Model

William Fisher

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Read data

```
Clean_data = read_rds("data/clean_data_1.Rds")
```

Correlation between CPIA and GDP

```
cor.test(x = Clean_data$GDP, y = Clean_data$CPIA_Mean)
```

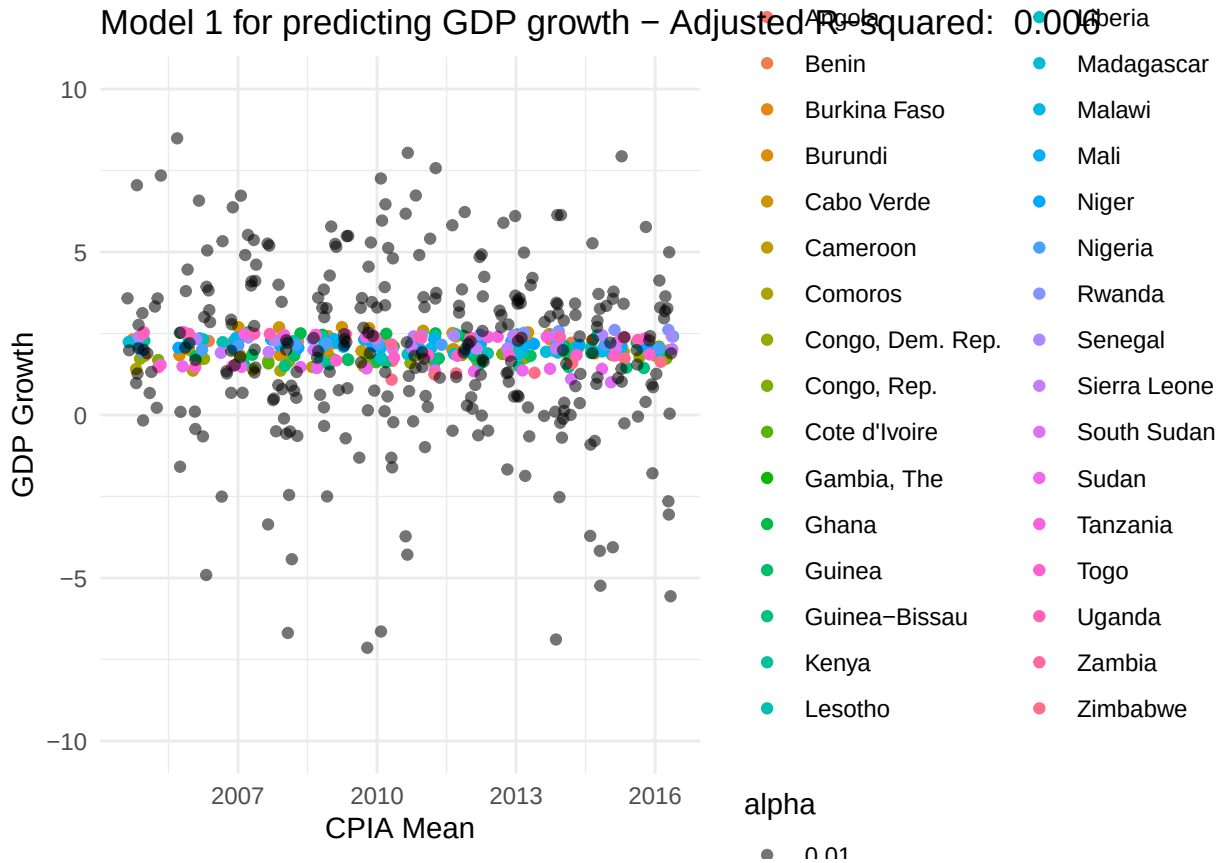
```
##
##  Pearson's product-moment correlation
##
## data:  Clean_data$GDP and Clean_data$CPIA_Mean
## t = 0.92266, df = 302, p-value = 0.3569
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
##  -0.05983045  0.16452970
## sample estimates:
##       cor
## 0.05301869
```

