

Modeling GDP Using Health and Socioeconomic Indicators

Erin Xu, Dora Dong, Shencen Cai, Sharon Lam

2025-06-12

Introduction

Gross domestic product (GDP) is a widely used measure of a country's economic output, representing the total market value of goods and services produced within its borders over a specified period. It serves as a key indicator of national economic performance and enables comparison across countries and time periods. From economic theory, GDP is influenced by components such as consumer spending, government expenditures, investment in capital goods, and net exports. Factors like human capital, infrastructure, technological innovation, and political stability are also vital.

This project applies multiple linear regression (MLR) to investigate the extent to which health-related and socioeconomic factors are associated with GDP, with the research question being: *To what extent do government spending on health and socioeconomic resources affect a country's GDP?* Specifically, country status (developed vs. developing), percentage expenditure on health, polio immunization coverage, income composition of resources, years of schooling, and population are the combination of continuous and categorical predictors used to explain the extent in which they affect GDP in countries around the world. Health spending, represented by percent of a country's expenditure and polio immunization coverage, has been shown to enhance productivity, and income composition and national development status reflect broader socioeconomic conditions. Education and population are also recognized as structural drivers of economic growth because educated workers increase human capital, research and innovation for better products, processes and overall economic advancement.

As economic theory suggests a positive relationship between GDP and improved development indicators, and estimating a linear model allows us to quantify the individual contribution of each predictor to GDP while controlling for the others, a positive relationship between GDP and indicated predictors can be expected. The focus of this analysis is on interpretability, to understand how each predictor relates to economic output and to support evidence-based approaches to development and policy planning.

Data description

The dataset used in this project is titled *Life Expectancy* (WHO), sourced from *Kaggle* (Kumar, 2018). Its primary usage is for health data analysis. Data collectors combined publicly available data from the *World Health Organization* (WHO) and the *United Nations* (UN), which were gathered through national health departments, structured questionnaires, and annual statistical submissions by participating countries (World Health Organization, n.d.; United Nations, n.d.).

While the dataset was initially intended to examine factors affecting life expectancy, this project selects 7 of the original 22 variables. The sample comprises over 1,600 complete observations, focusing on education, demographic, and socioeconomic indicators relevant to economic growth. These variables align with economic theory, which emphasizes the importance of education, health, and human capital in supporting sustained increases in productivity and GDP.

Multiple linear regression is an appropriate method for analysis, as the data set consists of independent observations and the model assumes normally distributed residuals, which can be evaluated through diagnostic procedures.

Table 1: Variables used in the model

Variable	Description	Type
GDP	Gross Domestic Product per capita (USD)	Response variable
Status	Developed or Developing status	Categorical variable
Percentage expenditure	Expenditure on health as a percentage of Gross Domestic Product per capita (%)	Continuous variable
Polio	Polio immunization coverage among 1-year-olds (%)	Continuous variable
Population	Population of the country	Continuous variable
Income composition of resources	Human Development Index in terms of income composition (index from 0 to 1)	Continuous variable
Schooling	Number of years of schooling (years)	Continuous variable

The model includes five continuous and one categorical predictors. Since the dataset contains a categorical variable, no transformation is needed. All six predictors are continuous and directly related to our question. They reflect government investment in health, education, and social equity, all of which may influence a country's GDP.

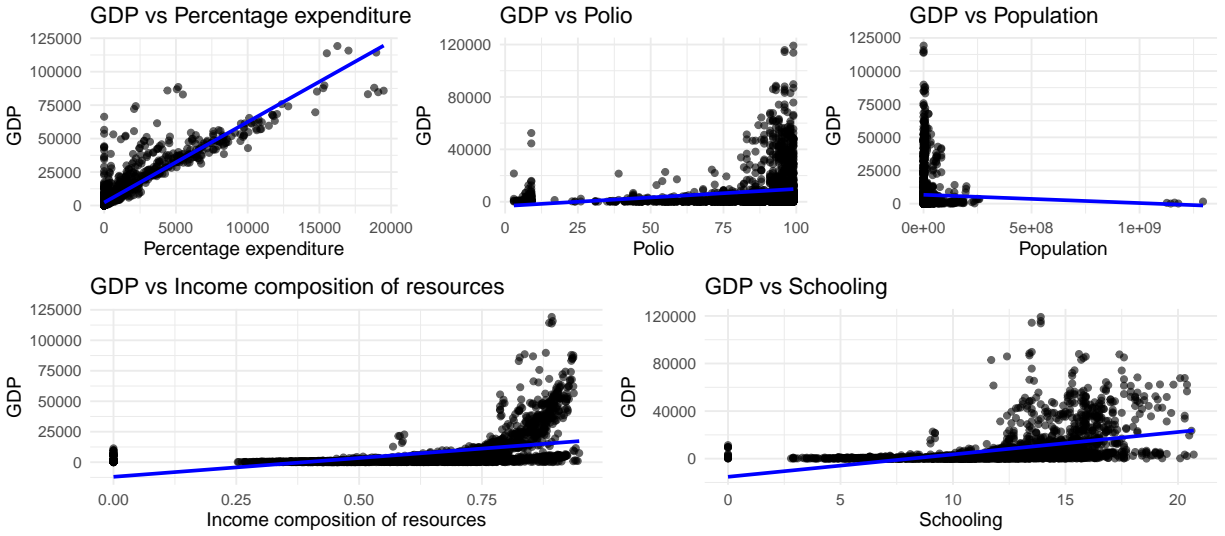
Table 2: Continuous variables summary

Variable	Mean	Std	Min	Q1	Median	Q3	Max
GDP	7483.16	14270.17	1.68	463.94	1766.95	5910.81	119172.74
Percentage expenditure	738.25	1987.91	0.01	4.69	64.91	441.53	19479.91
Polio	82.55	23.43	3.00	78.00	93.00	97.00	99.00
Population	1.28e+07	6.10e+07	34.00	1.96e+05	1.39e+06	7.42e+06	1.29e+09
Income composition of resources	0.63	0.21	0.00	0.49	0.68	0.78	0.95
Schooling	11.99	3.36	0.00	10.10	12.30	14.30	20.70

Table 3: Status (categorical variable) frequency

Status	Frequency
Developing	2426
Developed	512
Total	2938

Figure 1: Scatter plots of GDP against numeric predictors



GDP increases with higher schooling, income composition, and population, though with some spread. Percentage expenditure and polio demonstrate weaker positive trends. Education and income equality appear more strongly linked to economic growth than health spending.

Figure 2: Histogram of GDP & numeric predictors



GDP, percentage expenditure, and population are strongly right-skewed, with mostly low values. Schooling and income composition are slightly left-skewed, clustering at the high end. Income composition is also bimodal. Polio rates are highly left-skewed. Polio, income composition, and schooling show potential outliers

at the low end. These patterns demonstrate how the predictors vary and help explain differences in GDP.
Primary model results and diagnostics

