Divides in Development: An Analysis on the Impact of Modern Western Colonialism on Today's Economies

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Abstract

The effects of Modern Western Colonialism are still visible in today's global political landscape. In my replication experiment, settler mortality is used as an instrumental variable to investigate the relationship between protection against expropriation and Gross Domestic Product per capita of former colonies. Former colonies with strong protection against expropriation tend to enjoy higher GDP per capita today. Whether or not the colonial powers established strong protections against expropriation laws can explain Colonies with high settler mortality were less Strong land ownership laws are often attributed with strong legal systems in countries which impact protection of private enterprises. land owners from corrupt government What was done, what was found and why it matters?

Introduction

In 1492, Christopher Colombus with a crew of 90 men set sail from Spain on a mission to discover a sea route that would reach the spice ladened lands of India and China. He had no way of knowing that two giant landmasses stood in the way of his ambitions. His discovery of these new lands ignited the period of history dominated by the phenomenon of Western colonialism which saw 300 years of the slave trade, the decimation of entire Native populations through war and disease, and the emergence of European super powers whose wealth was attributed to amassing large amounts of precious metals and raw resources from their colonies.

The effects of colonization are deeply embedded into today's global political landscape with many countries still coping with the aftermath of having been governed by a foreign power, often with little to no understanding of local cultures, for hundreds of years. Of course, colonization hasn't impacted all countrie equally. In the paper by Daron Acemoglu, Simon Johnson, and James A Robinson titled "The Colonial Origins of Comparative Development: An Empirical Investigation", it is hypothesized that different strategies used by colonial powers impacted how the colonies were governed. Colonies with stronger protection against expropriation

Discussion and Analysis

Model

$$R_i = \beta_0 + \beta_1 logM_i + X_s tau_n + \upsilon_y + \epsilon_i$$

Table 1 contains summary statistics of the variables used in this study and their relationships to one another.