Linear Model with 1 variable, R-sqaured = 0.0058

```
model_1 = lm(GDP_growth ~ CPIA_Mean, data = Clean_data)

summary(model_1)
```

```
##
## Call:
## lm(formula = GDP_growth ~ CPIA_Mean, data = Clean_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -24.3496  -1.3786   0.0098   1.6213  16.0158
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  -0.3726     1.4583  -0.256   0.7985
## CPIA_Mean     0.7377     0.4416   1.671   0.0958 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.613 on 302 degrees of freedom
## Multiple R-squared:  0.009157,   Adjusted R-squared:  0.005876
## F-statistic: 2.791 on 1 and 302 DF,  p-value: 0.09584
```

```
Clean_data$model_1 = model_1$fitted.values

Clean_data %>%
  ggplot(
  mapping = aes(
    x = Year
  )
) +
  geom_jitter(mapping = aes(colour = Country, y = model_1)) +
  geom_jitter(mapping = aes(y = GDP_growth, alpha = 0.01)) +
  theme_minimal() +
  labs(title = "Model 1 for predicting GDP growth - Adjusted R-squared:  0.006") +
  xlab("CPIA Mean") +
  ylab("GDP Growth") +
  ylim(-10, 10)
```



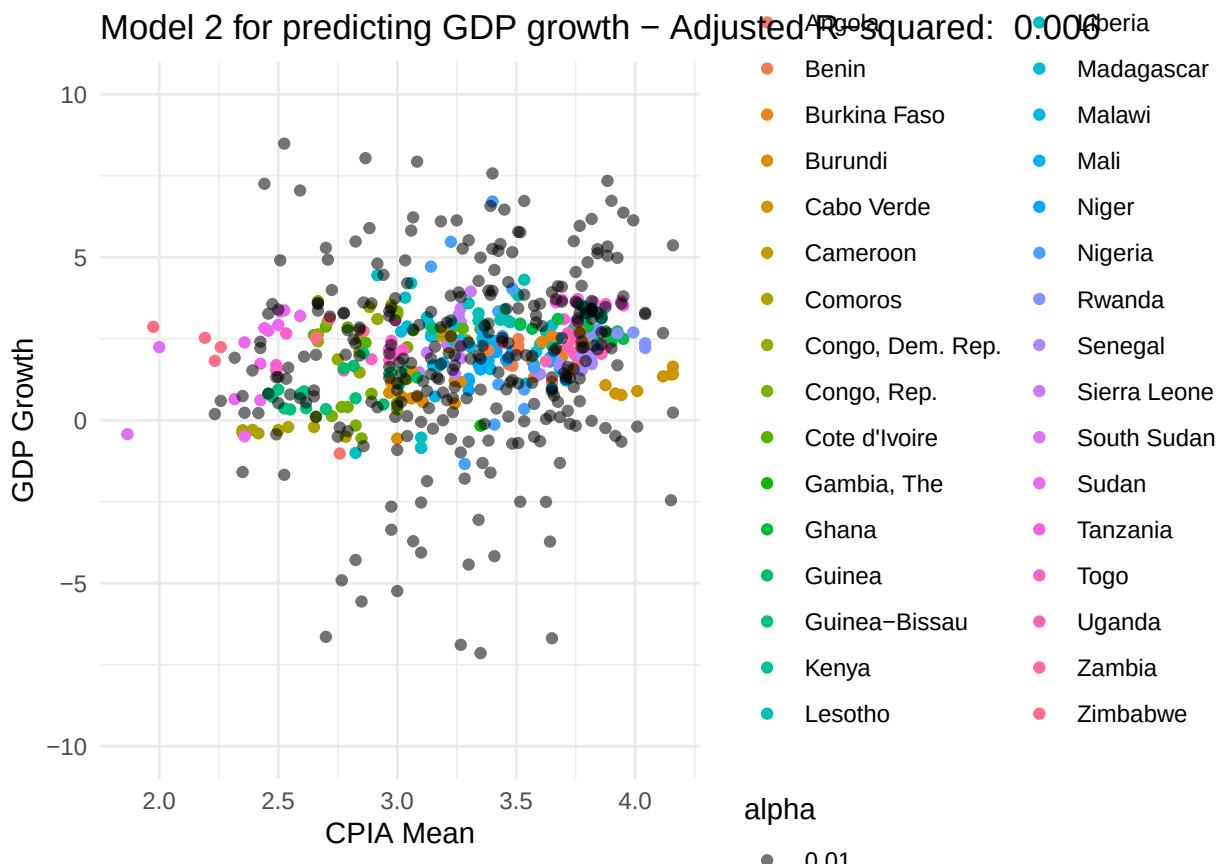

```
ggsave(filename = "graphs/linear_model_1",
       device = "png",
       height = 4,
       width = 8)
```