Model selection

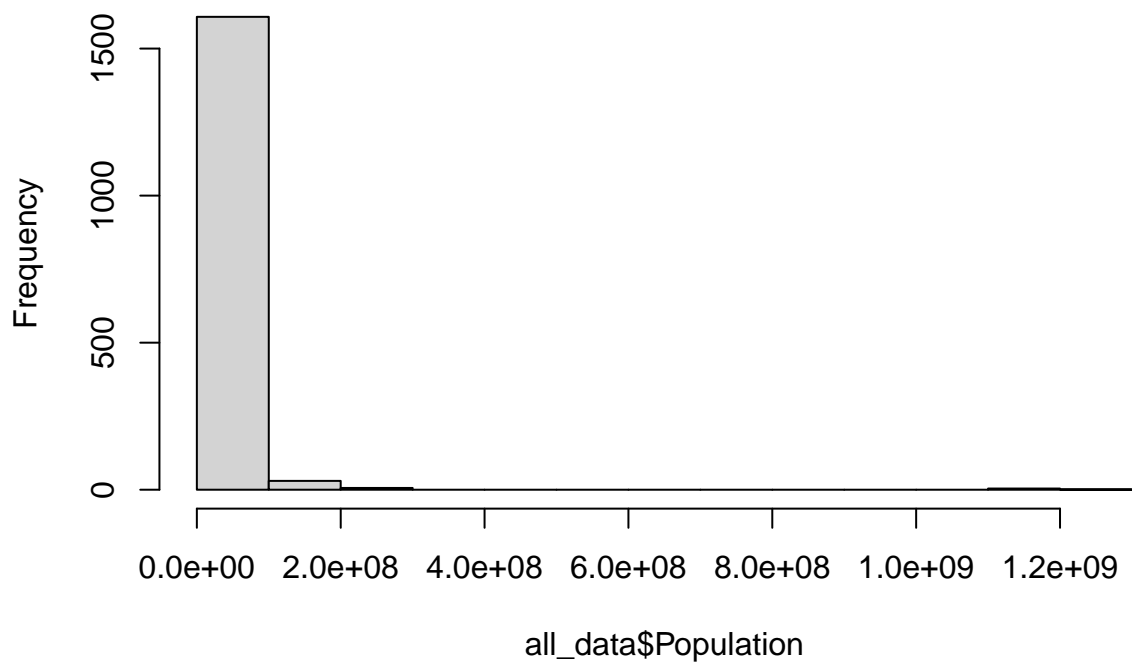
Final model inference and results

Discussion and conclusion

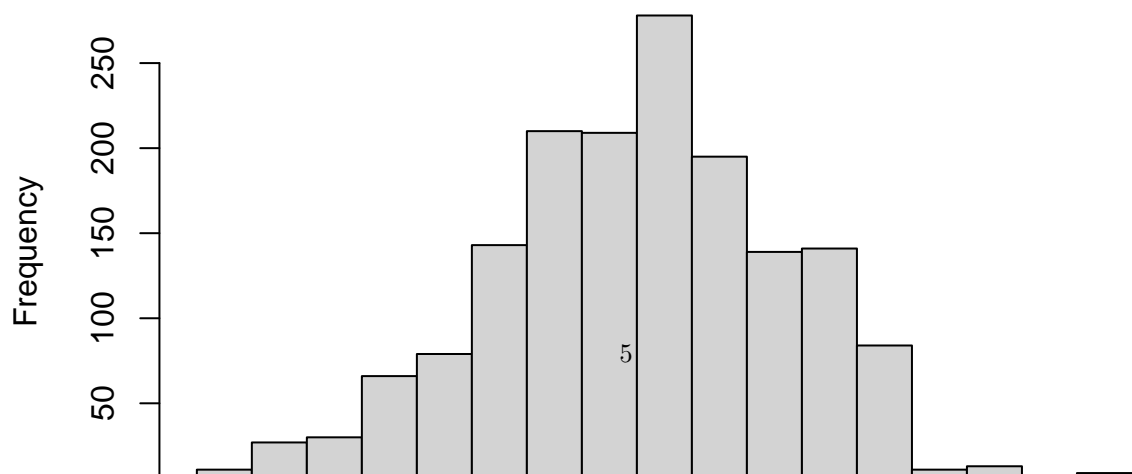
Author contributions

References

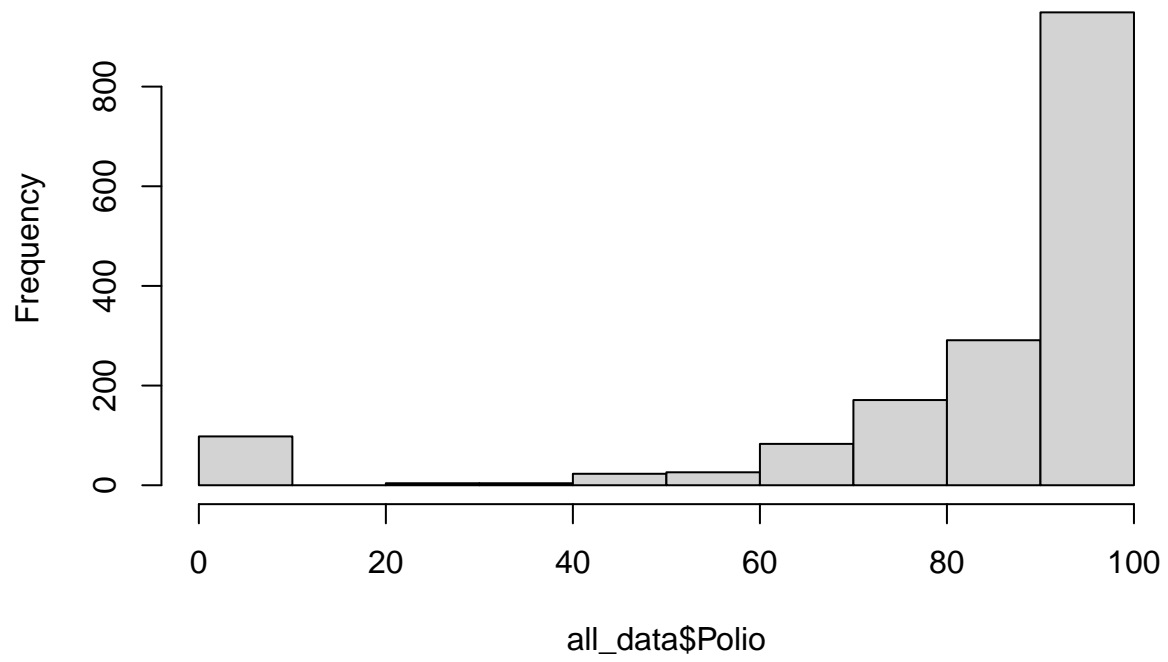
Histogram of all_data\$Population



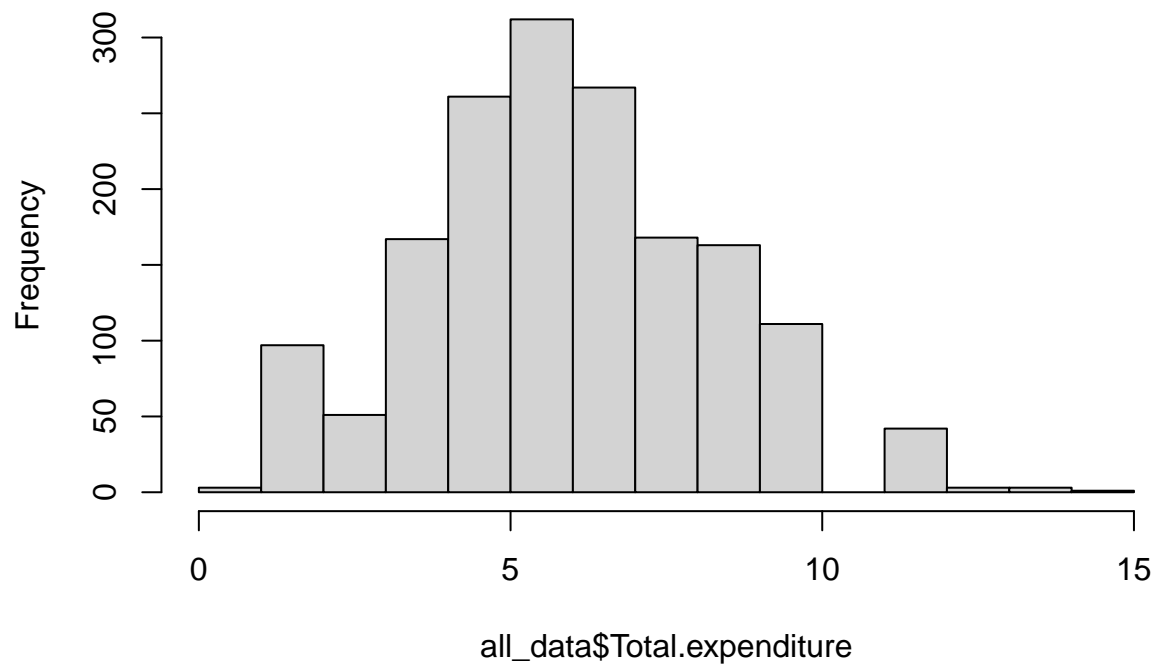
Histogram of all_data\$Schooling



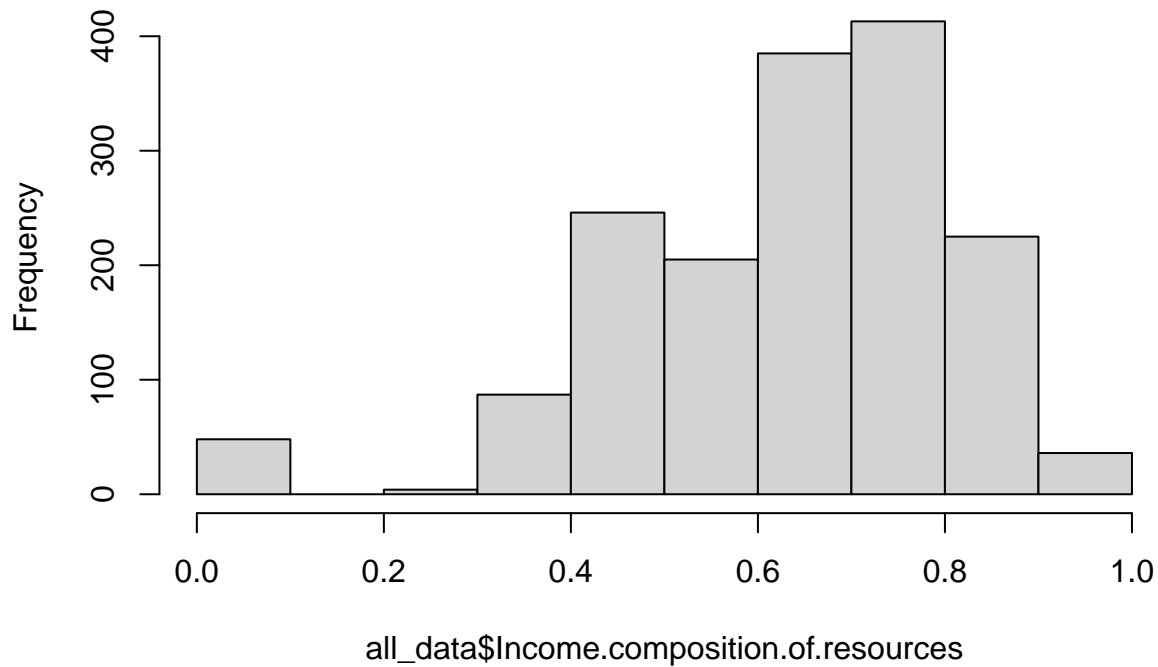
Histogram of all_data\$Polio



Histogram of all_data\$Total.expenditure



Histogram of all_data\$Income.composition.of.resources



```
##
## Call:
## lm(formula = GDP ~ Life.expectancy + Status + Adult.Mortality +
##     infant.deaths + Alcohol + Total.expenditure + percentage.expenditure +
##     Hepatitis.B + Measles + BMI + under.five.deaths + Polio +
##     Diphtheria + HIV.AIDS + Population + thinness..1.19.years +
##     thinness.5.9.years + Income.composition.of.resources + Schooling,
##     data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11955  -1094   -374     420   39494
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -1.862e+03  1.387e+03  -1.342  0.17974
## Life.expectancy  6.664e+00  2.164e+01   0.308  0.75813
## StatusDeveloping -7.400e+02  2.953e+02  -2.506  0.01231 *
## Adult.Mortality  4.601e-01  9.038e-01   0.509  0.61076
## infant.deaths   5.775e-01  9.521e+00   0.061  0.95164
## Alcohol         6.869e+00  2.903e+01   0.237  0.81297
## Total.expenditure -5.451e+01  3.553e+01  -1.534  0.12521
## percentage.expenditure  5.989e+00  5.276e-02 113.516 < 2e-16 ***
## Hepatitis.B     3.972e+00  3.886e+00   1.022  0.30686
## Measles        -6.929e-04  9.421e-03  -0.074  0.94138
## BMI            -4.532e+00  5.288e+00  -0.857  0.39148
```



```

## under.five.deaths      1.908e-01  6.904e+00  0.028  0.97796
## Polio                  5.025e+00  4.501e+00  1.116  0.26438
## Diphtheria             -3.010e+00  5.186e+00 -0.580  0.56172
## HIV.AIDS               1.325e+00  1.823e+01  0.073  0.94207
## Population             -9.416e-07  1.527e-06 -0.617  0.53755
## thinness..1.19.years   1.399e+01  4.629e+01  0.302  0.76252
## thinness.5.9.years     -3.130e+01  4.569e+01 -0.685  0.49342
## Income.composition.of.resources 2.043e+03  7.554e+02  2.705  0.00691 **
## Schooling              1.732e+02  5.499e+01  3.150  0.00166 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3133 on 1629 degrees of freedom
## Multiple R-squared:  0.9263, Adjusted R-squared:  0.9255
## F-statistic: 1078 on 19 and 1629 DF, p-value: < 2.2e-16

## Start: AIC=26568.24
## GDP ~ Life.expectancy + Status + Adult.Mortality + infant.deaths +
##       Alcohol + Total.expenditure + percentage.expenditure + Hepatitis.B +
##       Measles + BMI + under.five.deaths + Polio + Diphtheria +
##       HIV.AIDS + Population + thinness..1.19.years + thinness.5.9.years +
##       Income.composition.of.resources + Schooling
##
##              Df Sum of Sq      RSS   AIC
## - under.five.deaths      1 7.4980e+03 1.5993e+10 26566
## - infant.deaths          1 3.6125e+04 1.5993e+10 26566
## - HIV.AIDS                1 5.1865e+04 1.5993e+10 26566
## - Measles                 1 5.3109e+04 1.5993e+10 26566
## - Alcohol                 1 5.4974e+05 1.5993e+10 26566
## - thinness..1.19.years    1 8.9674e+05 1.5994e+10 26566
## - Life.expectancy         1 9.3129e+05 1.5994e+10 26566
## - Adult.Mortality         1 2.5444e+06 1.5995e+10 26566
## - Diphtheria              1 3.3072e+06 1.5996e+10 26567
## - Population              1 3.7332e+06 1.5996e+10 26567
## - thinness.5.9.years      1 4.6071e+06 1.5997e+10 26567
## - BMI                     1 7.2132e+06 1.6000e+10 26567
## - Hepatitis.B             1 1.0257e+07 1.6003e+10 26567
## - Polio                   1 1.2238e+07 1.6005e+10 26568
## <none>                     1.5993e+10 26568
## - Total.expenditure       1 2.3103e+07 1.6016e+10 26569
## - Status                  1 6.1654e+07 1.6054e+10 26573
## - Income.composition.of.resources 1 7.1822e+07 1.6064e+10 26574
## - Schooling               1 9.7429e+07 1.6090e+10 26576
## - percentage.expenditure  1 1.2651e+11 1.4250e+11 30173
##
## Step: AIC=26566.24
## GDP ~ Life.expectancy + Status + Adult.Mortality + infant.deaths +
##       Alcohol + Total.expenditure + percentage.expenditure + Hepatitis.B +
##       Measles + BMI + Polio + Diphtheria + HIV.AIDS + Population +
##       thinness..1.19.years + thinness.5.9.years + Income.composition.of.resources +
##       Schooling
##
##              Df Sum of Sq      RSS   AIC
## - HIV.AIDS                1 4.8272e+04 1.5993e+10 26564

```

```

## - Measles 1 6.5722e+04 1.5993e+10 26564
## - Alcohol 1 5.8425e+05 1.5993e+10 26564
## - thinness..1.19.years 1 9.0256e+05 1.5994e+10 26564
## - Life.expectancy 1 9.4052e+05 1.5994e+10 26564
## - Adult.Mortality 1 2.5494e+06 1.5995e+10 26564
## - Diphtheria 1 3.3610e+06 1.5996e+10 26565
## - Population 1 3.9124e+06 1.5997e+10 26565
## - thinness.5.9.years 1 4.6559e+06 1.5997e+10 26565
## - infant.deaths 1 5.9284e+06 1.5999e+10 26565
## - BMI 1 7.2168e+06 1.6000e+10 26565
## - Hepatitis.B 1 1.0258e+07 1.6003e+10 26565
## - Polio 1 1.2235e+07 1.6005e+10 26566
## <none> 1.5993e+10 26566
## - Total.expenditure 1 2.3098e+07 1.6016e+10 26567
## + under.five.deaths 1 7.4980e+03 1.5993e+10 26568
## - Status 1 6.1675e+07 1.6054e+10 26571
## - Income.composition.of.resources 1 7.1819e+07 1.6064e+10 26572
## - Schooling 1 9.7535e+07 1.6090e+10 26574
## - percentage.expenditure 1 1.2686e+11 1.4285e+11 30175
##
## Step: AIC=26564.24
## GDP ~ Life.expectancy + Status + Adult.Mortality + infant.deaths +
## Alcohol + Total.expenditure + percentage.expenditure + Hepatitis.B +
## Measles + BMI + Polio + Diphtheria + Population + thinness..1.19.years +
## thinness.5.9.years + Income.composition.of.resources + Schooling
##
## Df Sum of Sq RSS AIC
## - Measles 1 6.1993e+04 1.5993e+10 26562
## - Alcohol 1 5.9383e+05 1.5993e+10 26562
## - thinness..1.19.years 1 9.0462e+05 1.5994e+10 26562
## - Life.expectancy 1 9.9482e+05 1.5994e+10 26562
## - Adult.Mortality 1 2.7397e+06 1.5995e+10 26562
## - Diphtheria 1 3.3350e+06 1.5996e+10 26563
## - Population 1 3.9084e+06 1.5997e+10 26563
## - thinness.5.9.years 1 4.6404e+06 1.5997e+10 26563
## - infant.deaths 1 5.8850e+06 1.5999e+10 26563
## - BMI 1 7.1721e+06 1.6000e+10 26563
## - Hepatitis.B 1 1.0210e+07 1.6003e+10 26563
## - Polio 1 1.2302e+07 1.6005e+10 26564
## <none> 1.5993e+10 26564
## - Total.expenditure 1 2.3153e+07 1.6016e+10 26565
## + HIV.AIDS 1 4.8272e+04 1.5993e+10 26566
## + under.five.deaths 1 3.9040e+03 1.5993e+10 26566
## - Status 1 6.1733e+07 1.6054e+10 26569
## - Income.composition.of.resources 1 7.3204e+07 1.6066e+10 26570
## - Schooling 1 1.0188e+08 1.6095e+10 26573
## - percentage.expenditure 1 1.2809e+11 1.4409e+11 30187
##
## Step: AIC=26562.25
## GDP ~ Life.expectancy + Status + Adult.Mortality + infant.deaths +
## Alcohol + Total.expenditure + percentage.expenditure + Hepatitis.B +
## BMI + Polio + Diphtheria + Population + thinness..1.19.years +
## thinness.5.9.years + Income.composition.of.resources + Schooling
##

```

```

##                                Df Sum of Sq      RSS      AIC
## - Alcohol                     1 5.9099e+05 1.5993e+10 26560
## - thinness..1.19.years        1 9.1247e+05 1.5994e+10 26560
## - Life.expectancy             1 9.8623e+05 1.5994e+10 26560
## - Adult.Mortality             1 2.7498e+06 1.5996e+10 26560
## - Diphtheria                  1 3.3603e+06 1.5996e+10 26561
## - Population                  1 3.8655e+06 1.5997e+10 26561
## - thinness.5.9.years          1 4.5979e+06 1.5997e+10 26561
## - infant.deaths               1 6.6522e+06 1.5999e+10 26561
## - BMI                         1 7.1103e+06 1.6000e+10 26561
## - Hepatitis.B                 1 1.0245e+07 1.6003e+10 26561
## - Polio                       1 1.2270e+07 1.6005e+10 26562
## <none>                        1.5993e+10 26562
## - Total.expenditure           1 2.3092e+07 1.6016e+10 26563
## + Measles                     1 6.1993e+04 1.5993e+10 26564
## + HIV.AIDS                    1 4.4543e+04 1.5993e+10 26564
## + under.five.deaths           1 1.3737e+04 1.5993e+10 26564
## - Status                      1 6.1874e+07 1.6055e+10 26567
## - Income.composition.of.resources 1 7.3180e+07 1.6066e+10 26568
## - Schooling                   1 1.0198e+08 1.6095e+10 26571
## - percentage.expenditure      1 1.2816e+11 1.4415e+11 30186
##
## Step: AIC=26560.31
## GDP ~ Life.expectancy + Status + Adult.Mortality + infant.deaths +
##       Total.expenditure + percentage.expenditure + Hepatitis.B +
##       BMI + Polio + Diphtheria + Population + thinness..1.19.years +
##       thinness.5.9.years + Income.composition.of.resources + Schooling
##
##                                Df Sum of Sq      RSS      AIC
## - Life.expectancy             1 7.9994e+05 1.5994e+10 26558
## - thinness..1.19.years        1 8.1835e+05 1.5994e+10 26558
## - Adult.Mortality             1 3.0136e+06 1.5996e+10 26559
## - Diphtheria                  1 3.2364e+06 1.5997e+10 26559
## - Population                  1 3.9529e+06 1.5997e+10 26559
## - thinness.5.9.years          1 4.6558e+06 1.5998e+10 26559
## - infant.deaths               1 7.1101e+06 1.6000e+10 26559
## - BMI                         1 7.1406e+06 1.6000e+10 26559
## - Hepatitis.B                 1 9.9854e+06 1.6003e+10 26559
## - Polio                       1 1.2536e+07 1.6006e+10 26560
## <none>                        1.5993e+10 26560
## - Total.expenditure           1 2.2839e+07 1.6016e+10 26561
## + Alcohol                     1 5.9099e+05 1.5993e+10 26562
## + Measles                     1 5.9155e+04 1.5993e+10 26562
## + HIV.AIDS                    1 5.3829e+04 1.5993e+10 26562
## + under.five.deaths           1 5.2447e+04 1.5993e+10 26562
## - Income.composition.of.resources 1 7.7114e+07 1.6070e+10 26566
## - Status                      1 7.9619e+07 1.6073e+10 26566
## - Schooling                   1 1.1444e+08 1.6108e+10 26570
## - percentage.expenditure      1 1.2957e+11 1.4556e+11 30200
##
## Step: AIC=26558.39
## GDP ~ Status + Adult.Mortality + infant.deaths + Total.expenditure +
##       percentage.expenditure + Hepatitis.B + BMI + Polio + Diphtheria +
##       Population + thinness..1.19.years + thinness.5.9.years +