Figure 1: Expropriation Protection VS GDP

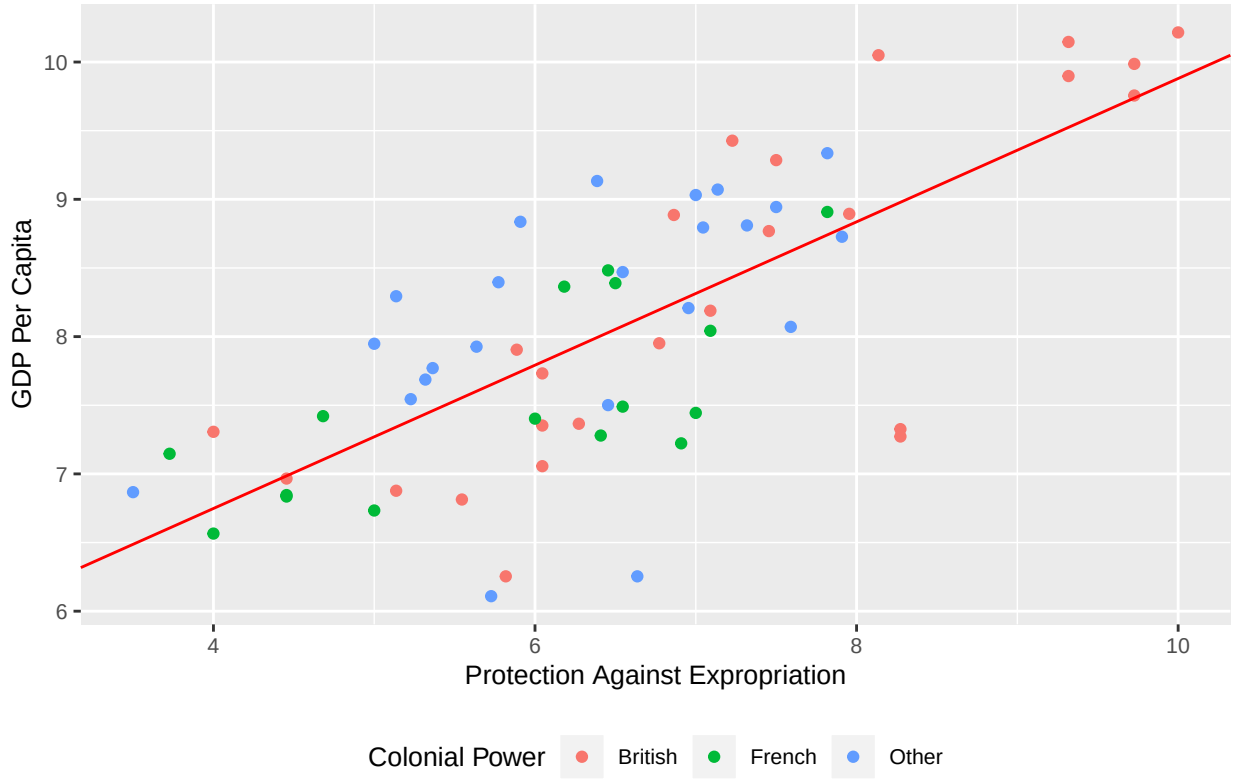


Figure 2: Relationship between settler mortality and GDP

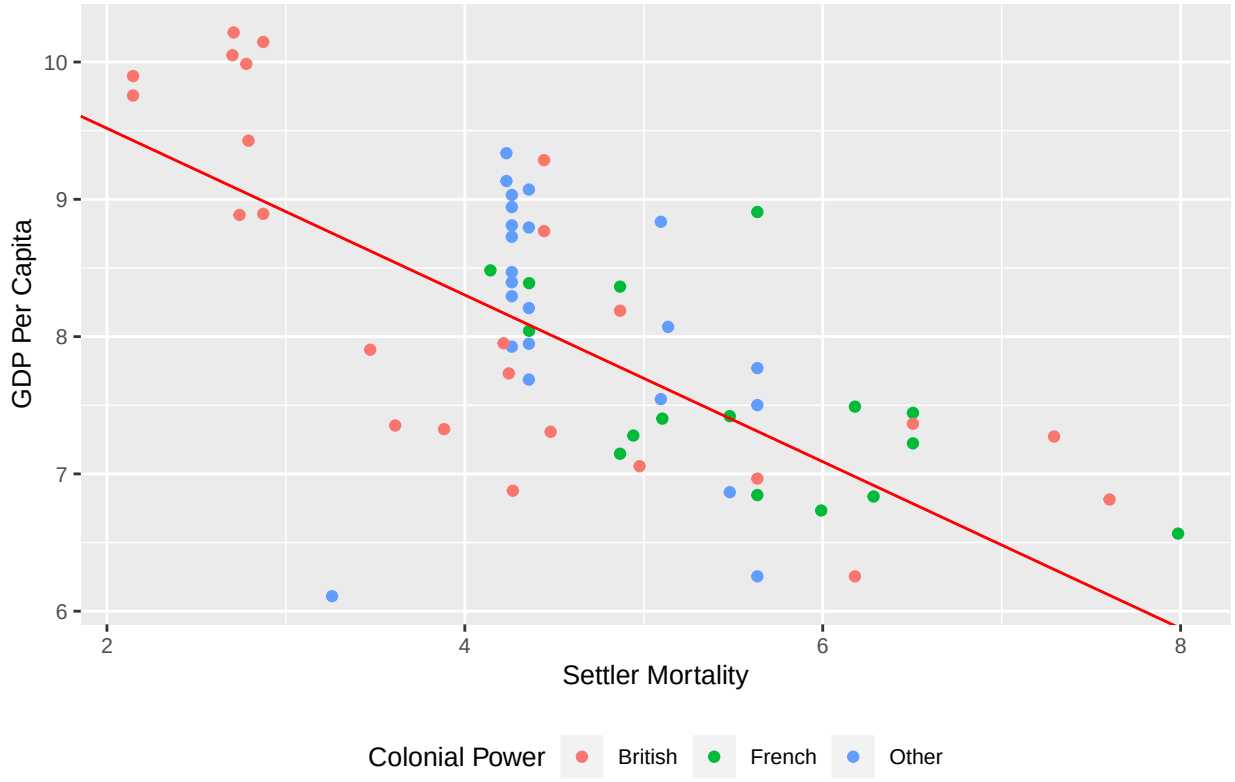
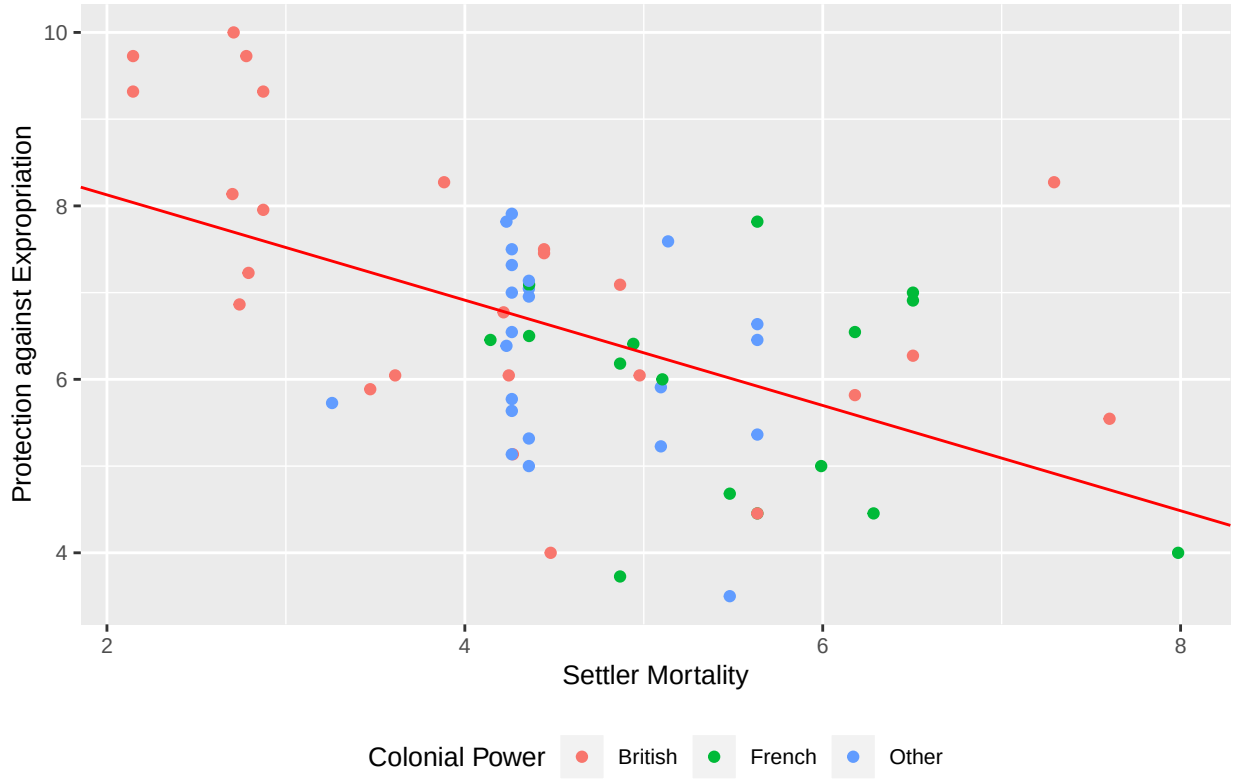


Figure 3: Relationship between settler mortality and Expropriation Protection



short comings and limitations

Ethics

Conclusion

Colonialism was bad news for native populations across all colonies. The places in the world where European settlers could settle had native populations being forced to give up their lands, let go of their culture and accept a foreign one as their own, and if that wasn't enough, they were being killed in the millions by European diseases like small The colonies where europeans couldn't safely settle because of the prescence of endemic diseases like Yellow Fever and Malaria, natives faced exploitation, the robbery of resources and the establishment of weak political and legal structures that serve as obstacles for those countries to this day.