Linear Model with all variable, R-sqaured = 0.05467

```r
model_2 = lm(GDP_growth ~ CPIA_Mean + Exports + FDI + GDP + Capital + Savings + Imports + Inflation + Ai

summary(model_2)
```

```
##
## Call:
## lm(formula = GDP_growth ~ CPIA_Mean + Exports + FDI + GDP + Capital +
##     Savings + Imports + Inflation + Aid + Remitances + log(Population) +
##     Population_growth, data = Clean_data)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -25.329  -1.527   0.097   1.577  14.615
##
## Coefficients:
##                      Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -4.207e+00  5.361e+00  -0.785  0.43319
## CPIA_Mean          4.410e-02  4.915e-01   0.090  0.92857
## Exports           -5.191e-11  4.070e-11  -1.275  0.20322
## FDI                6.568e-02  2.356e-02   2.787  0.00567 **
## GDP               -7.378e-04  4.465e-04  -1.652  0.09955 .
## Capital            1.834e-11  6.974e-11   0.263  0.79280
## Savings            4.118e-02  2.215e-02   1.859  0.06403 .
## Imports            6.292e-11  3.394e-11   1.854  0.06473 .
## Inflation         -5.880e-02  3.257e-02  -1.805  0.07204 .
## Aid               -1.051e-03  3.359e-02  -0.031  0.97507
## Remitances        -5.399e-02  5.691e-02  -0.949  0.34356
## log(Population)    6.349e-01  3.226e-01   1.968  0.04999 *
## Population_growth -1.492e+00  5.017e-01  -2.974  0.00319 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.502 on 291 degrees of freedom
## Multiple R-squared:  0.103,  Adjusted R-squared:  0.066
## F-statistic: 2.784 on 12 and 291 DF,  p-value: 0.001305
```

```r
Clean_data$model_2 = model_2$fitted.values

ggplot(
  data = Clean_data,
  mapping = aes(
    x = CPIA_Mean
  )
) +
  geom_jitter(mapping = aes(colour = Country, y = model_2)) +
  geom_jitter(mapping = aes(y = GDP_growth, alpha = 0.01)) +
  theme_minimal() +
  labs(title = "Model 2 for predicting GDP growth - Adjusted R-squared:  0.006") +
  xlab("CPIA Mean") +
  ylab("GDP Growth") +
  ylim(-10, 10)
```




```
ggsave(filename = "graphs/model_2.png",
       device = "png",
       height = 4,
       width = 8)
```