```

```

##      Income.composition.of.resources + Schooling
##
##
##      Df      Sum of Sq      RSS      AIC
## - thinness..1.19.years      1 8.0467e+05 1.5995e+10 26556
## - Adult.Mortality            1 2.2528e+06 1.5996e+10 26557
## - Diphtheria                 1 3.0315e+06 1.5997e+10 26557
## - Population                 1 3.8304e+06 1.5998e+10 26557
## - thinness.5.9.years        1 4.7284e+06 1.5999e+10 26557
## - BMI                        1 6.6380e+06 1.6001e+10 26557
## - infant.deaths              1 6.9259e+06 1.6001e+10 26557
## - Hepatitis.B                1 9.9897e+06 1.6004e+10 26557
## - Polio                      1 1.2752e+07 1.6007e+10 26558
## <none>                        1.5994e+10 26558
## - Total.expenditure          1 2.3075e+07 1.6017e+10 26559
## + Life.expectancy            1 7.9994e+05 1.5993e+10 26560
## + Alcohol                    1 4.0470e+05 1.5994e+10 26560
## + HIV.AIDS                   1 6.9035e+04 1.5994e+10 26560
## + Measles                    1 5.1936e+04 1.5994e+10 26560
## + under.five.deaths          1 1.1600e+03 1.5994e+10 26560
## - Status                     1 7.9966e+07 1.6074e+10 26565
## - Income.composition.of.resources 1 8.6777e+07 1.6081e+10 26565
## - Schooling                  1 1.2908e+08 1.6123e+10 26570
## - percentage.expenditure      1 1.3159e+11 1.4759e+11 30221
##
## Step:  AIC=26556.48
## GDP ~ Status + Adult.Mortality + infant.deaths + Total.expenditure +
##      percentage.expenditure + Hepatitis.B + BMI + Polio + Diphtheria +
##      Population + thinness.5.9.years + Income.composition.of.resources +
##      Schooling
##
##
##      Df      Sum of Sq      RSS      AIC
## - Adult.Mortality            1 2.1517e+06 1.5997e+10 26555
## - Diphtheria                 1 3.1578e+06 1.5998e+10 26555
## - Population                 1 3.7395e+06 1.5999e+10 26555
## - BMI                        1 6.8962e+06 1.6002e+10 26555
## - infant.deaths              1 7.3189e+06 1.6002e+10 26555
## - thinness.5.9.years        1 7.7985e+06 1.6003e+10 26555
## - Hepatitis.B                1 1.0170e+07 1.6005e+10 26556
## - Polio                      1 1.3167e+07 1.6008e+10 26556
## <none>                        1.5995e+10 26556
## - Total.expenditure          1 2.2992e+07 1.6018e+10 26557
## + thinness..1.19.years      1 8.0467e+05 1.5994e+10 26558
## + Life.expectancy            1 7.8626e+05 1.5994e+10 26558
## + Alcohol                    1 3.3047e+05 1.5995e+10 26558
## + HIV.AIDS                   1 6.5999e+04 1.5995e+10 26558
## + Measles                    1 5.8992e+04 1.5995e+10 26558
## + under.five.deaths          1 3.0320e+03 1.5995e+10 26558
## - Status                     1 7.9939e+07 1.6075e+10 26563
## - Income.composition.of.resources 1 8.6172e+07 1.6081e+10 26563
## - Schooling                  1 1.2827e+08 1.6123e+10 26568
## - percentage.expenditure      1 1.3161e+11 1.4761e+11 30219
##
## Step:  AIC=26554.7
## GDP ~ Status + infant.deaths + Total.expenditure + percentage.expenditure +

```

```

##      Hepatitis.B + BMI + Polio + Diphtheria + Population + thinness.5.9.years +
##      Income.composition.of.resources + Schooling
##
##              Df  Sum of Sq      RSS    AIC
## - Diphtheria      1 3.2348e+06 1.6000e+10 26553
## - Population      1 3.6979e+06 1.6001e+10 26553
## - infant.deaths    1 6.7733e+06 1.6004e+10 26553
## - thinness.5.9.years 1 7.2627e+06 1.6004e+10 26553
## - BMI              1 7.8706e+06 1.6005e+10 26554
## - Hepatitis.B      1 1.0199e+07 1.6007e+10 26554
## - Polio            1 1.2717e+07 1.6010e+10 26554
## <none>                                1.5997e+10 26555
## - Total.expenditure 1 2.2515e+07 1.6020e+10 26555
## + Adult.Mortality  1 2.1517e+06 1.5995e+10 26556
## + Alcohol          1 7.7561e+05 1.5996e+10 26557
## + thinness..1.19.years 1 7.0356e+05 1.5996e+10 26557
## + HIV.AIDS         1 2.5873e+05 1.5997e+10 26557
## + under.five.deaths 1 9.7304e+04 1.5997e+10 26557
## + Measles          1 7.9230e+04 1.5997e+10 26557
## + Life.expectancy  1 3.3698e+04 1.5997e+10 26557
## - Status           1 7.9000e+07 1.6076e+10 26561
## - Income.composition.of.resources 1 8.4029e+07 1.6081e+10 26561
## - Schooling        1 1.2664e+08 1.6124e+10 26566
## - percentage.expenditure 1 1.3175e+11 1.4775e+11 30219
##
## Step:  AIC=26553.03
## GDP ~ Status + infant.deaths + Total.expenditure + percentage.expenditure +
##      Hepatitis.B + BMI + Polio + Population + thinness.5.9.years +
##      Income.composition.of.resources + Schooling
##
##              Df  Sum of Sq      RSS    AIC
## - Population      1 4.0209e+06 1.6004e+10 26551
## - infant.deaths    1 6.9353e+06 1.6007e+10 26552
## - thinness.5.9.years 1 7.1294e+06 1.6007e+10 26552
## - Hepatitis.B      1 7.1762e+06 1.6008e+10 26552
## - BMI              1 7.3060e+06 1.6008e+10 26552
## - Polio            1 9.6013e+06 1.6010e+10 26552
## <none>                                1.6000e+10 26553
## - Total.expenditure 1 2.2802e+07 1.6023e+10 26553
## + Diphtheria      1 3.2348e+06 1.5997e+10 26555
## + Adult.Mortality  1 2.2286e+06 1.5998e+10 26555
## + thinness..1.19.years 1 8.2166e+05 1.6000e+10 26555
## + Alcohol          1 6.6680e+05 1.6000e+10 26555
## + HIV.AIDS         1 2.7412e+05 1.6000e+10 26555
## + under.five.deaths 1 2.4379e+05 1.6000e+10 26555
## + Measles          1 1.1008e+05 1.6000e+10 26555
## + Life.expectancy  1 8.9328e+04 1.6000e+10 26555
## - Status           1 7.9580e+07 1.6080e+10 26559
## - Income.composition.of.resources 1 8.1425e+07 1.6082e+10 26559
## - Schooling        1 1.2517e+08 1.6126e+10 26564
## - percentage.expenditure 1 1.3180e+11 1.4780e+11 30217
##
## Step:  AIC=26551.45
## GDP ~ Status + infant.deaths + Total.expenditure + percentage.expenditure +

```

```

##      Hepatitis.B + BMI + Polio + thinness.5.9.years + Income.composition.of.resources +
##      Schooling
##
##              Df  Sum of Sq      RSS    AIC
## - infant.deaths      1 3.1092e+06 1.6007e+10 26550
## - Hepatitis.B         1 7.2245e+06 1.6012e+10 26550
## - thinness.5.9.years  1 7.4161e+06 1.6012e+10 26550
## - BMI                 1 7.8099e+06 1.6012e+10 26550
## - Polio               1 9.1541e+06 1.6014e+10 26550
## <none>                1.6004e+10 26551
## - Total.expenditure   1 2.2685e+07 1.6027e+10 26552
## + Population          1 4.0209e+06 1.6000e+10 26553
## + Diphtheria          1 3.5578e+06 1.6001e+10 26553
## + Adult.Mortality     1 2.1882e+06 1.6002e+10 26553
## + Alcohol             1 7.6900e+05 1.6004e+10 26553
## + thinness..1.19.years 1 7.3352e+05 1.6004e+10 26553
## + under.five.deaths   1 6.6606e+05 1.6004e+10 26553
## + HIV.AIDS            1 2.9820e+05 1.6004e+10 26553
## + Life.expectancy     1 1.2450e+05 1.6004e+10 26553
## + Measles             1 4.8634e+04 1.6004e+10 26553
## - Status              1 8.0497e+07 1.6085e+10 26558
## - Income.composition.of.resources 1 8.1559e+07 1.6086e+10 26558
## - Schooling           1 1.2254e+08 1.6127e+10 26562
## - percentage.expenditure 1 1.3180e+11 1.4780e+11 30215
##
## Step:  AIC=26549.77
## GDP ~ Status + Total.expenditure + percentage.expenditure + Hepatitis.B +
##      BMI + Polio + thinness.5.9.years + Income.composition.of.resources +
##      Schooling
##
##              Df  Sum of Sq      RSS    AIC
## - thinness.5.9.years  1 4.8231e+06 1.6012e+10 26548
## - Hepatitis.B         1 5.8403e+06 1.6013e+10 26548
## - BMI                 1 7.5995e+06 1.6015e+10 26548
## - Polio               1 8.9634e+06 1.6016e+10 26549
## <none>                1.6007e+10 26550
## - Total.expenditure   1 2.3459e+07 1.6031e+10 26550
## + Diphtheria          1 3.4617e+06 1.6004e+10 26551
## + under.five.deaths   1 3.3433e+06 1.6004e+10 26551
## + infant.deaths      1 3.1092e+06 1.6004e+10 26551
## + Adult.Mortality     1 1.7236e+06 1.6006e+10 26552
## + thinness..1.19.years 1 1.1261e+06 1.6006e+10 26552
## + Alcohol             1 1.0180e+06 1.6006e+10 26552
## + Measles             1 5.0265e+05 1.6007e+10 26552
## + Population          1 1.9482e+05 1.6007e+10 26552
## + HIV.AIDS            1 1.6248e+05 1.6007e+10 26552
## + Life.expectancy     1 8.3662e+04 1.6007e+10 26552
## - Status              1 8.1911e+07 1.6089e+10 26556
## - Income.composition.of.resources 1 8.6568e+07 1.6094e+10 26557
## - Schooling           1 1.2053e+08 1.6128e+10 26560
## - percentage.expenditure 1 1.3179e+11 1.4780e+11 30213
##
## Step:  AIC=26548.26
## GDP ~ Status + Total.expenditure + percentage.expenditure + Hepatitis.B +

```

```

## BMI + Polio + Income.composition.of.resources + Schooling
##
##
## Df Sum of Sq RSS AIC
## - BMI 1 4.2981e+06 1.6017e+10 26547
## - Hepatitis.B 1 6.0564e+06 1.6018e+10 26547
## - Polio 1 8.9424e+06 1.6021e+10 26547
## <none> 1.6012e+10 26548
## - Total.expenditure 1 2.1696e+07 1.6034e+10 26548
## + thinness.5.9.years 1 4.8231e+06 1.6007e+10 26550
## + Diphtheria 1 3.3998e+06 1.6009e+10 26550
## + thinness..1.19.years 1 2.1401e+06 1.6010e+10 26550
## + Alcohol 1 1.5156e+06 1.6011e+10 26550
## + Adult.Mortality 1 1.5102e+06 1.6011e+10 26550
## + Population 1 1.1221e+06 1.6011e+10 26550
## + under.five.deaths 1 6.3183e+05 1.6012e+10 26550
## + infant.deaths 1 5.1626e+05 1.6012e+10 26550
## + Measles 1 2.3819e+05 1.6012e+10 26550
## + HIV.AIDS 1 7.6652e+04 1.6012e+10 26550
## + Life.expectancy 1 1.4796e+04 1.6012e+10 26550
## - Status 1 8.4362e+07 1.6097e+10 26555
## - Income.composition.of.resources 1 8.9500e+07 1.6102e+10 26556
## - Schooling 1 1.2537e+08 1.6138e+10 26559
## - percentage.expenditure 1 1.3203e+11 1.4804e+11 30214
##
## Step: AIC=26546.71
## GDP ~ Status + Total.expenditure + percentage.expenditure + Hepatitis.B +
## Polio + Income.composition.of.resources + Schooling
##
## Df Sum of Sq RSS AIC
## - Hepatitis.B 1 5.7276e+06 1.6022e+10 26545
## - Polio 1 9.4022e+06 1.6026e+10 26546
## <none> 1.6017e+10 26547
## - Total.expenditure 1 2.3171e+07 1.6040e+10 26547
## + BMI 1 4.2981e+06 1.6012e+10 26548
## + Diphtheria 1 2.9527e+06 1.6014e+10 26548
## + Adult.Mortality 1 2.2457e+06 1.6014e+10 26548
## + Alcohol 1 1.5605e+06 1.6015e+10 26548
## + thinness.5.9.years 1 1.5218e+06 1.6015e+10 26548
## + under.five.deaths 1 1.1902e+06 1.6015e+10 26549
## + infant.deaths 1 1.0251e+06 1.6016e+10 26549
## + Population 1 8.3016e+05 1.6016e+10 26549
## + Measles 1 5.0682e+05 1.6016e+10 26549
## + thinness..1.19.years 1 3.7389e+05 1.6016e+10 26549
## + Life.expectancy 1 3.1464e+05 1.6016e+10 26549
## + HIV.AIDS 1 2.4126e+05 1.6016e+10 26549
## - Status 1 8.4354e+07 1.6101e+10 26553
## - Income.composition.of.resources 1 8.5665e+07 1.6102e+10 26554
## - Schooling 1 1.2199e+08 1.6139e+10 26557
## - percentage.expenditure 1 1.3207e+11 1.4808e+11 30212
##
## Step: AIC=26545.3
## GDP ~ Status + Total.expenditure + percentage.expenditure + Polio +
## Income.composition.of.resources + Schooling
##

```

```

##                                Df Sum of Sq      RSS      AIC
## <none>                                1.6022e+10 26545
## - Polio                                1 2.0134e+07 1.6042e+10 26545
## - Total.expenditure                    1 2.1914e+07 1.6044e+10 26546
## + Hepatitis.B                          1 5.7276e+06 1.6017e+10 26547
## + BMI                                  1 3.9694e+06 1.6018e+10 26547
## + Adult.Mortality                      1 2.2967e+06 1.6020e+10 26547
## + thinness.5.9.years                   1 1.7100e+06 1.6021e+10 26547
## + Population                           1 1.4084e+06 1.6021e+10 26547
## + Alcohol                              1 1.2101e+06 1.6021e+10 26547
## + thinness..1.19.years                  1 4.7062e+05 1.6022e+10 26547
## + under.five.deaths                    1 4.3252e+05 1.6022e+10 26547
## + infant.deaths                        1 3.4607e+05 1.6022e+10 26547
## + Diphtheria                           1 2.5765e+05 1.6022e+10 26547
## + Life.expectancy                      1 2.3613e+05 1.6022e+10 26547
## + Measles                              1 2.1471e+05 1.6022e+10 26547
## + HIV.AIDS                             1 1.4599e+05 1.6022e+10 26547
## - Income.composition.of.resources       1 8.5900e+07 1.6108e+10 26552
## - Status                               1 8.6874e+07 1.6109e+10 26552
## - Schooling                             1 1.2421e+08 1.6147e+10 26556
## - percentage.expenditure                1 1.3320e+11 1.4923e+11 30223

##
## Call:
## lm(formula = GDP ~ Status + Total.expenditure + percentage.expenditure +
##     Polio + Income.composition.of.resources + Schooling, data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -12186  -1126   -375    411   39287
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)   -1.406e+03  5.924e+02  -2.374  0.01773 *
## StatusDeveloping -8.002e+02  2.682e+02  -2.984  0.00289 **
## Total.expenditure -5.207e+01  3.475e+01  -1.499  0.13417
## percentage.expenditure  5.988e+00  5.125e-02 116.838 < 2e-16 ***
## Polio          5.278e+00  3.674e+00   1.436  0.15106
## Income.composition.of.resources  2.041e+03  6.878e+02   2.967  0.00305 **
## Schooling      1.691e+02  4.740e+01   3.568  0.00037 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3124 on 1642 degrees of freedom
## Multiple R-squared:  0.9262, Adjusted R-squared:  0.9259
## F-statistic: 3433 on 6 and 1642 DF, p-value: < 2.2e-16

