01  7.331e-01  88.356  < 2e-16 ***
## factor(Pays)Papua New Guinea       5.433e+01  6.398e-01  84.910  < 2e-16 ***
## factor(Pays)Paraguay               6.202e+01  7.149e-01  86.753  < 2e-16 ***
## factor(Pays)Peru                   6.161e+01  7.463e-01  82.549  < 2e-16 ***
## factor(Pays)Philippines            5.701e+01  6.999e-01  81.460  < 2e-16 ***
## factor(Pays)Poland                 6.167e+01  8.048e-01  76.630  < 2e-16 ***
## factor(Pays)Portugal               6.537e+01  8.236e-01  79.370  < 2e-16 ***
## factor(Pays)Qatar                  6.470e+01  7.546e-01  85.747  < 2e-16 ***
## factor(Pays)Romania                6.126e+01  7.684e-01  79.731  < 2e-16 ***
## factor(Pays)Russian Federation     5.515e+01  7.653e-01  72.063  < 2e-16 ***
## factor(Pays)Rwanda                 5.249e+01  6.657e-01  78.860  < 2e-16 ***
```

```
## factor(Pays)Samoa                    6.227e+01  7.184e-01  86.681  < 2e-16 ***
## factor(Pays)Sao Tome and Principe     5.609e+01  6.938e-01  80.847  < 2e-16 ***
## factor(Pays)Saudi Arabia              6.114e+01  7.528e-01  81.212  < 2e-16 ***
## factor(Pays)Senegal                   5.604e+01  6.083e-01  92.131  < 2e-16 ***
## factor(Pays)Serbia                    6.152e+01  7.582e-01  81.142  < 2e-16 ***
## factor(Pays)Seychelles                6.041e+01  7.443e-01  81.159  < 2e-16 ***
## factor(Pays)Sierra Leone              3.909e+01  6.274e-01  62.303  < 2e-16 ***
## factor(Pays)Singapore                 6.827e+01  7.770e-01  87.859  < 2e-16 ***
## factor(Pays)Slovenia                  6.465e+01  8.381e-01  77.143  < 2e-16 ***
## factor(Pays)Solomon Islands           5.959e+01  6.430e-01  92.678  < 2e-16 ***
## factor(Pays)South Africa              5.377e+01  8.094e-01  66.437  < 2e-16 ***
## factor(Pays)Spain                     6.701e+01  8.359e-01  80.165  < 2e-16 ***
## factor(Pays)Sri Lanka                 6.124e+01  7.529e-01  81.328  < 2e-16 ***
## factor(Pays)Suriname                  5.952e+01  7.073e-01  84.151  < 2e-16 ***
## factor(Pays)Swaziland                 5.587e+01  8.896e-01  62.807  < 2e-16 ***
## factor(Pays)Sweden                    6.771e+01  8.266e-01  81.914  < 2e-16 ***
## factor(Pays)Switzerland               6.760e+01  8.343e-01  81.031  < 2e-16 ***
## factor(Pays)Syrian Arab Republic      6.334e+01  8.564e-01  73.956  < 2e-16 ***
## factor(Pays)Tajikistan                5.684e+01  6.862e-01  82.831  < 2e-16 ***
## factor(Pays)Thailand                  6.159e+01  7.362e-01  83.654  < 2e-16 ***
## factor(Pays)Timor-Leste               5.515e+01  7.199e-01  76.614  < 2e-16 ***
## factor(Pays)Togo                      4.860e+01  6.817e-01  71.286  < 2e-16 ***
## factor(Pays)Tonga                     5.967e+01  7.676e-01  77.731  < 2e-16 ***
## factor(Pays)Trinidad and Tobago       5.999e+01  7.184e-01  83.500  < 2e-16 ***
## factor(Pays)Tunisia                   6.145e+01  7.738e-01  79.416  < 2e-16 ***
## factor(Pays)Turkey                    6.232e+01  7.287e-01  85.529  < 2e-16 ***
## factor(Pays)Turkmenistan              5.538e+01  6.721e-01  82.400  < 2e-16 ***
## factor(Pays)Uganda                    4.934e+01  6.927e-01  71.227  < 2e-16 ***
## factor(Pays)Ukraine                   5.690e+01  7.810e-01  72.845  < 2e-16 ***
## factor(Pays)United Arab Emirates      6.365e+01  7.420e-01  85.772  < 2e-16 ***
## factor(Pays)Uruguay                   6.213e+01  8.029e-01  77.381  < 2e-16 ***
## factor(Pays)Uzbekistan                5.727e+01  7.148e-01  80.121  < 2e-16 ***
## factor(Pays)Vanuatu                   6.176e+01  6.711e-01  92.022  < 2e-16 ***
## factor(Pays)Zambia                    4.886e+01  7.271e-01  67.188  < 2e-16 ***
## factor(Pays)Zimbabwe                  5.144e+01  7.811e-01  65.852  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.071 on 2291 degrees of freedom
## Multiple R-squared:  0.9992, Adjusted R-squared:  0.9991
## F-statistic: 1.767e+04 on 159 and 2291 DF,  p-value: < 2.2e-16
```

4.2.2 Within