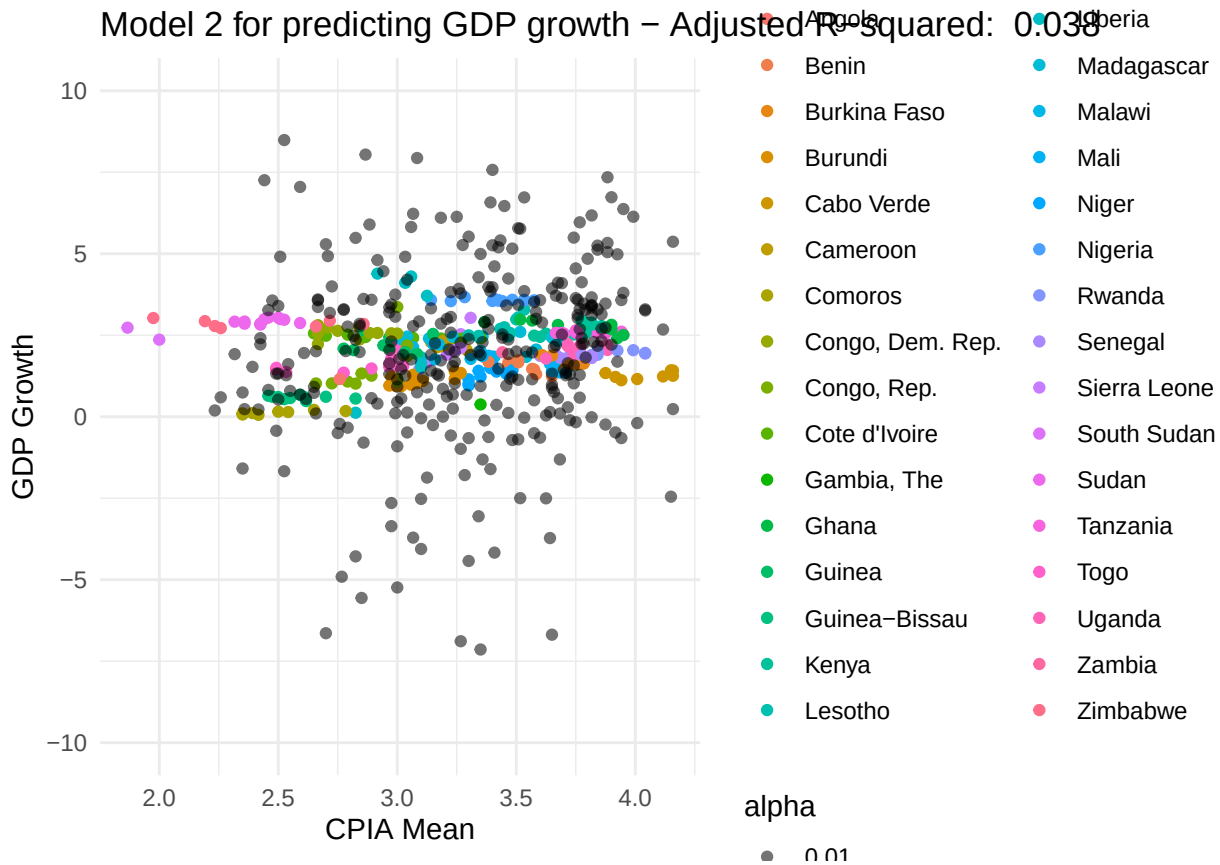
Linear Model with all variable, R-sqaured = 0.0383

```
model_3 = lm(GDP_growth ~ FDI + log(Population) + Population_growth, data = Clean_data)

summary(model_3)
```

```
##
## Call:
## lm(formula = GDP_growth ~ FDI + log(Population) + Population_growth,
##     data = Clean_data)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -24.4447  -1.4679   0.1789   1.5913  15.5211
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       -6.63952    2.80582  -2.366 0.018600 *
## FDI                0.04057    0.01972   2.058 0.040461 *
## log(Population)    0.66270    0.18778   3.529 0.000482 ***
```

```
## Population_growth -0.89637    0.35702  -2.511 0.012574 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.554 on 300 degrees of freedom
## Multiple R-squared:  0.04784,    Adjusted R-squared:  0.03832
## F-statistic: 5.025 on 3 and 300 DF,  p-value: 0.002061
```