```

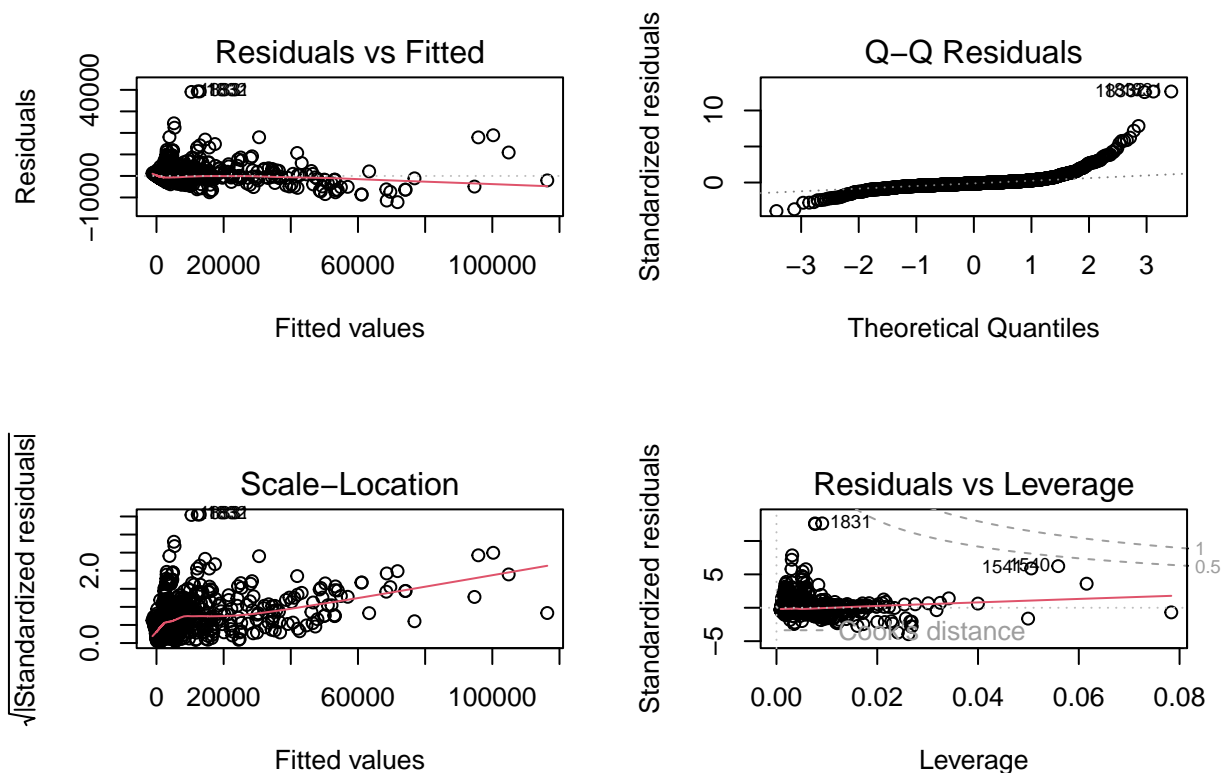
```

##
## Call:
## lm(formula = GDP ~ Status + Total.expenditure + Polio + percentage.expenditure +
##     Income.composition.of.resources + Schooling, data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max

```

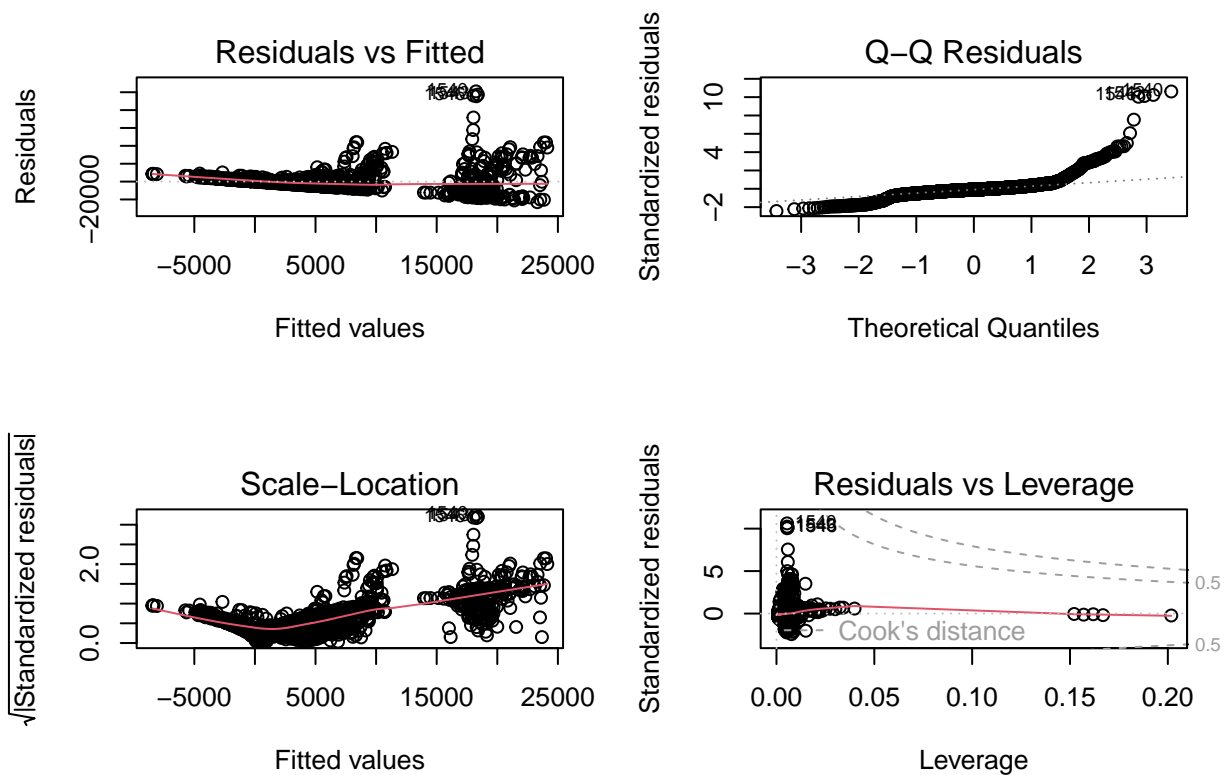


```
## -12186 -1126 -375 411 39287
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -1.406e+03  5.924e+02  -2.374  0.01773 *
## StatusDeveloping -8.002e+02  2.682e+02  -2.984  0.00289 **
## Total.expenditure -5.207e+01  3.475e+01  -1.499  0.13417
## Polio           5.278e+00  3.674e+00   1.436  0.15106
## percentage.expenditure 5.988e+00  5.125e-02 116.838 < 2e-16 ***
## Income.composition.of.resources 2.041e+03  6.878e+02  2.967  0.00305 **
## Schooling       1.691e+02  4.740e+01  3.568  0.00037 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3124 on 1642 degrees of freedom
## Multiple R-squared:  0.9262, Adjusted R-squared:  0.9259
## F-statistic: 3433 on 6 and 1642 DF, p-value: < 2.2e-16
```



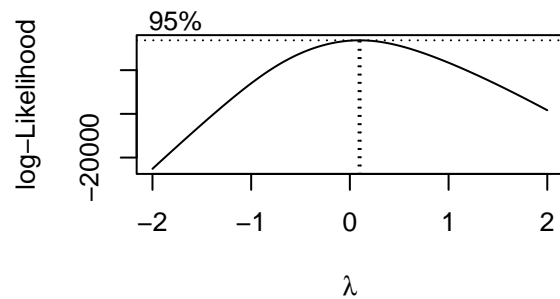
```
##
## Call:
## lm(formula = GDP ~ Status + Total.expenditure + Polio + Population +
##     Income.composition.of.resources + Schooling, data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

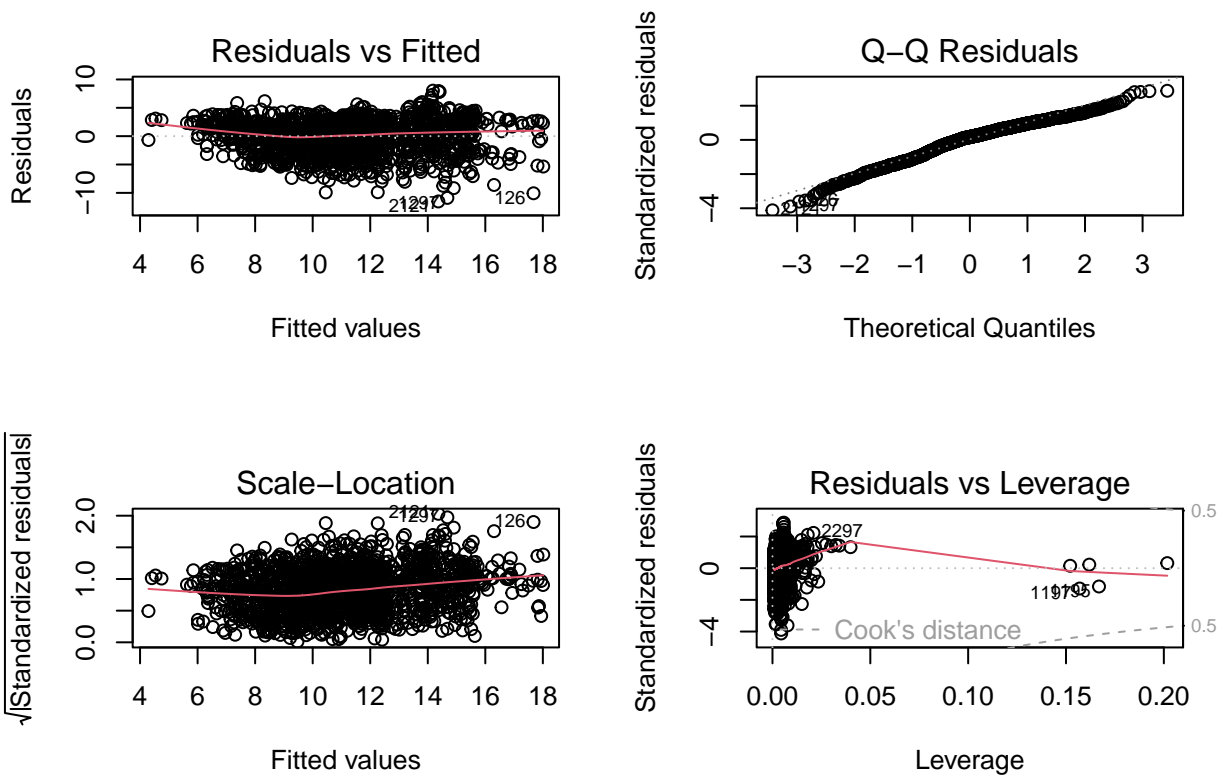
```
## -23023 -3267 -798 1578 100934
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    -1.305e+03  1.812e+03  -0.720   0.4714
## StatusDeveloping -1.022e+04  7.807e+02 -13.084 < 2e-16 ***
## Total.expenditure  2.506e+02  1.060e+02   2.364   0.0182 *
## Polio            -1.293e+01  1.121e+01  -1.153   0.2490
## Population        3.111e-07  3.349e-06   0.093   0.9260
## Income.composition.of.resources 1.006e+04  2.090e+03   4.811 1.64e-06 ***
## Schooling         7.276e+02  1.440e+02   5.053 4.83e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9533 on 1642 degrees of freedom
## Multiple R-squared:  0.3124, Adjusted R-squared:  0.3099
## F-statistic: 124.4 on 6 and 1642 DF, p-value: < 2.2e-16
```



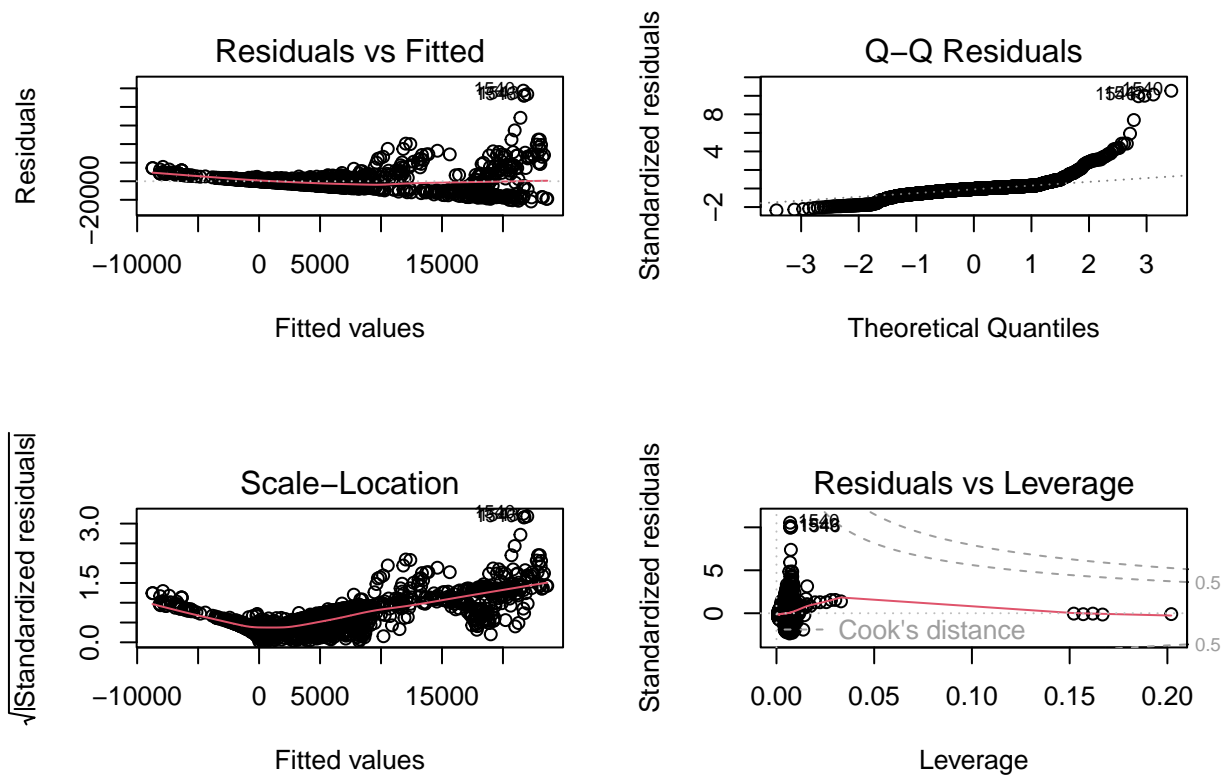
```
## [1] 0.1010101
##
## Call:
## lm(formula = bc_GDP ~ Status + Total.expenditure + Polio + Population +
##      Income.composition.of.resources + Schooling, data = all_data)
##
```