References

libraries used

```
##
##   Wickham et al., (2019). Welcome to the tidyverse. Journal of Open
##   Source Software, 4(43), 1686, https://doi.org/10.21105/joss.01686
##
## A BibTeX entry for LaTeX users is
```

```
##
##   @Article{,
##     title = {Welcome to the {tidyverse}},
##     author = {Hadley Wickham and Mara Averick and Jennifer Bryan and Winston Chang and Lucy D'Agostin
##     year = {2019},
##     journal = {Journal of Open Source Software},
##     volume = {4},
##     number = {43},
##     pages = {1686},
##     doi = {10.21105/joss.01686},
##   }
```

H. Wickham. ggplot2: Elegant Graphics for Data Analysis. Springer-Verlag New York, 2016.

Wickham et al., (2019). Welcome to the tidyverse. Journal of Open Source Software, 4(43), 1686, https://doi.org/10.21105/joss.01686

Datasets used can be found here

http://economics.mit.edu/faculty/acemoglu/data/ajr2001

Research sources

Appendix

```
excolonies <- tibble(country=data4$shortnam,
                     samples=data4$baseco,
                     dummy_africa=data4$africa,
                     dummy_asia=data4$asia,
                     dummy_neu=data4$rich4,
                     britcol=data5$f_brit,
                     frencol=data5$f_french,
                     landlocked=data6$landlock,
                     settler_mortality=data4$logem4,
                     expro_pro=data4$avexpr,
                     gdppc=data4$logpgp95

                     )%>% subset(samples==1)



excolonies<-excolonies %>% mutate(counttrycol= case_when(
                                  britcol==1~"British",
                                  frencol==1~"French",
                                  britcol==0~"Other",
                                  frencol==0~"Other"))


#latin american / caribbean countries

excolonies<-
```

```
  excolonies %>%
  mutate(nonasaf= dummy_africa+dummy_asia+dummy_neu,
         nonasaf=if_else(nonasaf==0,1,0))

#only latin american and caribbean
excolnocon <- excolonies %>% subset(dummy_africa==0)%>%
  subset(dummy_asia==0)%>%
  subset(dummy_neu==0)

#excolonies is master table with everything

#excolonies2 master table without dummy_neu, to take away outliers
excolonies2<-excolonies[!(excolonies$dummy_neu==1),]


#only africa
african<-
excolonies %>%
  filter(dummy_africa == "1")

# all colonies without africa
non_african <-
excolonies %>%
  filter(dummy_africa == "0")

#only asia
asian<-excolonies %>%
  filter(dummy_asia == "1")
#all colonies without asia

non_asian<-excolonies %>%
  filter(dummy_asia == "0")
#all colonies without latin america/caribbean
nonlacar<- excolonies%>%
  filter(nonasaf=="0")

#only neo-europe
neu <- excolonies %>%
  filter(dummy_neu == "1")
```

```
mortalgdp <- lm(gdppc~settler_mortality, data=african)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = african)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.82197 -0.38752  0.06745  0.37402  1.59484
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)         8.7787     0.6246  14.056 2.26e-13 ***
## settler_mortality  -0.2601     0.1103  -2.359   0.0265 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6879 on 25 degrees of freedom
## Multiple R-squared:  0.182,  Adjusted R-squared:  0.1493
## F-statistic: 5.563 on 1 and 25 DF,  p-value: 0.02647
```

```
mortalexpro <- lm(expro_pro~settler_mortality, data=african)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = african)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.3813 -1.0127  0.1096  0.7472  2.5878
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         6.4751     1.1234   5.764 5.24e-06 ***
## settler_mortality  -0.1084     0.1984  -0.546     0.59
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.237 on 25 degrees of freedom
## Multiple R-squared:  0.01179,    Adjusted R-squared:  -0.02773
## F-statistic: 0.2984 on 1 and 25 DF,  p-value: 0.5897
```

```
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##          2.400495
```

```
#your gdp will increase by 2 points if you have strong expropriation laws

first_stage3<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage3<-lm(gdppc~Expropriation_Protection,data=african)
summary(second_stage3)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = african)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.82197 -0.38752  0.06745  0.37402  1.59484
##
## Coefficients:
```

```
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -6.765      5.981  -1.131   0.2688
## Expropriation_Protection    2.400      1.018   2.359   0.0265 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6879 on 25 degrees of freedom
## Multiple R-squared:  0.182,  Adjusted R-squared:  0.1493
## F-statistic: 5.563 on 1 and 25 DF,  p-value: 0.02647
```

```
mortalgdp <- lm(gdppc~settler_mortality, data=non_african)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = non_african)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.53644 -0.49116  0.05234  0.53058  1.00132
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        11.3999     0.5827  19.564  < 2e-16 ***
## settler_mortality  -0.6996     0.1421  -4.922 2.03e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7081 on 35 degrees of freedom
## Multiple R-squared:  0.409,  Adjusted R-squared:  0.3921
## F-statistic: 24.22 on 1 and 35 DF,  p-value: 2.033e-05
```

```
mortalexpro <- lm(expro_pro~settler_mortality, data=non_african)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = non_african)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.2255 -0.9122  0.2324  0.9519  1.9628
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        11.8444     0.8978  13.193 3.81e-15 ***
## settler_mortality  -1.2104     0.2190  -5.526 3.25e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.091 on 35 degrees of freedom
## Multiple R-squared:  0.466,  Adjusted R-squared:  0.4507
## F-statistic: 30.54 on 1 and 35 DF,  p-value: 3.252e-06
```

```r
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##         0.5779968
```

```r
first_stage4<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage4<-lm(gdppc~Expropriation_Protection,data=non_african)
summary(second_stage4)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = non_african)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.53644 -0.49116  0.05234  0.53058  1.00132
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                4.5539     0.8283   5.498 3.55e-06 ***
## Expropriation_Protection   0.5780     0.1174   4.922 2.03e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7081 on 35 degrees of freedom
## Multiple R-squared:  0.409,  Adjusted R-squared:  0.3921
## F-statistic: 24.22 on 1 and 35 DF,  p-value: 2.033e-05
```

```r
mortalgdp <- lm(gdppc~settler_mortality, data=asian)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = asian)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.06549 -0.81914 -0.05288  0.72520  1.17365