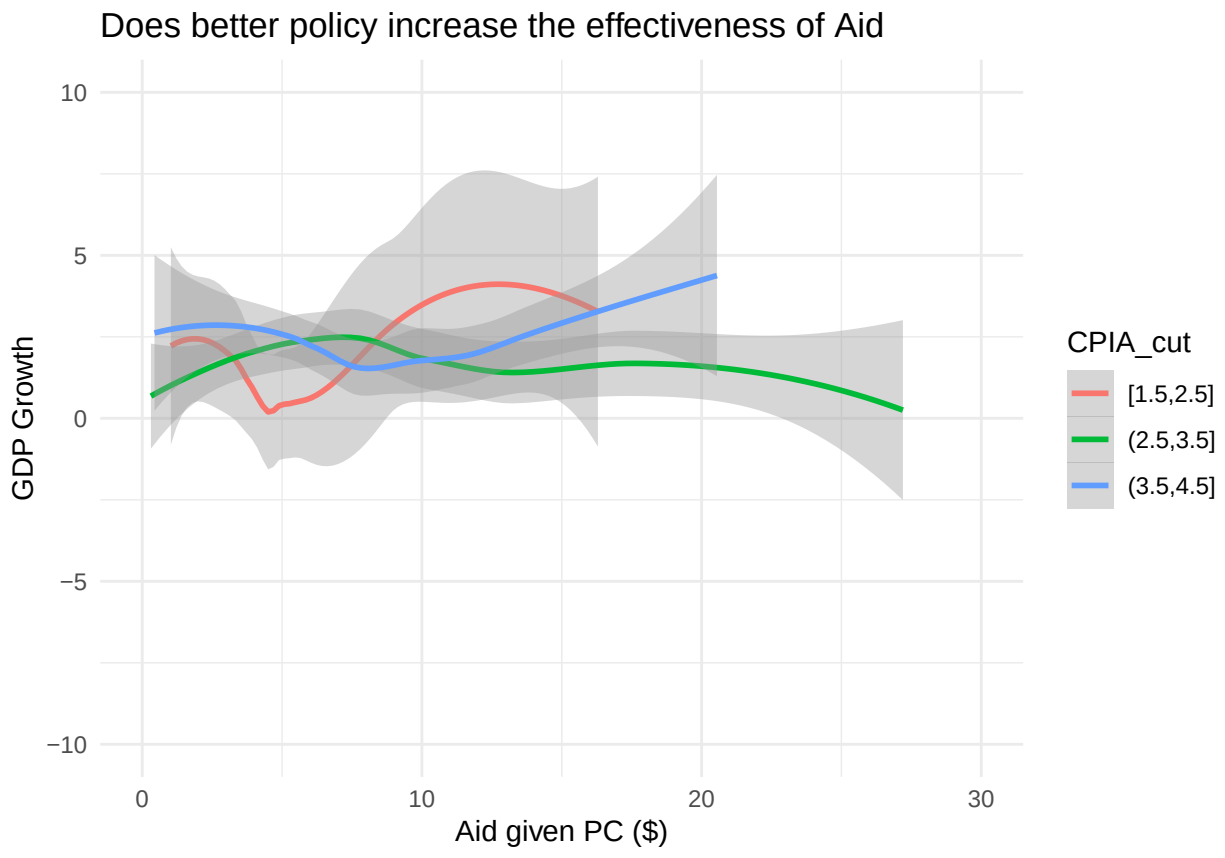
```
Clean_data$model_3 = model_3$fitted.values

ggplot(
  data = Clean_data,
  mapping = aes(
    x = CPIA_Mean
  )
) +
  geom_jitter(mapping = aes(colour = Country, y = model_3)) +
  geom_jitter(mapping = aes(y = GDP_growth, alpha = 0.01)) +
  theme_minimal() +
  labs(title = "Model 2 for predicting GDP growth - Adjusted R-squared:  0.038") +
  xlab("CPIA Mean") +
  ylab("GDP Growth") +
  ylim(-10, 10)
```



```
ggsave(filename = "graphs/model_3.png",
       device = "png",
       height = 4,
       width = 8)
```

Does better policy increase the effectiveness of Aid

```
Clean_data = Clean_data %>%
  mutate(
    CPIA_aid = CPIA_Mean * Aid,
    CPIA_cut = cut_width(CPIA_Mean, width = 1)
  )

ggplot(
  data = Clean_data,
  mapping = aes(
    x = Aid
  )
) +
  geom_smooth(mapping = aes(colour = CPIA_cut, y = GDP_growth)) +
  theme_minimal() +
  labs(title = "Does better policy increase the effectiveness of Aid") +
  xlab("Aid given PC ($)") +
  ylab("GDP Growth") +
  ylim(-10, 10) +
  xlim(0, 30)
```



```r
ggsave(filename = "graphs/model_4.png",
       device = "png",
       height = 4,
       width = 8)
```