```
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11.5140  -1.7886   0.4771   1.9855   8.0242
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      3.742e+00  5.323e-01   7.029 3.04e-12 ***
## StatusDeveloping -1.484e+00  2.294e-01  -6.470 1.29e-10 ***
## Total.expenditure  3.593e-02  3.115e-02   1.153   0.249
## Polio             -4.012e-03  3.294e-03  -1.218   0.223
## Population        -3.108e-10  9.840e-10  -0.316   0.752
## Income.composition.of.resources 4.106e+00  6.141e-01   6.685 3.15e-11 ***
## Schooling         5.124e-01  4.231e-02  12.110 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.801 on 1642 degrees of freedom
## Multiple R-squared:  0.4209, Adjusted R-squared:  0.4188
## F-statistic: 198.9 on 6 and 1642 DF,  p-value: < 2.2e-16
```

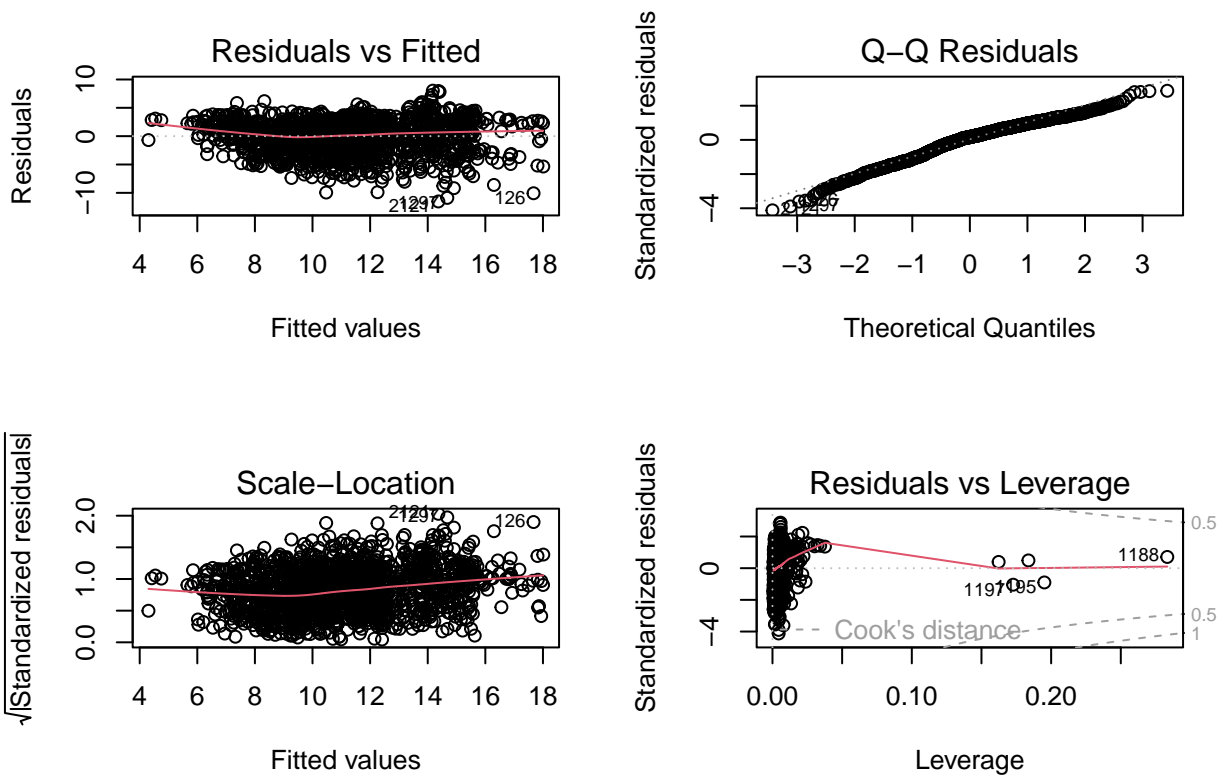




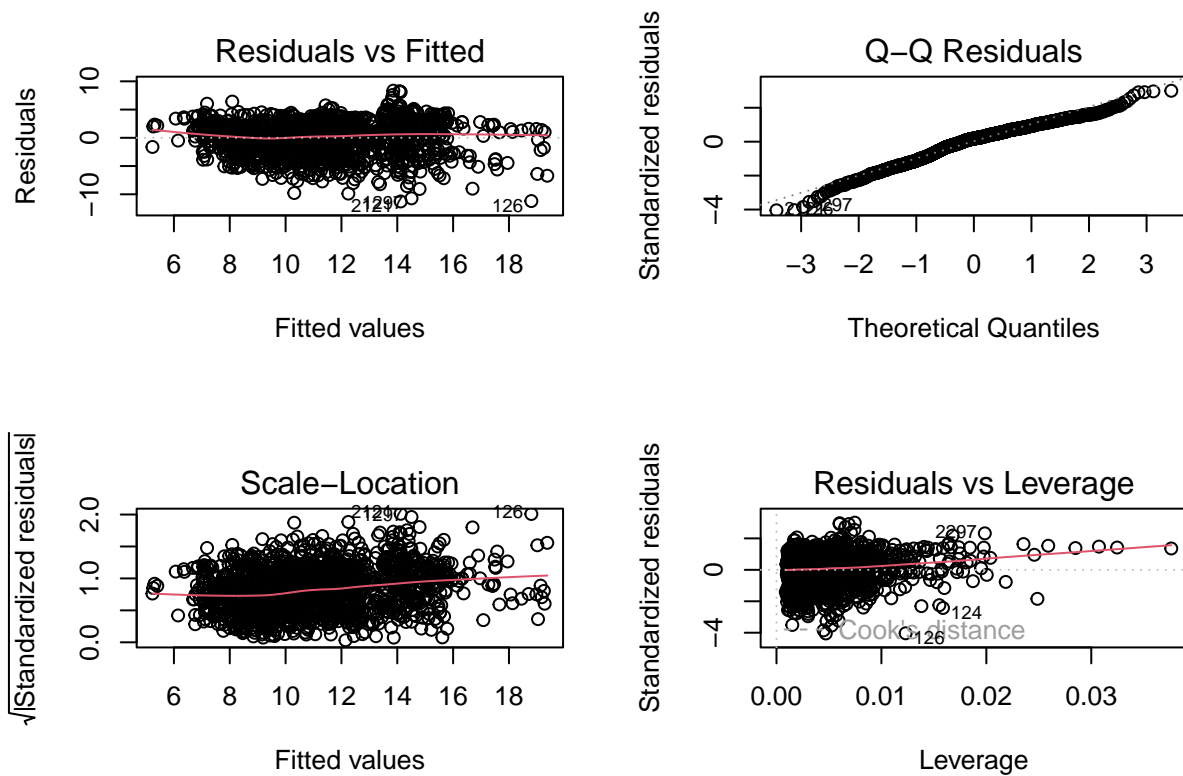
```
##
## Call:
## lm(formula = GDP ~ Status + Total.expenditure + I(Polio^2) +
##     Population + I(Income.composition.of.resources^2) + Schooling,
##     data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -21751  -3347   -430    1704   97502
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.279e+03  1.759e+03   2.433  0.01509 *
## StatusDeveloping -8.426e+03  7.829e+02 -10.762 < 2e-16 ***
## Total.expenditure  2.763e+02  1.033e+02   2.676  0.00753 **
## I(Polio^2)       -2.033e-01  9.635e-02  -2.110  0.03501 *
## Population       -9.121e-08  3.262e-06  -0.028  0.97769
## I(Income.composition.of.resources^2)  2.630e+04  2.454e+03  10.717 < 2e-16 ***
## Schooling       -2.489e+02  1.710e+02  -1.455  0.14576
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 9281 on 1642 degrees of freedom
## Multiple R-squared:  0.3483, Adjusted R-squared:  0.3459
## F-statistic: 146.3 on 6 and 1642 DF, p-value: < 2.2e-16
```



```
##
## Call:
## lm(formula = bc_GDP ~ Status + Total.expenditure + I(Polio^2) +
##      I(Population^2) + Income.composition.of.resources + Schooling,
##      data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11.5154  -1.8079   0.4799   1.9878   8.0250
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    3.624e+00  5.115e-01   7.084 2.07e-12 ***
## StatusDeveloping -1.483e+00  2.294e-01  -6.464 1.34e-10 ***
## Total.expenditure  3.557e-02  3.110e-02   1.144  0.253
## I(Polio^2)        -2.791e-05  2.898e-05  -0.963  0.336
## I(Population^2)   -7.755e-19  8.933e-19  -0.868  0.385
## Income.composition.of.resources  4.111e+00  6.150e-01   6.684 3.17e-11 ***
## Schooling         5.114e-01  4.253e-02  12.025 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.801 on 1642 degrees of freedom
## Multiple R-squared:  0.4209, Adjusted R-squared:  0.4188
## F-statistic: 198.9 on 6 and 1642 DF, p-value: < 2.2e-16
```



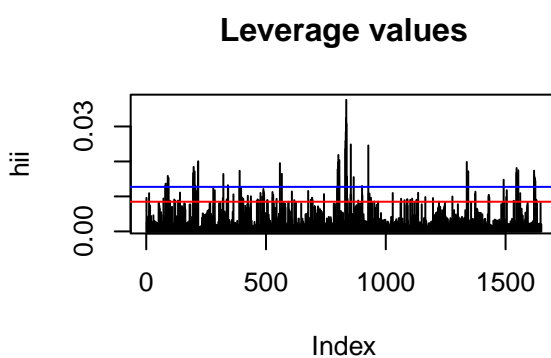
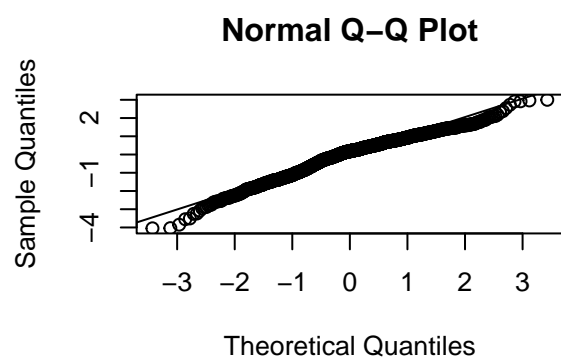
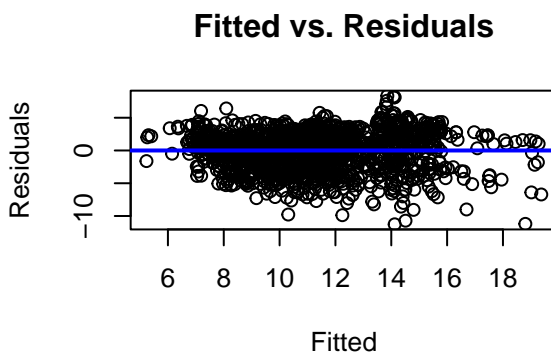
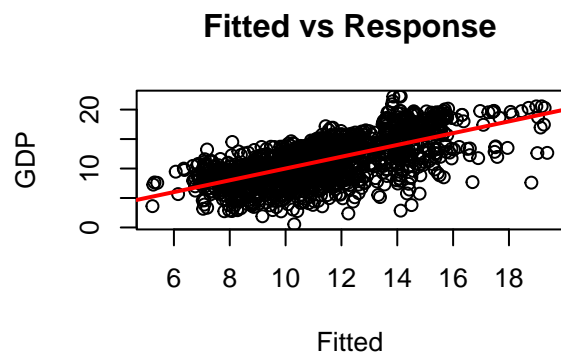
```
##
## Call:
## lm(formula = bc_GDP ~ Status + I(Total.expenditure^2) + Polio +
##     I(log(Population)) + Income.composition.of.resources + I(Schooling^2),
##     data = all_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -11.2678  -1.8229   0.5069   1.9800   8.3447
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    6.227949   0.603082  10.327 < 2e-16 ***
## StatusDeveloping -1.175649   0.235843  -4.985 6.86e-07 ***
## I(Total.expenditure^2)  0.003817   0.002451   1.557  0.120
## Polio          -0.003145   0.003273  -0.961  0.337
## I(log(Population)) -0.001182   0.025241  -0.047  0.963
## Income.composition.of.resources  4.273179   0.596040   7.169 1.14e-12 ***
## I(Schooling^2)      0.021669   0.001756  12.342 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.792 on 1642 degrees of freedom
## Multiple R-squared:  0.4249, Adjusted R-squared:  0.4228
## F-statistic: 202.2 on 6 and 1642 DF, p-value: < 2.2e-16
```



```
##           Status           I(Total.expenditure^2)
##           1.473847           1.102295
##           Polio           I(log(Population))
##           1.141679           1.017460
## Income.composition.of.resources           I(Schooling^2)
##           2.518552           2.985993
```

```
##           df           AIC
## model1  8 31226.955
## model2  8 34906.658
## model3  8  8085.575
## model4  8 34818.269
## model5  8  8085.524
## model6  8  8074.323
```