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        12.0180     1.3810   8.702 5.31e-05 ***
## settler_mortality  -0.9971     0.3514  -2.837   0.0251 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8932 on 7 degrees of freedom
## Multiple R-squared:  0.5349, Adjusted R-squared:  0.4684
## F-statistic: 8.049 on 1 and 7 DF,  p-value: 0.02515
```

```r
mortalexpro <- lm(expro_pro~settler_mortality, data=asian)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = asian)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.72548 -0.83491  0.00162  1.09881  1.43360
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        10.3290     1.8957   5.449 0.000957 ***
## settler_mortality  -0.8123     0.4824  -1.684 0.136092
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.226 on 7 degrees of freedom
## Multiple R-squared:  0.2883, Adjusted R-squared:  0.1866
## F-statistic: 2.835 on 1 and 7 DF,  p-value: 0.1361
```

```r
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##          1.227493
```

```r
first_stage5<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage5<-lm(gdppc~Expropriation_Protection,data=asian)
summary(second_stage5)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = asian)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.06549 -0.81914 -0.05288  0.72520  1.17365
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)               -0.6608     3.1345  -0.211   0.8390
## Expropriation_Protection   1.2275     0.4327   2.837   0.0251 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8932 on 7 degrees of freedom
## Multiple R-squared:  0.5349, Adjusted R-squared:  0.4684
## F-statistic: 8.049 on 1 and 7 DF,  p-value: 0.02515
```

```r
mortalgdp <- lm(gdppc~settler_mortality, data=non_asian)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = non_asian)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8133 -0.4191  0.1252  0.4271  1.3520
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       10.79614    0.38694  27.901  < 2e-16 ***
## settler_mortality -0.57504    0.07814  -7.359 1.19e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7255 on 53 degrees of freedom
## Multiple R-squared:  0.5054, Adjusted R-squared:  0.4961
## F-statistic: 54.16 on 1 and 53 DF,  p-value: 1.191e-09
```

```r
mortalexpro <- lm(expro_pro~settler_mortality, data=non_asian)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = non_asian)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6307 -0.9657 -0.1485  0.8232  3.3010
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         9.1401     0.6867  13.309  < 2e-16 ***
## settler_mortality  -0.5716     0.1387  -4.121 0.000133 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.288 on 53 degrees of freedom
## Multiple R-squared:  0.2427, Adjusted R-squared:  0.2284
## F-statistic: 16.99 on 1 and 53 DF,  p-value: 0.000133
```

```r
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##          1.006109
```

```r
first_stage6<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage6<-lm(gdppc~Expropriation_Protection,data=non_asian)
summary(second_stage6)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = non_asian)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.8133 -0.4191  0.1252  0.4271  1.3520
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)                 1.6002     0.8806   1.817   0.0749 .
## Expropriation_Protection    1.0061     0.1367   7.359 1.19e-09 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7255 on 53 degrees of freedom
## Multiple R-squared:  0.5054, Adjusted R-squared:  0.4961
## F-statistic: 54.16 on 1 and 53 DF,  p-value: 1.191e-09
```

```
mortalgdp <- lm(gdppc~settler_mortality, data=nonlacar)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = nonlacar)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.5460 -0.4752  0.0078  0.4838  1.5443
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)         10.4259     0.4373  23.844  < 2e-16 ***
## settler_mortality  -0.5435     0.0862  -6.305 2.18e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8212 on 38 degrees of freedom
## Multiple R-squared:  0.5113, Adjusted R-squared:  0.4984
## F-statistic: 39.75 on 1 and 38 DF,  p-value: 2.176e-07
```

```
mortalexpro <- lm(expro_pro~settler_mortality, data=nonlacar)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = nonlacar)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7908 -0.9308  0.0140  1.0521  3.2804
##
## Coefficients:
```

```
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         9.6543     0.7350  13.135 1.06e-15 ***
## settler_mortality  -0.6392     0.1449  -4.412 8.18e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.38 on 38 degrees of freedom
## Multiple R-squared:  0.3387, Adjusted R-squared:  0.3213
## F-statistic: 19.46 on 1 and 38 DF,  p-value: 8.18e-05
```

```
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##         0.8501676
```

```
first_stage7<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage7<-lm(gdppc~Expropriation_Protection,data=nonlacar)
summary(second_stage7)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = nonlacar)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.5460 -0.4752  0.0078  0.4838  1.5443
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                2.2181     0.8938   2.482   0.0176 *
## Expropriation_Protection   0.8502     0.1348   6.305 2.18e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.8212 on 38 degrees of freedom
## Multiple R-squared:  0.5113, Adjusted R-squared:  0.4984
## F-statistic: 39.75 on 1 and 38 DF,  p-value: 2.176e-07
```

```
mortalgdp <- lm(gdppc~settler_mortality, data=neu)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = neu)
##
## Residuals:
##        1        2        3        4
##  0.06322 -0.12227 -0.07861  0.13766
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)         8.9058     0.6098  14.605  0.00466 **
## settler_mortality   0.4329     0.2476   1.748  0.22251
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1484 on 2 degrees of freedom
## Multiple R-squared:  0.6045, Adjusted R-squared:  0.4067
## F-statistic: 3.057 on 1 and 2 DF,  p-value: 0.2225
```

```
mortalexpro <- lm(expro_pro~settler_mortality, data=neu)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = neu)
##
## Residuals:
##       1       2       3       4
## -0.2138 -0.1463  0.1953  0.1647
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         8.3737     1.0567   7.924   0.0156 *
## settler_mortality   0.5397     0.4290   1.258   0.3354
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.2572 on 2 degrees of freedom
## Multiple R-squared:  0.4418, Adjusted R-squared:  0.1626
## F-statistic: 1.583 on 1 and 2 DF,  p-value: 0.3354
```

```
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

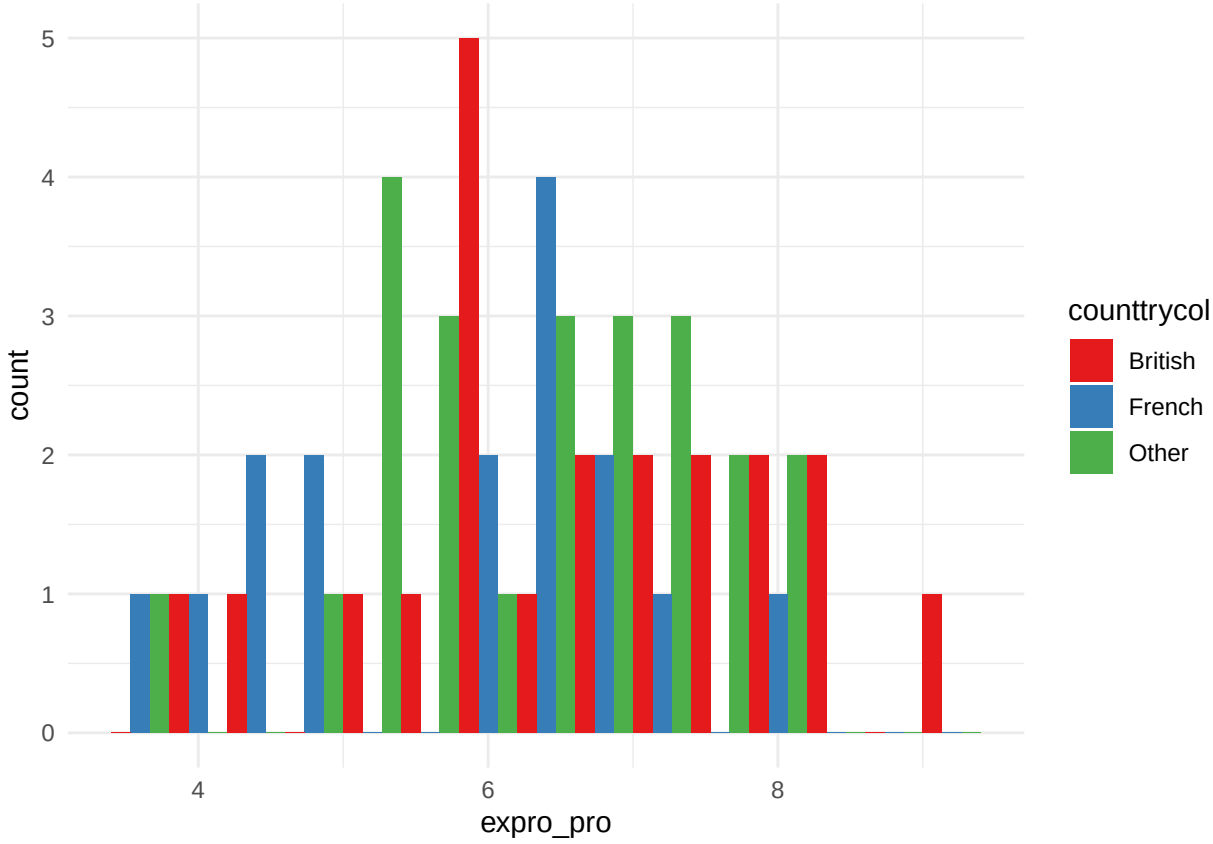
```
## settler_mortality
##         0.8020011
```