```r
modele_within <-plm(esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base, model = "within", index =
summary(modele_within)
```

```
## Oneway (individual) effect Within Model
##
## Call:
## plm(formula = esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base,
##     model = "within", index = c("Pays", "Année"))
```

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```
## 
## Unbalanced Panel: n = 155, T = 8-16, N = 2450
## 
## Residuals:
##      Min.   1st Qu.    Median   3rd Qu.      Max.
## -24.16091  -0.88498  -0.15307   0.58463  10.64426
## 
## Coefficients:
##          Estimate  Std. Error  t-value  Pr(>|t|)
## Pib    1.2651e-05  4.4824e-06   2.8223 0.0048093 **
## Educ   8.6243e-01  3.8867e-02  22.1893 < 2.2e-16 ***
## Hiv   -4.3163e-01  1.5719e-02 -27.4592 < 2.2e-16 ***
## Polio  8.0758e-03  2.4399e-03   3.3099 0.0009478 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Total Sum of Squares:    16282
## Residual Sum of Squares: 9824.2
## R-Squared:      0.39661
## Adj. R-Squared: 0.355
## F-statistic: 376.473 on 4 and 2291 DF, p-value: < 2.22e-16
```

4.3   Modèle à effet aléatoire

```
modele_aléatoire <-plm(esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base, model = "random", index
summary(modele_aléatoire)
```

```
## Oneway (individual) effect Random Effect Model
##    (Swamy-Arora's transformation)
## 
## Call:
## plm(formula = esp_vie ~ Pib + Educ + Hiv + Polio + Statut, data = base,
##     model = "random", index = c("Pays", "Année"))
## 
## Unbalanced Panel: n = 155, T = 8-16, N = 2450
## 
## Effects:
##                 var std.dev share
## idiosyncratic  4.288   2.071 0.246
## individual    13.122   3.622 0.754
## theta:
##    Min. 1st Qu. Median   Mean 3rd Qu.   Max.
##  0.8019  0.8585 0.8585 0.8578  0.8585 0.8585
## 
## Residuals:
##      Min.   1st Qu.    Median      Mean   3rd Qu.      Max.
## -24.79820  -1.10814  -0.01642  -0.00203   0.79073  11.36133
## 
## Coefficients:
##                   Estimate  Std. Error  z-value  Pr(>|z|)
## (Intercept)     6.2796e+01  9.5012e-01  66.0929 < 2.2e-16 ***
## Pib             1.5551e-05  4.5952e-06   3.3843 0.0007137 ***
```

```
## Educ              9.6775e-01  3.8192e-02  25.3391 < 2.2e-16 ***
## Hiv              -4.5343e-01  1.5766e-02 -28.7593 < 2.2e-16 ***
## Polio             1.0091e-02  2.5058e-03   4.0271 5.648e-05 ***
## StatutDeveloping -6.3278e+00  8.0988e-01  -7.8132 5.575e-15 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Total Sum of Squares:    20831
## Residual Sum of Squares: 11173
## R-Squared:      0.46364
## Adj. R-Squared: 0.46254
## Chisq: 2046.3 on 5 DF, p-value: < 2.22e-16
```

5 Choix du modele et justification

5.1 Test de Haussmann

```
hausman_test <- phtest(modele_within,modele_aléatoire)
hausman_test
```

```
##
##  Hausman Test
##
## data:  esp_vie ~ Pib + Educ + Hiv + Polio + Statut
## chisq = 65.332, df = 4, p-value = 2.19e-13
## alternative hypothesis: one model is inconsistent
```

5.2 Test de Breush-Pagan

```
library(lmtest)
bptest(esp_vie ~ Pib + Educ + Hiv + Polio + Statut+factor(Pays)+factor(Année), data=base)
```

```
##
##  studentized Breusch-Pagan test
##
## data:  esp_vie ~ Pib + Educ + Hiv + Polio + Statut + factor(Pays) +     factor(Année)
## BP = 242.45, df = 173, p-value = 0.0003887
```

5.3 Test de Fisher

```
# Comparaison entre Effets Fixes et Pooleé
Fisher <- pFtest(modele_within, modele_poolé)
Fisher
```

```
##
##  F test for individual effects
```

```
##
## data:  esp_vie ~ Pib + Educ + Hiv + Polio + Statut
## F = 62.982, df1 = 153, df2 = 2291, p-value < 2.2e-16
## alternative hypothesis: significant effects
```

La **p-value** étant inferieure à 0.5 ,

6   Conclusion