```
##           df           BIC
## model1  8 31270.218
## model2  8 34949.922
## model3  8  8128.838
## model4  8 34861.533
## model5  8  8128.788
## model6  8  8117.587
```



##	1	2	3	4	5	6
##	0.0096092189	0.0025023581	0.0031525829	0.0025681352	0.0020458790	0.0036276318
##	7	8	9	10	11	12
##	0.0042132438	0.0028365273	0.0027538105	0.0026426202	0.0039567007	0.0109294352
##	13	14	15	16	17	18
##	0.0057112240	0.0057718479	0.0054528732	0.0073908800	0.0026516157	0.0018066982
##	19	20	21	22	23	24
##	0.0018711889	0.0044166138	0.0015482377	0.0016445453	0.0015801646	0.0016347591
##	25	26	27	28	29	30
##	0.0026913104	0.0017205743	0.0020791814	0.0020041139	0.0020265199	0.0045975738
##	31	32	34	35	36	37
##	0.0028102319	0.0026332281	0.0029777481	0.0029472669	0.0028954642	0.0027174478
##	38	39	40	41	42	43
##	0.0025137349	0.0013364697	0.0014907129	0.0025766286	0.0025882016	0.0024203053
##	44	50	51	52	53	54
##	0.0015436018	0.0016114731	0.0014115623	0.0016321009	0.0022011886	0.0023653325
##	55	56	57	82	83	84
##	0.0024454136	0.0020672618	0.0022462755	0.0082566962	0.0081975903	0.0066942893
##	85	86	87	88	89	90
##	0.0073150072	0.0064789449	0.0043802112	0.0042841750	0.0043052546	0.0039148258
##	91	92	93	94	98	99
##	0.0054288517	0.0054486697	0.0048014769	0.0045878497	0.0027191953	0.0017714056
##	100	101	102	103	104	105
##	0.0016872616	0.0018768863	0.0016639302	0.0018013886	0.0028103560	0.0094103022
##	106	107	108	109	110	111
##	0.0027888085	0.0017295439	0.0042943301	0.0026771589	0.0016685616	0.0023192429

##	112	114	115	116	117	118
##	0.0013498326	0.0130599878	0.0136271916	0.0127659500	0.0106283621	0.0095819422
##	119	120	121	122	123	124
##	0.0085517736	0.0083473557	0.0088530550	0.0136296699	0.0138113431	0.0158674516
##	125	126	127	130	131	132
##	0.0146461757	0.0123073404	0.0152718800	0.0083569464	0.0082703483	0.0083412675
##	133	134	135	136	137	138
##	0.0064839906	0.0081610331	0.0087583019	0.0066350928	0.0066055265	0.0066606565
##	139	140	141	142	143	144
##	0.0065559430	0.0066253708	0.0066031049	0.0068829175	0.0066216129	0.0070323912
##	146	147	148	149	150	151
##	0.0017662157	0.0018553154	0.0021380891	0.0018638960	0.0017093940	0.0019347709
##	152	153	154	155	156	157
##	0.0023213819	0.0020541440	0.0091108529	0.0018096251	0.0038086303	0.0019771059
##	158	194	195	196	197	198
##	0.0087983152	0.0026338866	0.0039149078	0.0022701473	0.0040537610	0.0027377090
##	199	200	201	202	203	204
##	0.0028322369	0.0031043519	0.0044079760	0.0026764269	0.0031708481	0.0029179571
##	205	226	227	228	229	230
##	0.0088206120	0.0036990697	0.0035511477	0.0037472195	0.0036756329	0.0030088884
##	231	232	233	234	235	236
##	0.0026455317	0.0029501669	0.0111018829	0.0019014428	0.0022932197	0.0015804522
##	237	238	239	240	242	243
##	0.0032814062	0.0018398779	0.0017360802	0.0011892161	0.0072332198	0.0068717228
##	244	245	246	247	248	249
##	0.0068274899	0.0065647372	0.0065313033	0.0064601866	0.0054107570	0.0062482152
##	250	251	252	253	254	255
##	0.0047975603	0.0048268133	0.0080710949	0.0075722329	0.0078950513	0.0067150401
##	256	258	259	260	261	262
##	0.0063736878	0.0012303555	0.0012346474	0.0022518247	0.0012980286	0.0021622355
##	263	264	265	266	267	268
##	0.0013221561	0.0019657057	0.0024144436	0.0025839261	0.0015604734	0.0025549920
##	269	270	271	272	274	275
##	0.0024911187	0.0025487896	0.0016426785	0.0016240300	0.0012610934	0.0029313255
##	276	277	278	279	280	281
##	0.0076978859	0.0017620798	0.0016576707	0.0076960472	0.0018542113	0.0019374320
##	282	283	284	285	286	290
##	0.0018780549	0.0019303095	0.0040881503	0.0020547352	0.0024662673	0.0017419254
##	291	292	293	294	295	296
##	0.0016967851	0.0016589739	0.0032030346	0.0166341296	0.0154030007	0.0184352775
##	297	298	299	300	301	302
##	0.0140519193	0.0136514388	0.0130700280	0.0171556575	0.0124014631	0.0122453055
##	303	304	322	323	324	325
##	0.0130691323	0.0117511371	0.0038857214	0.0030740060	0.0043003887	0.0034584148
##	326	327	328	329	330	331
##	0.0115616840	0.0116504735	0.0021105538	0.0040456884	0.0018347244	0.0197595046
##	332	338	339	340	341	342
##	0.0200396748	0.0012526951	0.0013173248	0.0012046822	0.0013339770	0.0012803404
##	343	344	345	346	347	348
##	0.0010830434	0.0010895627	0.0012218163	0.0011670812	0.0010661820	0.0012903641
##	349	350	351	352	354	355
##	0.0015234064	0.0011843525	0.0011805027	0.0016043474	0.0038962859	0.0022502059
##	356	357	358	359	360	361
##	0.0020477864	0.0051663615	0.0045352245	0.0048474079	0.0026720180	0.0027208538

##	362	363	364	365	366	367
##	0.0028676340	0.0044957321	0.0042573003	0.0047775507	0.0021324061	0.0018843414
##	368	386	387	388	389	390
##	0.0042017240	0.0047680176	0.0047718625	0.0045576637	0.0047783198	0.0049567391
##	391	392	393	394	395	396
##	0.0050302618	0.0050625366	0.0052906915	0.0058646403	0.0053848799	0.0053393993
##	397	398	399	400	402	403
##	0.0058178577	0.0057440311	0.0061848326	0.0055175524	0.0030784863	0.0025066297
##	404	405	406	407	408	409
##	0.0079378766	0.0082980518	0.0083063137	0.0039800679	0.0045509008	0.0043007899
##	410	418	419	420	421	422
##	0.0049826520	0.0024602872	0.0033551544	0.0030187118	0.0037138500	0.0039413587
##	423	424	425	426	427	428
##	0.0031869283	0.0040033482	0.0043687108	0.0123122052	0.0075177074	0.0042273357
##	450	451	452	453	454	455
##	0.0016141640	0.0039937933	0.0014784145	0.0117662737	0.0020617548	0.0015155589
##	456	457	458	459	460	461
##	0.0015792110	0.0014318927	0.0019011438	0.0012392575	0.0011016037	0.0018822723
##	462	466	467	468	469	470
##	0.0018277344	0.0011963651	0.0010497941	0.0014352980	0.0014883217	0.0013223238
##	471	472	473	474	482	483
##	0.0027074217	0.0014904968	0.0018053205	0.0079608336	0.0013167035	0.0020036907
##	484	485	486	487	488	489
##	0.0012794236	0.0081682186	0.0012398280	0.0019262706	0.0029840883	0.0024637274
##	490	491	498	499	500	501
##	0.0023131182	0.0017507961	0.0061807726	0.0061102422	0.0052137377	0.0052051423
##	502	503	504	505	506	507
##	0.0080759941	0.0095103729	0.0059656673	0.0164080161	0.0049962964	0.0053611706
##	508	509	514	515	516	517
##	0.0053433744	0.0053552139	0.0034201427	0.0057083468	0.0035142199	0.0034810849
##	518	519	530	531	532	533
##	0.0036036209	0.0049135996	0.0037441869	0.0036336329	0.0031275435	0.0090151410
##	534	535	536	546	547	548
##	0.0038906963	0.0049713007	0.0093655621	0.0046369932	0.0132030304	0.0124091291
##	549	550	551	552	553	554
##	0.0034016740	0.0031780555	0.0033476372	0.0031625205	0.0027946000	0.0028682029
##	562	563	564	565	566	567
##	0.0016941747	0.0017094055	0.0017386313	0.0016552461	0.0017440653	0.0015860882
##	568	569	570	571	572	573
##	0.0015006559	0.0014611457	0.0031847907	0.0031216310	0.0019781670	0.0033741721
##	574	575	576	578	579	580
##	0.0056099087	0.0021513399	0.0016810040	0.0105951127	0.0024089277	0.0023862438
##	581	582	583	584	585	586
##	0.0011832579	0.0011786294	0.0023757267	0.0012375191	0.0022572902	0.0023791478
##	587	588	589	590	591	592
##	0.0024311984	0.0022251624	0.0021818907	0.0020183155	0.0010385590	0.0010771646
##	594	595	596	597	598	599
##	0.0011050432	0.0030067292	0.0012203507	0.0016519661	0.0010925345	0.0015530692
##	600	601	602	603	604	605
##	0.0012515720	0.0019709736	0.0014745133	0.0016754006	0.0128300616	0.0173386095
##	627	628	629	630	631	632
##	0.0032662538	0.0036987308	0.0120696162	0.0041069768	0.0034013972	0.0122642021
##	633	634	635	636	637	638
##	0.0026617066	0.0021400284	0.0015917857	0.0017833808	0.0096578689	0.0023108861

##	639	640	641	643	644	645
##	0.0028051780	0.0017786552	0.0092987519	0.0043560023	0.0044459704	0.0046017201
##	646	647	648	649	650	675
##	0.0046562199	0.0050242472	0.0049735457	0.0047499093	0.0073342191	0.0058502487
##	676	677	678	679	680	681
##	0.0055563470	0.0061178045	0.0055365968	0.0052546192	0.0067229282	0.0059554944
##	682	683	684	685	686	687
##	0.0062136383	0.0077524832	0.0062498197	0.0102116946	0.0062140404	0.0069165370
##	688	689	755	756	757	758
##	0.0077784294	0.0068758670	0.0033978250	0.0053507913	0.0050161799	0.0051229289
##	759	760	761	762	772	773
##	0.0055763130	0.0056680552	0.0054563883	0.0068215281	0.0100493251	0.0014900619
##	774	775	776	777	778	779
##	0.0018242926	0.0030406087	0.0016086041	0.0016451732	0.0013091359	0.0012326919
##	780	781	782	783	784	785
##	0.0015705650	0.0015430673	0.0016041918	0.0013668768	0.0012915817	0.0013713435
##	786	788	789	790	791	792
##	0.0013229077	0.0027157467	0.0019173228	0.0017118097	0.0016615775	0.0010381857
##	793	794	795	796	797	798
##	0.0016905366	0.0017118260	0.0011054641	0.0010275307	0.0015138012	0.0087440055
##	799	800	801	802	820	821
##	0.0010963370	0.0027133469	0.0091530156	0.0018456715	0.0013674770	0.0010477684
##	822	823	824	825	826	827
##	0.0013571134	0.0089293017	0.0012310882	0.0012324401	0.0018190161	0.0011406136
##	828	829	830	831	832	833
##	0.0010460048	0.0009437249	0.0109827068	0.0014862685	0.0018080587	0.0016345032
##	834	836	855	856	857	858
##	0.0021858484	0.0058174190	0.0044671528	0.0099255471	0.0041546636	0.0041822988
##	859	860	861	862	863	864
##	0.0039973118	0.0042136915	0.0121196305	0.0114414211	0.0110208401	0.0105754144
##	868	869	870	871	872	873
##	0.0042504956	0.0042299664	0.0042611796	0.0042354042	0.0037749715	0.0035258368
##	874	875	876	877	878	884
##	0.0048021350	0.0052740062	0.0042074207	0.0036303434	0.0035924026	0.0031646567
##	885	886	887	888	889	890
##	0.0089134984	0.0089350127	0.0079803483	0.0020699755	0.0034063073	0.0036242023
##	891	900	901	902	903	904
##	0.0048172626	0.0035785300	0.0030212505	0.0029516776	0.0029876913	0.0030366851
##	905	906	907	908	909	910
##	0.0024822226	0.0029761439	0.0023957350	0.0021684161	0.0021357400	0.0018243022
##	911	912	913	914	932	933
##	0.0018379009	0.0017712223	0.0017505821	0.0015091946	0.0112595386	0.0097870316
##	934	935	936	937	938	939
##	0.0093375268	0.0105082102	0.0085542455	0.0081358516	0.0055633906	0.0055943553
##	940	941	942	943	944	945
##	0.0067183932	0.0058058067	0.0047067093	0.0056478954	0.0047060125	0.0067031449
##	946	948	949	950	951	952
##	0.0052516560	0.0018462455	0.0013586211	0.0093363684	0.0019397968	0.0033405377
##	953	954	955	956	957	980
##	0.0014776253	0.0016108035	0.0015458943	0.0035943731	0.0041113162	0.0038828319
##	981	982	983	984	985	986
##	0.0038294873	0.0043340754	0.0050790936	0.0050645396	0.0050985083	0.0195089003
##	987	988	989	990	991	992
##	0.0063157944	0.0040964006	0.0068148147	0.0048981987	0.0069539416	0.0044289170

##	993	994	996	997	998	999
##	0.0022318373	0.0164517177	0.0083395256	0.0076585753	0.0070869205	0.0070150574
##	1000	1001	1002	1003	1004	1005
##	0.0082995104	0.0081694426	0.0068762014	0.0080524652	0.0079480834	0.0078427506
##	1006	1007	1008	1009	1010	1012
##	0.0068970421	0.0077720863	0.0078453430	0.0078355214	0.0068610590	0.0022400189
##	1013	1014	1015	1016	1017	1018
##	0.0019015006	0.0011221254	0.0018923995	0.0012853714	0.0013317780	0.0014969021
##	1019	1020	1021	1022	1023	1024
##	0.0020485962	0.0023632477	0.0023784223	0.0023226673	0.0081918152	0.0084898027
##	1028	1029	1030	1031	1032	1033
##	0.0061134813	0.0062743988	0.0056647889	0.0059852071	0.0055997314	0.0053754300
##	1034	1035	1036	1037	1038	1039
##	0.0049487816	0.0051007967	0.0049960642	0.0041907345	0.0029999707	0.0039816677
##	1040	1041	1042	1060	1061	1062
##	0.0037399488	0.0114107289	0.0029868747	0.0018636977	0.0016127232	0.0013887255
##	1063	1064	1065	1066	1067	1068
##	0.0017567623	0.0014108859	0.0013949133	0.0017836457	0.0016559305	0.0089396102
##	1069	1076	1077	1078	1079	1080
##	0.0019276865	0.0035965874	0.0022270672	0.0022738228	0.0025981122	0.0025332255
##	1081	1082	1083	1092	1093	1094
##	0.0082338272	0.0026380058	0.0036957463	0.0017139048	0.0017689235	0.0017498542
##	1095	1096	1097	1108	1109	1110
##	0.0017513524	0.0021124797	0.0018141283	0.0018727722	0.0025153107	0.0021853054
##	1111	1112	1113	1114	1115	1116
##	0.0036749562	0.0017418745	0.0018334440	0.0016062288	0.0011196576	0.0016861195
##	1117	1118	1119	1120	1121	1124
##	0.0015558637	0.0009930139	0.0010106322	0.0011065456	0.0079559201	0.0024062909
##	1125	1140	1141	1142	1143	1144
##	0.0022845053	0.0022944798	0.0032123324	0.0036439958	0.0023876119	0.0024209407
##	1145	1146	1147	1148	1149	1150
##	0.0028030548	0.0023362968	0.0016347284	0.0015129768	0.0018723991	0.0018367438
##	1151	1152	1153	1154	1188	1189
##	0.0021057089	0.0020087233	0.0018685631	0.0016332420	0.0049211062	0.0027138161
##	1190	1191	1192	1193	1194	1195
##	0.0027113305	0.0027479977	0.0015512894	0.0027618165	0.0028658985	0.0050389438
##	1196	1197	1198	1204	1205	1206
##	0.0050714190	0.0051377367	0.0053956496	0.0115567223	0.0024182070	0.0038615173
##	1207	1208	1209	1210	1211	1212
##	0.0022712243	0.0037438925	0.0021820637	0.0036558831	0.0036550607	0.0022109686
##	1213	1214	1215	1216	1217	1218
##	0.0021585700	0.0036926548	0.0090489923	0.0086808871	0.0017059505	0.0022972898
##	1236	1237	1238	1239	1240	1241
##	0.0050328097	0.0096346952	0.0094751416	0.0089511849	0.0019439404	0.0023557561
##	1242	1243	1244	1245	1246	1252
##	0.0024856228	0.0018524749	0.0028722584	0.0020690307	0.0016155155	0.0071346241
##	1253	1254	1255	1256	1268	1269
##	0.0072018367	0.0070682042	0.0068994834	0.0062167794	0.0039839921	0.0050690261
##	1270	1271	1272	1273	1274	1275
##	0.0050925685	0.0036739554	0.0035564044	0.0034831429	0.0049354894	0.0048370727
##	1276	1277	1278	1279	1280	1281
##	0.0047947272	0.0049231991	0.0071731833	0.0038533236	0.0067630378	0.0044241478
##	1282	1284	1285	1286	1287	1288
##	0.0044128029	0.0047989504	0.0050730165	0.0062592739	0.0061848502	0.0063237170

##	1289	1290	1291	1292	1293	1294
##	0.0051805790	0.0058703256	0.0045485959	0.0057770015	0.0057029271	0.0055942989
##	1295	1296	1297	1298	1300	1301
##	0.0044736215	0.0051341121	0.0044978620	0.0046079055	0.0014252174	0.0012780864
##	1302	1303	1304	1305	1306	1307
##	0.0014290310	0.0013631890	0.0014353534	0.0106507978	0.0013588623	0.0014392376
##	1308	1309	1310	1311	1332	1333
##	0.0018237893	0.0016142338	0.0019336884	0.0017059446	0.0019179268	0.0018916107
##	1334	1335	1336	1337	1338	1339
##	0.0022478264	0.0024754956	0.0020407999	0.0036988111	0.0027348894	0.0023345730
##	1340	1341	1342	1343	1344	1345
##	0.0027056768	0.0027033068	0.0034014249	0.0029663556	0.0036712981	0.0041603986
##	1346	1348	1349	1350	1351	1352
##	0.0038114187	0.0034483500	0.0028480686	0.0032026616	0.0024455199	0.0029764335
##	1353	1354	1355	1356	1357	1358
##	0.0027490371	0.0040660219	0.0034651786	0.0026893726	0.0018508949	0.0018996880
##	1359	1360	1361	1362	1364	1365
##	0.0021571250	0.0021856494	0.0021606498	0.0020015328	0.0010831454	0.0022709324
##	1366	1367	1368	1369	1370	1371
##	0.0022780303	0.0024590138	0.0079108687	0.0013893775	0.0023716504	0.0012328823
##	1372	1373	1374	1375	1376	1380
##	0.0023690323	0.0078569426	0.0016281477	0.0018580394	0.0019327636	0.0036450189
##	1381	1382	1383	1384	1385	1386
##	0.0033674415	0.0034494885	0.0036073547	0.0036992385	0.0127977134	0.0116429610
##	1387	1388	1389	1390	1391	1392
##	0.0177820585	0.0037265879	0.0197368742	0.0218495152	0.0187210408	0.0184879593
##	1393	1394	1444	1445	1446	1447
##	0.0155603664	0.0203864998	0.0046375049	0.0048989579	0.0047885891	0.0058353870
##	1448	1449	1450	1451	1452	1453
##	0.0046088979	0.0045600010	0.0045572641	0.0057151316	0.0045129049	0.0045866882
##	1454	1455	1456	1457	1458	1460
##	0.0044714008	0.0045743295	0.0048445639	0.0050573597	0.0053463287	0.0015938979
##	1461	1462	1463	1464	1465	1466
##	0.0016358910	0.0016591984	0.0017904706	0.0017457729	0.0017627813	0.0023913987
##	1467	1468	1469	1470	1471	1472
##	0.0025415323	0.0030858673	0.0235416445	0.0258980911	0.0284888784	0.0324633535
##	1473	1474	1476	1477	1478	1479
##	0.0376217040	0.0307301009	0.0083118751	0.0156731326	0.0070857686	0.0093621785
##	1480	1481	1482	1483	1484	1485
##	0.0035718078	0.0049532773	0.0028049701	0.0024495613	0.0017178270	0.0015760801
##	1486	1487	1492	1493	1494	1495
##	0.0016825874	0.0082060936	0.0033227981	0.0036339624	0.0084048200	0.0085002964
##	1496	1497	1498	1524	1525	1526
##	0.0105834350	0.0248644083	0.0103837035	0.0046549821	0.0046017318	0.0046775241
##	1527	1528	1529	1530	1531	1532
##	0.0049284616	0.0048098829	0.0046349332	0.0047589275	0.0048636649	0.0050072901
##	1533	1534	1535	1536	1537	1538
##	0.0049598855	0.0155196624	0.0045861364	0.0046027021	0.0047095621	0.0047341130
##	1540	1541	1542	1543	1544	1545
##	0.0060164714	0.0068834297	0.0068859725	0.0060241029	0.0070474375	0.0067580898
##	1546	1547	1548	1549	1550	1551
##	0.0074611911	0.0063762566	0.0065664938	0.0065392242	0.0074285227	0.0070959154
##	1552	1553	1554	1556	1557	1558
##	0.0064785206	0.0062925499	0.0088137421	0.0014094326	0.0018625586	0.0020273747

##	1559	1560	1561	1562	1563	1564
##	0.0018367459	0.0078429724	0.0012383641	0.0019196506	0.0020440705	0.0014815758
##	1565	1566	1567	1568	1572	1573
##	0.0079474549	0.0015357280	0.0022238236	0.0023715496	0.0079261368	0.0027547350
##	1574	1575	1576	1577	1578	1579
##	0.0129660620	0.0103515975	0.0023723918	0.0027992304	0.0032856896	0.0040075400
##	1580	1581	1582	1583	1584	1588
##	0.0049423622	0.0032045265	0.0030086315	0.0028711381	0.0020143466	0.0022494003
##	1589	1590	1591	1592	1593	1594
##	0.0021689284	0.0021624159	0.0029241287	0.0028282617	0.0020717949	0.0021503848
##	1595	1596	1597	1598	1599	1600
##	0.0027999877	0.0026066079	0.0027335373	0.0018342734	0.0018954704	0.0026793373
##	1601	1602	1604	1605	1606	1607
##	0.0020925703	0.0022458804	0.0245705724	0.0109351491	0.0073862441	0.0065667512
##	1608	1609	1610	1611	1612	1613
##	0.0065856628	0.0108088167	0.0075618389	0.0061573261	0.0062277244	0.0077716842
##	1614	1615	1616	1617	1618	1620
##	0.0062371489	0.0096508369	0.0064015880	0.0064054512	0.0068158930	0.0024952294
##	1621	1622	1623	1624	1625	1626
##	0.0083418279	0.0035950010	0.0021968088	0.0026226897	0.0025358089	0.0035978298
##	1627	1628	1629	1630	1631	1636
##	0.0029547389	0.0030461405	0.0035805419	0.0085508312	0.0038297975	0.0064817698
##	1637	1638	1639	1640	1641	1642
##	0.0066300648	0.0067832817	0.0056130091	0.0060725754	0.0054203388	0.0061028300
##	1643	1644	1645	1646	1647	1653
##	0.0061048319	0.0075828139	0.0056600164	0.0059532589	0.0054980625	0.0029675519
##	1654	1655	1656	1657	1658	1659
##	0.0083887275	0.0085182835	0.0024455054	0.0032267309	0.0028777835	0.0027706296
##	1660	1661	1662	1669	1670	1671
##	0.0024348237	0.0027963928	0.0036259841	0.0026510396	0.0023450512	0.0020493188
##	1672	1673	1674	1675	1676	1677
##	0.0021010804	0.0052532557	0.0017099082	0.0017277917	0.0020573044	0.0016620873
##	1678	1679	1680	1681	1682	1683
##	0.0014936663	0.0031618122	0.0019647487	0.0016624619	0.0014217746	0.0013294847
##	1685	1686	1687	1688	1689	1690
##	0.0012992698	0.0031794688	0.0015630966	0.0018546055	0.0032929733	0.0019339372
##	1691	1692	1693	1694	1695	1696
##	0.0020097333	0.0033363699	0.0015069686	0.0021726237	0.0021132565	0.0015175741
##	1697	1698	1699	1718	1719	1720
##	0.0016543244	0.0019597294	0.0021491425	0.0026737454	0.0027348935	0.0027991134
##	1721	1722	1723	1724	1725	1726
##	0.0026493679	0.0022047120	0.0016251177	0.0013301013	0.0013601524	0.0014906052
##	1727	1728	1729	1730	1731	1732
##	0.0012448693	0.0013758361	0.0016193006	0.0017896704	0.0020498055	0.0023691564
##	1734	1735	1736	1737	1738	1739
##	0.0028259069	0.0028129344	0.0041299372	0.0041204031	0.0021523208	0.0018425291
##	1740	1741	1742	1750	1751	1752
##	0.0016673195	0.0014007643	0.0109812909	0.0012587687	0.0021618168	0.0022079129
##	1753	1754	1755	1756	1757	1758
##	0.0022239303	0.0015704541	0.0024878877	0.0025589962	0.0024570252	0.0017777312
##	1759	1760	1761	1762	1763	1764
##	0.0027520505	0.0019133934	0.0025190214	0.0029125714	0.0030643421	0.0034776368
##	1766	1767	1768	1769	1770	1771
##	0.0026404889	0.0024123844	0.0016709986	0.0018312541	0.0017569369	0.0018252114

##	1772	1773	1774	1775	1776	1777
##	0.0026362475	0.0027725871	0.0029767781	0.0037588357	0.0028478413	0.0034823708
##	1778	1779	1782	1783	1784	1785
##	0.0037550147	0.0037562661	0.0032494596	0.0029908004	0.0023060817	0.0083474676
##	1786	1787	1788	1789	1790	1791
##	0.0081559305	0.0093513200	0.0034597790	0.0034796828	0.0034356313	0.0035952366
##	1792	1793	1798	1799	1800	1801
##	0.0030160860	0.0036571538	0.0023084720	0.0019348265	0.0015951879	0.0020855994
##	1802	1815	1816	1817	1818	1819
##	0.0014209789	0.0021511741	0.0012980305	0.0089139297	0.0021609721	0.0009837367
##	1820	1821	1822	1823	1824	1825
##	0.0013414564	0.0019195463	0.0018906345	0.0015259040	0.0012855373	0.0075373736
##	1826	1831	1832	1833	1834	1863
##	0.0013648711	0.0090616505	0.0090300795	0.0092033743	0.0073463195	0.0031965925
##	1864	1865	1866	1867	1868	1869
##	0.0024461516	0.0020598600	0.0018357410	0.0015125033	0.0015850071	0.0013402710
##	1870	1871	1872	1873	1874	1875
##	0.0011939529	0.0009630562	0.0010936204	0.0090092782	0.0008881183	0.0010995395
##	1876	1877	1879	1880	1881	1882
##	0.0035375151	0.0011848398	0.0036863319	0.0038975308	0.0038394933	0.0093684664
##	1883	1884	1895	1896	1897	1898
##	0.0042311929	0.0045300109	0.0024181961	0.0030861090	0.0047574866	0.0029269752
##	1899	1900	1901	1902	1903	1904
##	0.0038468003	0.0019803983	0.0081171111	0.0024524237	0.0031299268	0.0043395464
##	1944	1945	1946	1947	1948	1949
##	0.0044923291	0.0044944812	0.0044617308	0.0044412783	0.0027522418	0.0088954244
##	1950	1951	1952	1953	1954	1955
##	0.0090481680	0.0034572558	0.0035626255	0.0037958735	0.0056250680	0.0035712540
##	1961	1962	1963	1964	1965	1966
##	0.0110409992	0.0029979062	0.0017593364	0.0016672020	0.0025029574	0.0017623188
##	1967	1968	1969	1970	1971	1972
##	0.0014736734	0.0013369688	0.0015670206	0.0014938848	0.0026055220	0.0015659946
##	1973	1974	1977	1978	1979	1980
##	0.0022351070	0.0016869440	0.0016608218	0.0077726445	0.0012290440	0.0014374320
##	1981	1982	1983	1984	1985	1986
##	0.0014072194	0.0016632703	0.0017007756	0.0018336726	0.0018325268	0.0022051713
##	1987	1988	1989	1990	1991	1993
##	0.0037668478	0.0033526895	0.0036905719	0.0033707809	0.0034313957	0.0039204799
##	1994	1995	1996	1997	1998	1999
##	0.0098115338	0.0021160195	0.0031816699	0.0022869884	0.0027856295	0.0011608108
##	2000	2001	2002	2003	2004	2009
##	0.0012784310	0.0013737545	0.0012950528	0.0015627957	0.0014904599	0.0015119081
##	2010	2011	2012	2013	2014	2015
##	0.0017392408	0.0014760645	0.0022909275	0.0021637853	0.0022207857	0.0014263433
##	2016	2017	2018	2019	2020	2025
##	0.0022636439	0.0022530863	0.0018917438	0.0020069266	0.0023242134	0.0017310681
##	2026	2027	2028	2029	2030	2031
##	0.0015382588	0.0028087671	0.0016638978	0.0027488600	0.0015083715	0.0016285559
##	2032	2033	2034	2035	2036	2037
##	0.0016240261	0.0016000841	0.0095268185	0.0027943450	0.0016349229	0.0015080149
##	2038	2039	2041	2042	2043	2044
##	0.0027489033	0.0026985357	0.0046470141	0.0044740298	0.0043479045	0.0043202168
##	2045	2046	2047	2048	2049	2050
##	0.0043384926	0.0043083195	0.0051457827	0.0046046970	0.0053257170	0.0053636361

##	2051	2052	2053	2054	2055	2057
##	0.0053363883	0.0045709415	0.0044945697	0.0047025419	0.0056071733	0.0066697489
##	2058	2059	2060	2061	2062	2063
##	0.0051387425	0.0053473322	0.0071824415	0.0084887557	0.0066642448	0.0055118659
##	2064	2065	2066	2067	2068	2069
##	0.0052278497	0.0052964407	0.0070500613	0.0054839767	0.0051543916	0.0048447588
##	2070	2071	2121	2122	2123	2124
##	0.0047903724	0.0048191658	0.0047029471	0.0051650439	0.0060701402	0.0047692840
##	2125	2126	2127	2128	2129	2130
##	0.0046674541	0.0046661925	0.0048102533	0.0051032433	0.0052019669	0.0059352924
##	2131	2132	2133	2134	2135	2137
##	0.0063522260	0.0067553069	0.0071207063	0.0075776033	0.0082418693	0.0046108454
##	2138	2139	2140	2141	2142	2143
##	0.0029531118	0.0025000425	0.0023198062	0.0037463680	0.0039864178	0.0022321989
##	2144	2145	2146	2147	2148	2149
##	0.0016767281	0.0022587763	0.0036789490	0.0015846872	0.0034169145	0.0013225150
##	2150	2153	2154	2155	2156	2157
##	0.0019373987	0.0023859889	0.0019180412	0.0020571187	0.0021339873	0.0021343917
##	2158	2159	2160	2161	2162	2163
##	0.0022681629	0.0022357244	0.0030431209	0.0037966332	0.0029280534	0.0027586286
##	2164	2165	2202	2203	2204	2205
##	0.0030872928	0.0028645489	0.0034714016	0.0030961733	0.0021220467	0.0099914702
##	2206	2207	2208	2209	2210	2211
##	0.0035175739	0.0035655026	0.0028685782	0.0031291909	0.0058331333	0.0026445228
##	2212	2213	2214	2215	2216	2219
##	0.0060860611	0.0013122064	0.0012048333	0.0011731224	0.0023739502	0.0020479099
##	2220	2221	2222	2223	2224	2225
##	0.0048084171	0.0024363745	0.0046126582	0.0016731347	0.0029532339	0.0017585280
##	2226	2227	2228	2229	2230	2251
##	0.0030567649	0.0022008135	0.0039686781	0.0050624745	0.0077823730	0.0020108918
##	2252	2253	2254	2255	2256	2257
##	0.0022613910	0.0018873089	0.0040046500	0.0023932888	0.0022106468	0.0025449736
##	2258	2259	2260	2261	2267	2268
##	0.0034127422	0.0032752476	0.0031505491	0.0030358367	0.0030216050	0.0032534461
##	2269	2270	2271	2272	2273	2274
##	0.0037928218	0.0035136968	0.0027139887	0.0041681988	0.0025577781	0.0027880871
##	2275	2276	2277	2283	2284	2285
##	0.0029849501	0.0022221714	0.0021948226	0.0027573707	0.0026420422	0.0035518212
##	2286	2287	2288	2289	2290	2291
##	0.0026222330	0.0038876895	0.0028190928	0.0028207445	0.0039867606	0.0060768192
##	2292	2293	2294	2295	2296	2297
##	0.0024466766	0.0023253868	0.0022486966	0.0023543438	0.0036073477	0.0198548937
##	2299	2300	2301	2302	2303	2304
##	0.0103062417	0.0095764851	0.0085281814	0.0117956276	0.0027682013	0.0172141247
##	2305	2306	2363	2364	2365	2366
##	0.0028902542	0.0030275610	0.0022738662	0.0019102531	0.0019560248	0.0019481533
##	2367	2368	2369	2370	2371	2372
##	0.0027416983	0.0032009805	0.0024675318	0.0026026082	0.0026039953	0.0084592563
##	2373	2374	2375	2376	2377	2395
##	0.0021405260	0.0020444328	0.0025257576	0.0030970233	0.0036118859	0.0034859288
##	2396	2397	2398	2399	2400	2401
##	0.0035001093	0.0026805295	0.0034272348	0.0021421968	0.0019332705	0.0026125524
##	2402	2403	2404	2405	2406	2407
##	0.0024868596	0.0014160551	0.0013566515	0.0036625267	0.0107199840	0.0113534210

##	2408	2409	2427	2428	2429	2430
##	0.0030784563	0.0034149817	0.0059231091	0.0054986030	0.0055723361	0.0064815734
##	2431	2432	2433	2434	2435	2436
##	0.0063225388	0.0062508030	0.0046444563	0.0044298975	0.0053312351	0.0052634506
##	2437	2438	2439	2440	2441	2443
##	0.0054125360	0.0052427595	0.0051464027	0.0042365377	0.0042890158	0.0051972116
##	2444	2445	2446	2447	2448	2449
##	0.0051207977	0.0053121309	0.0053021897	0.0052659711	0.0033264253	0.0032992823
##	2450	2451	2452	2453	2454	2475
##	0.0031541427	0.0047600478	0.0028429436	0.0028610044	0.0048910969	0.0011745076
##	2476	2477	2478	2479	2480	2481
##	0.0018098490	0.0017449303	0.0010593185	0.0019403439	0.0017960063	0.0011289853
##	2482	2483	2484	2491	2492	2493
##	0.0033553205	0.0034653934	0.0013078779	0.0031513136	0.0036020030	0.0021914738
##	2494	2495	2496	2497	2498	2499
##	0.0019175192	0.0021653855	0.0022270775	0.0017824970	0.0013667070	0.0017060803
##	2500	2501	2502	2503	2504	2505
##	0.0017800853	0.0027451420	0.0017734273	0.0049223387	0.0017636201	0.0017336629
##	2507	2508	2509	2510	2546	2547
##	0.0100430706	0.0104712015	0.0101548090	0.0097054735	0.0013008127	0.0018344302
##	2548	2549	2550	2551	2552	2553
##	0.0017911222	0.0012455416	0.0017870593	0.0016199794	0.0017994965	0.0013710648
##	2555	2556	2557	2558	2559	2560
##	0.0015362334	0.0012630549	0.0012010076	0.0015480714	0.0011298543	0.0013470168
##	2561	2562	2563	2564	2565	2566
##	0.0009809512	0.0011723527	0.0030186370	0.0011380157	0.0011616867	0.0014023259
##	2567	2571	2572	2573	2574	2575
##	0.0015165776	0.0033485756	0.0022209199	0.0033557941	0.0017803974	0.0018131207
##	2576	2577	2578	2579	2580	2581
##	0.0030835589	0.0019745193	0.0030684065	0.0030751167	0.0019978156	0.0017787658
##	2582	2583	2584	2585	2603	2604
##	0.0030217629	0.0019119146	0.0031047425	0.0021113194	0.0019414112	0.0018973193
##	2605	2606	2607	2608	2609	2619
##	0.0024041687	0.0023655658	0.0025897670	0.0033152507	0.0033799958	0.0019834950
##	2620	2621	2622	2623	2624	2625
##	0.0017377807	0.0021220639	0.0018887858	0.0014444095	0.0013609265	0.0077752621
##	2635	2636	2637	2638	2639	2640
##	0.0032313353	0.0032799355	0.0036796114	0.0035503908	0.0035848975	0.0056943801
##	2641	2642	2643	2644	2645	2646
##	0.0083946166	0.0033378946	0.0035493231	0.0147701823	0.0084889512	0.0016427642
##	2647	2648	2649	2651	2652	2653
##	0.0016656563	0.0014825148	0.0032578039	0.0017431503	0.0016819878	0.0016724679
##	2654	2655	2656	2657	2658	2659
##	0.0017145295	0.0034021543	0.0098141467	0.0019487479	0.0117856080	0.0021614233
##	2660	2661	2662	2663	2667	2668
##	0.0016415632	0.0019603973	0.0019450028	0.0016671342	0.0020121637	0.0020454409
##	2669	2670	2671	2672	2673	2674
##	0.0019892625	0.0019177925	0.0018083620	0.0018716519	0.0021073664	0.0021340932
##	2675	2676	2677	2678	2679	2680
##	0.0018323971	0.0019257765	0.0029012065	0.0018120625	0.0017502074	0.0012949120
##	2681	2683	2684	2685	2686	2687
##	0.0015992956	0.0019508482	0.0035535557	0.0034652036	0.0019177476	0.0027924640
##	2688	2689	2690	2691	2692	2693
##	0.0028038509	0.0017280433	0.0026937651	0.0087383209	0.0086717097	0.0010145164

##	2694	2695	2696	2697	2699	2700
##	0.0012734734	0.0012655724	0.0025188941	0.0015352797	0.0026929787	0.0028199950
##	2701	2702	2703	2704	2705	2706
##	0.0027857046	0.0026696337	0.0167858153	0.0181214869	0.0163349830	0.0159945855
##	2707	2708	2709	2710	2711	2716
##	0.0163891411	0.0157603527	0.0151493584	0.0143373223	0.0174838926	0.0024240719
##	2717	2718	2719	2720	2721	2722
##	0.0025463705	0.0016532174	0.0041842053	0.0084644124	0.0031516213	0.0040583357
##	2723	2724	2725	2726	2727	2728
##	0.0109400375	0.0046763661	0.0040563764	0.0046982124	0.0028860157	0.0029006127
##	2732	2733	2734	2735	2736	2737
##	0.0064826734	0.0030186762	0.0028532154	0.0046304507	0.0044656602	0.0032329999
##	2738	2739	2740	2741	2742	2743
##	0.0021115280	0.0021369559	0.0023384859	0.0018233370	0.0020202449	0.0020575877
##	2744	2745	2746	2812	2813	2814
##	0.0021526914	0.0025789624	0.0026413481	0.0034349231	0.0053813381	0.0035585250
##	2815	2816	2817	2818	2819	2820
##	0.0034243529	0.0036092154	0.0036044198	0.0032703716	0.0030235021	0.0069379765
##	2821	2822	2823	2824	2825	2826
##	0.0075378247	0.0083927632	0.0023431222	0.0020762211	0.0016714124	0.0018073826
##	2828	2829	2830	2831	2832	2833
##	0.0022094263	0.0022357635	0.0013704137	0.0013620798	0.0014110073	0.0013373547
##	2834	2835	2836	2837	2838	2839
##	0.0021680781	0.0021761154	0.0010608082	0.0023592345	0.0013320015	0.0013755316
##	2840	2844	2845	2846	2847	2848
##	0.0014166435	0.0025573572	0.0017382983	0.0018049549	0.0017695079	0.0015307446
##	2849	2850	2851	2852	2853	2854
##	0.0028701206	0.0029429962	0.0017440067	0.0016779424	0.0173700632	0.0158656381
##	2855	2856	2857	2858	2908	2909
##	0.0143804708	0.0142498401	0.0151771806	0.0144303770	0.0011597390	0.0012530636
##	2910	2911	2912	2913	2914	2915
##	0.0091041826	0.0017782548	0.0089214613	0.0019153737	0.0078932068	0.0017096905
##	2916	2917	2924	2925	2926	2927
##	0.0015960782	0.0014922078	0.0018943336	0.0017526211	0.0017274159	0.0021740955
##	2928	2929	2930	2931	2932	2933
##	0.0015756045	0.0015148282	0.0019691708	0.0016488090	0.0020511348	0.0020452881
##	2934	2935	2936	2937	2938	
##	0.0023613550	0.0081923717	0.0018060415	0.0018555355	0.0020259156	

##	1	12	105	114	115	116	117	118	119	121	122	123	124	125	126	127
##	1	12	72	80	81	82	83	84	85	87	88	89	90	91	92	93
##	135	154	158	205	233	294	295	296	297	298	299	300	301	302	303	304
##	99	117	121	133	141	196	197	198	199	200	201	202	203	204	205	206
##	326	327	331	332	426	453	503	505	533	536	547	548	578	604	605	629
##	211	212	216	217	280	286	320	322	336	339	341	342	364	389	390	393
##	632	637	641	685	772	798	801	823	830	856	861	862	863	864	885	886
##	396	401	405	424	437	462	465	470	477	484	489	490	491	492	505	506
##	932	933	934	935	936	950	986	994	1041	1068	1204	1215	1216	1237	1238	1239
##	527	528	529	530	531	544	558	566	608	618	676	687	688	692	693	694
##	1305	1385	1386	1387	1389	1390	1391	1392	1393	1394	1469	1470	1471	1472	1473	1474
##	742	797	798	799	801	802	803	804	805	806	831	832	833	834	835	836
##	1477	1479	1495	1496	1497	1498	1534	1554	1574	1575	1604	1605	1609	1615	1630	1655
##	838	840	852	853	854	855	866	885	901	902	927	928	932	938	952	968
##	1742	1787	1817	1831	1832	1833	1873	1882	1949	1950	1961	1994	2034	2205	2297	2299