```
first_stage8<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage8<-lm(gdppc~Expropriation_Protection,data=neu)
summary(second_stage8)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = neu)
##
## Residuals:
##        1        2        3        4
##  0.06322 -0.12227 -0.07861  0.13766
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                2.1901     4.4470   0.493    0.671
```

```
## Expropriation_Protection   0.8020     0.4587   1.748    0.223
##
## Residual standard error: 0.1484 on 2 degrees of freedom
## Multiple R-squared:  0.6045, Adjusted R-squared:  0.4067
## F-statistic: 3.057 on 1 and 2 DF,  p-value: 0.2225
```

```
ggplot(data=excolonies2,mapping=aes(x=expro_pro, fill=counttrycol))+
  geom_histogram(position="dodge",binwidth=0.4)+theme_minimal()+scale_fill_brewer(palette = "Set1")
```




```
#facet_wrap(vars(dummy_asia), nrow=2)
```

Excolonies2 is includes all excolonies except the neo european first world countries

```
mortalgdp <- lm(gdppc~settler_mortality, data=excolonies2)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = excolonies2)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6014 -0.5011  0.1131  0.4919  1.3886
```

```
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       10.34381    0.42263  24.475  < 2e-16 ***
## settler_mortality -0.50127    0.08558  -5.858 2.34e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.758 on 58 degrees of freedom
## Multiple R-squared:  0.3717, Adjusted R-squared:  0.3609
## F-statistic: 34.31 on 1 and 58 DF,  p-value: 2.337e-07
```

```
mortalexpro <- lm(expro_pro~settler_mortality, data=excolonies2)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = excolonies2)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.55186 -0.89431  0.04111  0.80475  2.94253
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         8.1835     0.6571   12.45   <2e-16 ***
## settler_mortality  -0.3912     0.1331   -2.94   0.0047 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.179 on 58 degrees of freedom
## Multiple R-squared:  0.1297, Adjusted R-squared:  0.1147
## F-statistic: 8.646 on 1 and 58 DF,  p-value: 0.004701
```

```
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

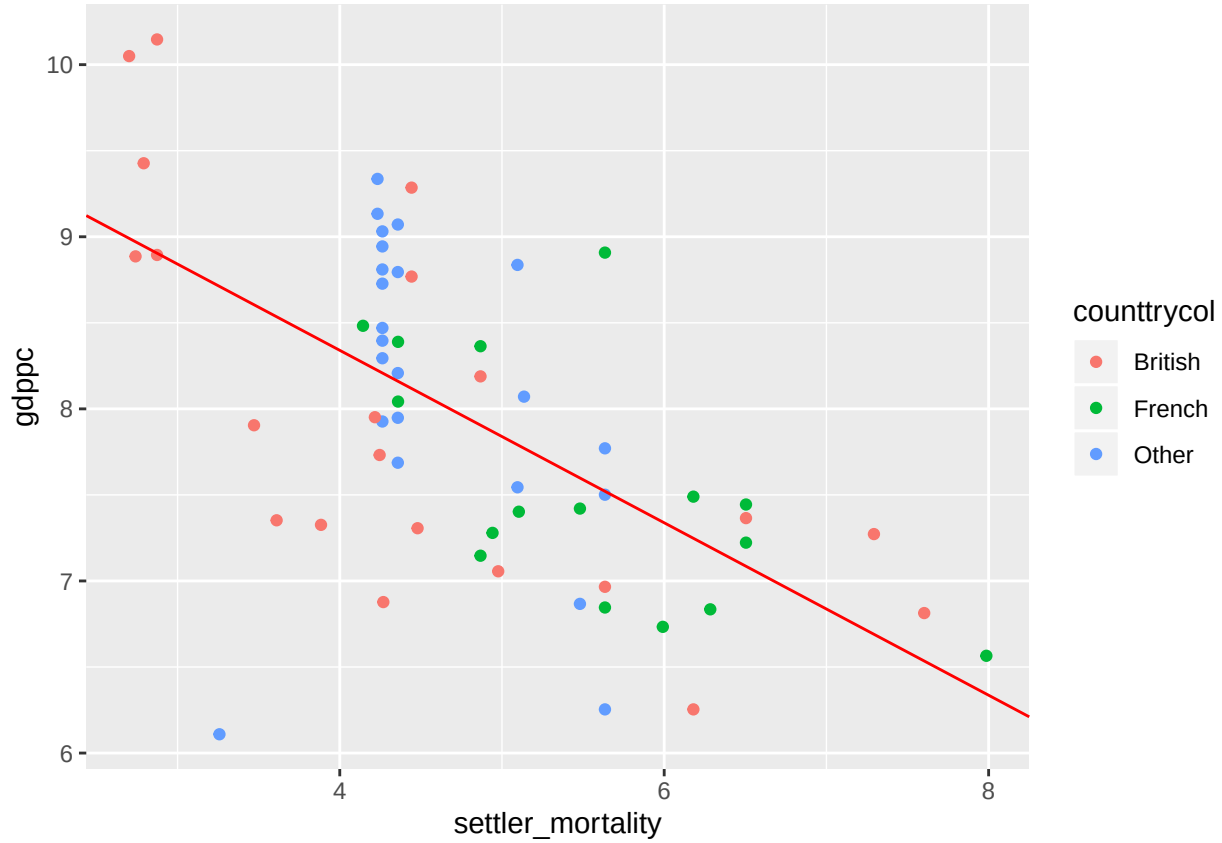
```
## settler_mortality
##           1.28124
```

```
first_stage2<-mortalexpro
Expropriation_Protection<-mortalexpro$fitted.values
second_stage2<-lm(gdppc~Expropriation_Protection,data=excolonies2)
summary(second_stage2)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = excolonies2)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6014 -0.5011  0.1131  0.4919  1.3886
##
```

```
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)                -0.1412     1.3823  -0.102    0.919
## Expropriation_Protection    1.2812     0.2187   5.858 2.34e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.758 on 58 degrees of freedom
## Multiple R-squared:  0.3717, Adjusted R-squared:  0.3609
## F-statistic: 34.31 on 1 and 58 DF,  p-value: 2.337e-07
```

```
ggplot(data=excolonies2)+
  geom_point(mapping=aes(x=settler_mortality,
                         y=gdppc, color=counttrycol))+
  geom_abline(intercept = 10.344,
              slope=-0.501, color="red")
```

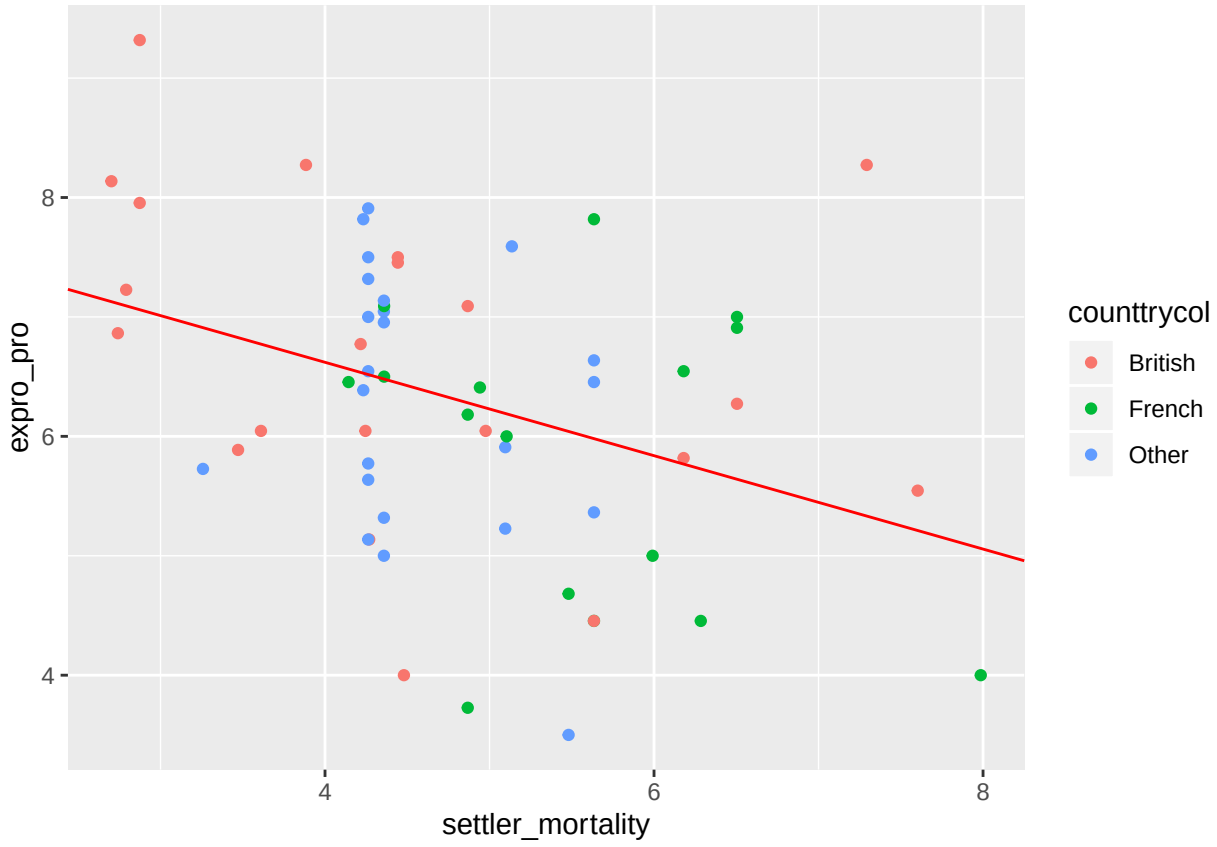



```
mortalgdp<-lm(expro_pro~settler_mortality,data=excolonies2)
summary(mortalgdp)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = excolonies2)
##
## Residuals:
```

```
##      Min       1Q   Median       3Q      Max
## -2.55186 -0.89431  0.04111  0.80475  2.94253
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         8.1835     0.6571   12.45   <2e-16 ***
## settler_mortality  -0.3912     0.1331   -2.94   0.0047 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.179 on 58 degrees of freedom
## Multiple R-squared:  0.1297, Adjusted R-squared:  0.1147
## F-statistic: 8.646 on 1 and 58 DF,  p-value: 0.004701
```

```
ggplot(data=excolonies2)+
  geom_point(mapping=aes(x=settler_mortality,
                         y=expro_pro,colour=counttrycol))+
  geom_abline(intercept = 8.184,
              slope=-0.391, color="red")
```