```
## 1029 1064 1078 1088 1089 1090 1102 1110 1128 1129 1135 1165 1197 1278 1338 1339
## 2300 2301 2302 2304 2406 2407 2507 2508 2509 2510 2644 2656 2658 2691 2692 2703
## 1340 1341 1342 1344 1373 1374 1429 1430 1431 1432 1492 1503 1505 1534 1535 1545
## 2704 2705 2706 2707 2708 2709 2710 2711 2723 2853 2854 2855 2856 2857 2858 2910
## 1546 1547 1548 1549 1550 1551 1552 1553 1561 1619 1620 1621 1622 1623 1624 1627
## 2912
## 1629
```

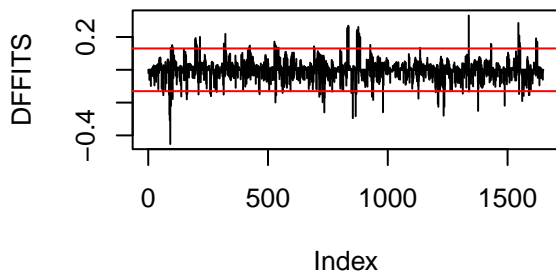
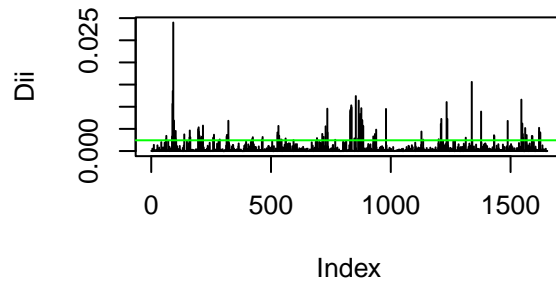
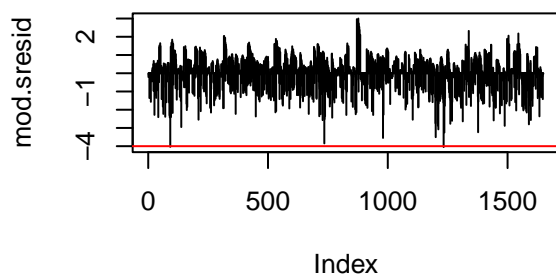
```
## 126 2121
## 92 1233
```

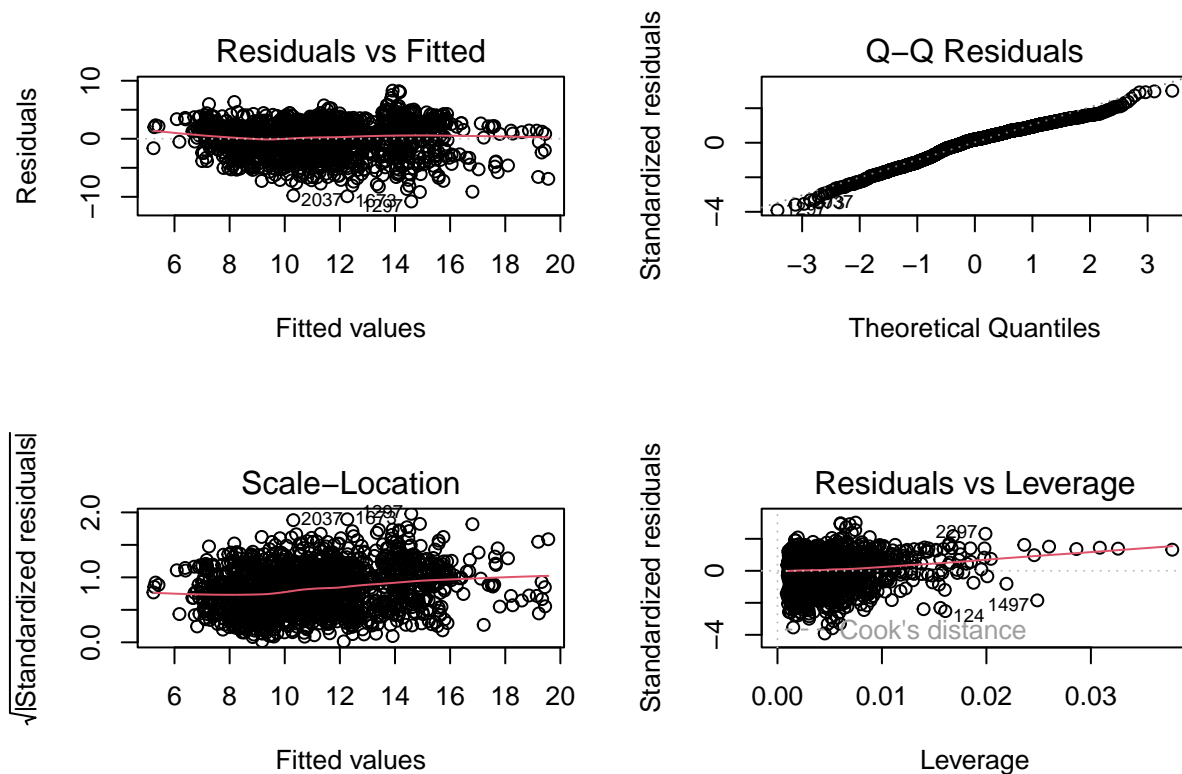
```
## 91 93 121 123 124 126 130 131 132 133 134 135 136 137 138 140
## 61 63 87 89 90 92 94 95 96 97 98 99 100 101 102 104
## 230 253 254 256 294 296 297 298 299 301 302 304 325 331 397 398
## 138 160 161 163 196 198 199 200 201 203 204 206 210 216 259 260
## 400 453 498 499 500 502 504 505 682 683 685 798 801 932 933 936
## 262 286 315 316 317 319 321 322 421 422 424 462 465 527 528 531
## 937 938 939 940 941 950 989 1024 1237 1238 1275 1281 1290 1297 1298 1352
## 532 533 534 535 536 544 561 594 692 693 714 720 728 735 736 768
## 1469 1470 1471 1472 1473 1474 1487 1497 1532 1534 1535 1537 1540 1541 1543 1546
## 831 832 833 834 835 836 848 854 864 866 867 869 871 872 874 877
## 1548 1550 1551 1553 1554 1604 1611 1616 1673 1949 1961 2037 2047 2049 2121 2124
## 879 881 882 884 885 927 934 939 980 1128 1135 1200 1209 1211 1233 1236
## 2267 2297 2299 2427 2509 2510 2640 2703 2706 2707 2709 2710 2711 2723 2732 2819
## 1313 1338 1339 1377 1431 1432 1488 1545 1548 1549 1551 1552 1553 1561 1567 1589
## 2821 2853 2854 2856 2857 2858
## 1591 1619 1620 1622 1623 1624
```