Excolonies contains all colonies including first world countries

```
mortalgdp<- lm(gdppc~settler_mortality, data=excolonies)
summary(mortalgdp)
```

```
##
```

```
## Call:
## lm(formula = gdppc ~ settler_mortality, data = excolonies)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7545 -0.5386  0.1412  0.4607  1.4059
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)       10.73057    0.36718  29.224  < 2e-16 ***
## settler_mortality -0.57297    0.07616  -7.523 2.66e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7604 on 62 degrees of freedom
## Multiple R-squared:  0.4772, Adjusted R-squared:  0.4688
## F-statistic:  56.6 on 1 and 62 DF,  p-value: 2.659e-10
```

```
mortalexpro<-lm(expro_pro~settler_mortality, data=excolonies)
summary(mortalexpro)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = excolonies)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6606 -0.9922  0.0280  0.8266  3.3566
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         9.3414     0.6107   15.30  < 2e-16 ***
## settler_mortality  -0.6068     0.1267   -4.79 1.08e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.265 on 62 degrees of freedom
## Multiple R-squared:  0.2701, Adjusted R-squared:  0.2584
## F-statistic: 22.95 on 1 and 62 DF,  p-value: 1.077e-05
```

```
coef(mortalgdp)["settler_mortality"]/ coef(mortalexpro)["settler_mortality"]
```

```
## settler_mortality
##         0.9442794
```

```
first_stage <- lm(expro_pro~settler_mortality, data=excolonies)
Expropriation_Protection <- first_stage$fitted.values
second_stage <- lm(gdppc~Expropriation_Protection, data=excolonies)
summary(first_stage)
```

```
##
## Call:
```

```
## lm(formula = expro_pro ~ settler_mortality, data = excolonies)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.6606 -0.9922  0.0280  0.8266  3.3566
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         9.3414     0.6107   15.30  < 2e-16 ***
## settler_mortality  -0.6068     0.1267   -4.79 1.08e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.265 on 62 degrees of freedom
## Multiple R-squared:  0.2701, Adjusted R-squared:  0.2584
## F-statistic: 22.95 on 1 and 62 DF,  p-value: 1.077e-05
```

```
summary(second_stage)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = excolonies)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7545 -0.5386  0.1412  0.4607  1.4059
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)                1.9097     0.8233   2.320   0.0237 *
## Expropriation_Protection   0.9443     0.1255   7.523 2.66e-10 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7604 on 62 degrees of freedom
## Multiple R-squared:  0.4772, Adjusted R-squared:  0.4688
## F-statistic:  56.6 on 1 and 62 DF,  p-value: 2.659e-10
```

Excolnocon are the colonies from latin america and the caribbean

```
# relation b/w settler mortality,gdp and expropriation for latin american and caribbean countries

mortalgdpnocon <- lm(gdppc~settler_mortality, data=excolnocon)
mortalexpronocon <- lm(expro_pro~settler_mortality, data=excolnocon)
summary(mortalgdpnocon)
```

```
##
## Call:
## lm(formula = gdppc ~ settler_mortality, data = excolnocon)
##
## Residuals:
```

```
##     Min      1Q  Median      3Q     Max
## -1.1188 -0.3615  0.1384  0.4165  0.8207
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        10.5470     1.1017   9.574 2.65e-09 ***
## settler_mortality  -0.4687     0.2521  -1.860   0.0764 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.576 on 22 degrees of freedom
## Multiple R-squared:  0.1358, Adjusted R-squared:  0.09655
## F-statistic: 3.458 on 1 and 22 DF,  p-value: 0.07638
```

```
summary(mortalexpronocon)
```

```
##
## Call:
## lm(formula = expro_pro ~ settler_mortality, data = excolnocon)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.38578 -0.77089  0.05814  0.85964  1.41115
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)         9.2104     2.0010   4.603 0.000138 ***
## settler_mortality  -0.6363     0.4578  -1.390 0.178466
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.046 on 22 degrees of freedom
## Multiple R-squared:  0.08072,    Adjusted R-squared:  0.03894
## F-statistic: 1.932 on 1 and 22 DF,  p-value: 0.1785
```

```
coef(mortalgdpnocon)["settler_mortality"]/coef(mortalexpronocon)["settler_mortality"]
```

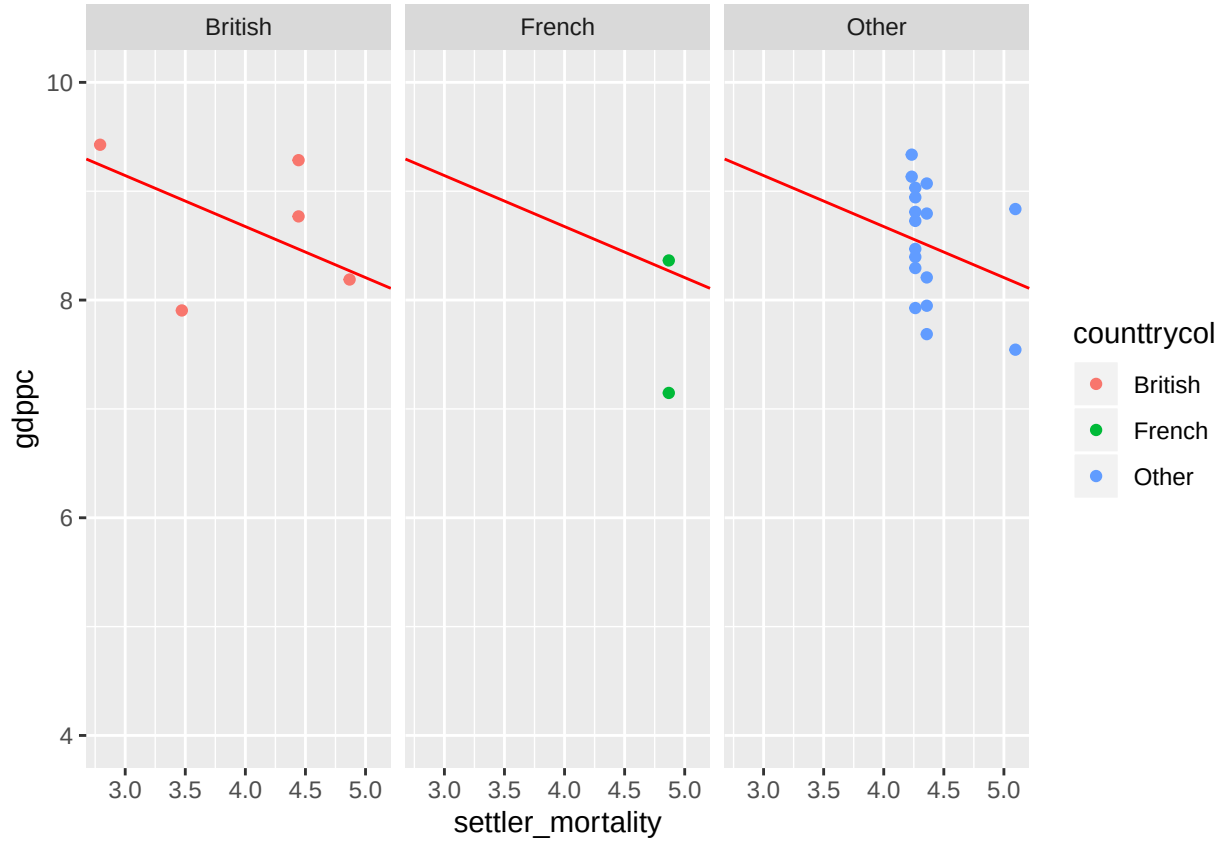
```
## settler_mortality
##         0.7365772
```

```
first_stage1<-mortalexpronocon
Expropriation_Protection<-mortalexpronocon$fitted.values
second_stage1<-lm(gdppc~Expropriation_Protection,data=excolnocon)
summary(second_stage1)
```

```
##
## Call:
## lm(formula = gdppc ~ Expropriation_Protection, data = excolnocon)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.1188 -0.3615  0.1384  0.4165  0.8207
```

```
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  3.7629     2.5556   1.472   0.1551
## Expropriation_Protection     0.7366     0.3961   1.860   0.0764 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.576 on 22 degrees of freedom
## Multiple R-squared:  0.1358, Adjusted R-squared:  0.09655
## F-statistic: 3.458 on 1 and 22 DF,  p-value: 0.07638
```

```
ggplot(data=excolnocon)+
  geom_point(mapping=aes(x=settler_mortality,
                         y=gdppc, color=counttrycol))+facet_wrap(~counttrycol)+ylim(4,10)+
  geom_abline(intercept = 10.55, slope=-0.4687, color="red")
```




```
#excolonies
exprogdp<-lm(gdppc~expro_pro, data=excolonies)
summary(exprogdp)
```

```
##
## Call:
## lm(formula = gdppc ~ expro_pro, data = excolonies)
##
```

```
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.8715 -0.4644  0.1683  0.4610  1.1413
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  4.66038    0.40851  11.408  < 2e-16 ***
## expro_pro    0.52211    0.06119   8.533 4.72e-12 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7132 on 62 degrees of freedom
## Multiple R-squared:  0.5401, Adjusted R-squared:  0.5327
## F-statistic: 72.82 on 1 and 62 DF,  p-value: 4.724e-12
```

```
#excolonies2
exprogdp2<-lm(gdppc~expro_pro, data=excolonies2)
summary(exprogdp2)
```

```
##
## Call:
## lm(formula = gdppc ~ expro_pro, data = excolonies2)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.8435 -0.4901  0.1638  0.4891  1.2221
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)   4.8665     0.4890   9.952 3.70e-14 ***
## expro_pro     0.4869     0.0761   6.397 2.99e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7322 on 58 degrees of freedom
## Multiple R-squared:  0.4137, Adjusted R-squared:  0.4036
## F-statistic: 40.92 on 1 and 58 DF,  p-value: 2.993e-08
```

```
#non_african
exprogdpnonaf<-lm(gdppc~expro_pro, data=non_african)
summary(exprogdpnonaf)
```

```
##
## Call:
## lm(formula = gdppc ~ expro_pro, data = non_african)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.88624 -0.19873  0.09113  0.38996  0.90329
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  5.22132    0.46364  11.262 3.46e-13 ***
```

```
## expro_pro    0.48242    0.06501   7.421 1.10e-08 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.5742 on 35 degrees of freedom
## Multiple R-squared:  0.6114, Adjusted R-squared:  0.6003
## F-statistic: 55.07 on 1 and 35 DF,  p-value: 1.102e-08
```

```
Exclusive_table<-huxreg("Neu"=second_stage8,"Africa"=second_stage3,  "Asia"=second_stage5,"Latin/Carib"=

inclusive_first_stage<-huxreg("Excolonies"=first_stage, "Non Neu"=first_stage1, "Non_African"=first_stag

Inclusive_table<-huxreg("Excolonies"=second_stage,"Non Neu"=second_stage2,"Non_African"=second_stage4)
#,"Non-Asia"=second_stage6, "Non_Latin/Carib"=second_stage7

inclusive_ols<-huxreg("Excolonies"=exprogdp, "Non Neu"=exprogdp2, "Non_African"=exprogdpnonaf)

#Exclusive_table
#Inclusive_table
#inclusive_first_stage
#inclusive_ols
binded<-rbind(Inclusive_table,inclusive_first_stage,inclusive_ols)
binded
```

Table 1: Table 1: Summ
Cons

(Intercept)

Expropriation_Protectio

N
R2
logLik
AIC

*** p < 0.001; ** p < 0

	Excolonies	Non Neu	Non_African
(Intercept)	1.910 *	-0.141	4.554 ***
	(0.823)	(1.382)	(0.828)
Expropriation_Protection	0.944 ***	1.281 ***	0.578 ***
	(0.126)	(0.219)	(0.117)
N	64	60	37
R2	0.477	0.372	0.409
logLik	-72.268	-67.494	-38.703
AIC	150.536	140.988	83.406

*** p < 0.001; ** p < 0.01; * p < 0.05.

	Excolonies	Non Neu	Non_African
(Intercept)	9.341 ***	9.210 ***	11.844 ***
	(0.611)	(2.001)	(0.898)
settler_mortality	-0.607 ***	-0.636	-1.210 ***
	(0.127)	(0.458)	(0.219)
N	64	24	37
R2	0.270	0.081	0.466
logLik	-104.829	-34.097	-54.697
AIC	215.659	74.193	115.393

*** p < 0.001; ** p < 0.01; * p < 0.05.

	Excolonies	Non Neu	Non_African
(Intercept)	4.660 ***	4.866 ***	5.221 ***
	(0.409)	(0.489)	(0.464)
expro_pro	0.522 ***	0.487 ***	0.482 ***
	(0.061)	(0.076)	(0.065)
N	64	60	37
R2	0.540	0.414	0.611
logLik	-68.168	-65.419	-30.945
AIC	142.335	136.838	67.890

*** p < 0.001; ** p < 0.01; * p < 0.05.