```
## 91 93 121 123 124 126 130 131 132 133 134 135 136 137 138 140
## 61 63 87 89 90 92 94 95 96 97 98 99 100 101 102 104
## 230 253 254 256 294 296 297 298 299 301 302 304 325 331 397 398
## 138 160 161 163 196 198 199 200 201 203 204 206 210 216 259 260
## 400 453 498 499 500 502 504 505 682 683 685 798 801 932 933 936
## 262 286 315 316 317 319 321 322 421 422 424 462 465 527 528 531
## 937 938 939 940 941 950 989 1024 1237 1238 1275 1281 1290 1297 1298 1352
## 532 533 534 535 536 544 561 594 692 693 714 720 728 735 736 768
## 1469 1470 1471 1472 1473 1474 1487 1497 1532 1534 1535 1537 1540 1541 1543 1546
## 831 832 833 834 835 836 848 854 864 866 867 869 871 872 874 877
## 1548 1550 1551 1553 1554 1604 1611 1616 1673 1949 1961 2037 2047 2049 2121 2124
## 879 881 882 884 885 927 934 939 980 1128 1135 1200 1209 1211 1233 1236
## 2267 2297 2299 2427 2509 2510 2640 2703 2706 2707 2709 2710 2711 2723 2732 2819
## 1313 1338 1339 1377 1431 1432 1488 1545 1548 1549 1551 1552 1553 1561 1567 1589
## 2821 2853 2854 2856 2857 2858
## 1591 1619 1620 1622 1623 1624
```

```
##
## Call:
## lm(formula = bc_GDP ~ Status + I(Total.expenditure^2) + Polio +
## I(log(Population)) + Income.composition.of.resources + I(Schooling^2),
## data = clean_data6)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
```

```
## -10.7965 -1.8298 0.4982 1.9687 8.2887
##
## Coefficients:
##
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)      6.329789   0.597670  10.591 < 2e-16 ***
## StatusDeveloping -1.245231   0.234032  -5.321 1.18e-07 ***
## I(Total.expenditure^2) 0.003577   0.002429   1.473 0.141
## Polio            -0.003347   0.003242  -1.032 0.302
## I(log(Population)) -0.002211   0.025005  -0.088 0.930
## Income.composition.of.resources 4.154936   0.591220   7.028 3.07e-12 ***
## I(Schooling^2)      0.022231   0.001746  12.733 < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 2.765 on 1640 degrees of freedom
## Multiple R-squared:  0.4343, Adjusted R-squared:  0.4322
## F-statistic: 209.8 on 6 and 1640 DF, p-value: < 2.2e-16
```





- Kumar, Rajarshi. 2018. "Life Expectancy (WHO)." <https://www.kaggle.com/datasets/kumarajarshi/life-expectancy-who>.
- Organisation for Economic Co-operation and Development. n.d. "Nominal Gross Domestic Product (GDP)." <https://www.oecd.org/en/data/indicators/nominal-gross-domestic-product-gdp.html?oecdcontrol-d7f68dbeee-var3=2023>.
- Radcliffe, Brent. n.d. "How Education and Training Affect the Economy." <https://www.investopedia.com/articles/economics/09/education-training-advantages.asp>.
- Raghupathi, Viju, and Wullianallur Raghupathi. 2020. "Healthcare Expenditure and Economic Performance: Insights from the United States Data." *Frontiers in Public Health* 8: 156. <https://doi.org/10.3389/fpubh.2020.00156>.
- Solow, Robert M. 1956. "A Contribution to the Theory of Economic Growth." *The Quarterly Journal of Economics* 70 (1): 65–94. <https://doi.org/10.2307/1884513>.
- United Nations. n.d. "UN Data." <https://data.un.org>.
- World Health Organization. n.d. "Global Health Observatory (GHO) Data Repository." <https://www.who.int/data/gho>.