democracy_index_confounding

Analysis of democracy index as a confounding variable

Start by loading the six month data:

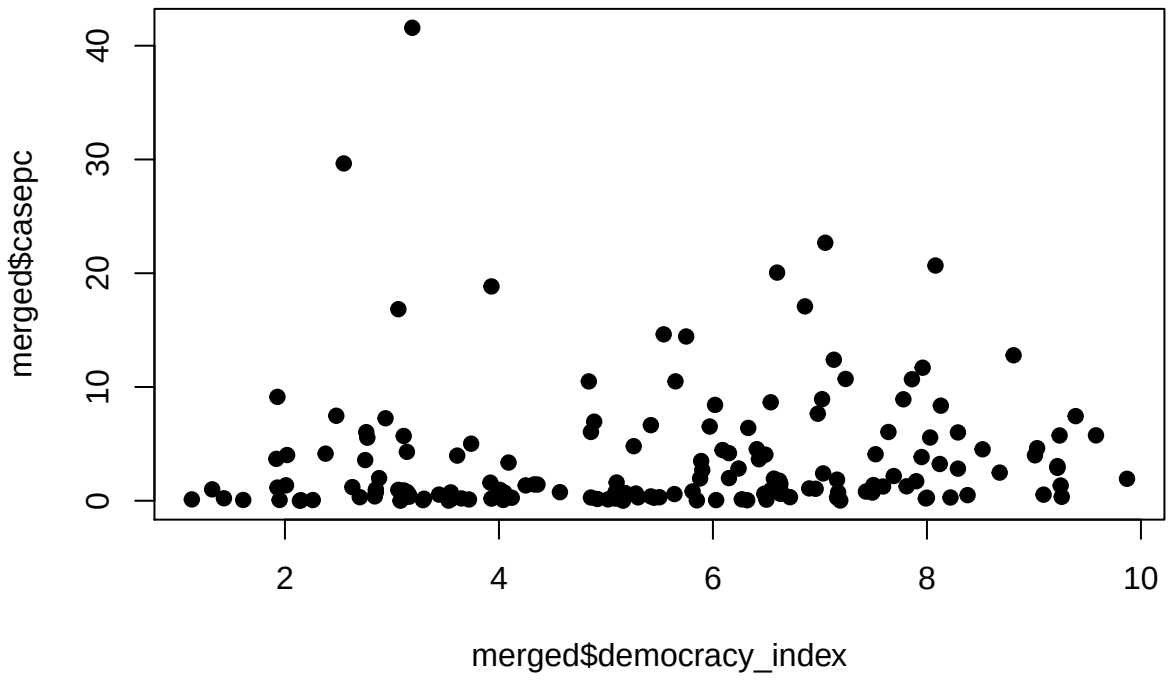
```
data <- read.csv(file = '../prepped_data/sixmonth.csv')
democracy <- read.csv(file = '../intermediate_data/democracy_index.csv')
democracy <- democracy[c("X2019", "country_code")]
colnames(democracy)[1] <- "democracy_index"
merged <- merge(data, democracy, by=c('country_code'), all.x=TRUE, all.y=FALSE)
```

Regressions on democracy index

```
summary(lm(formula = casepc ~ democracy_index, data = merged))
```

```
##
## Call:
## lm(formula = casepc ~ democracy_index, data = merged)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -4.255 -3.301 -2.254  1.089 38.117
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)       2.8574     1.2324   2.319   0.0217 *
## democracy_index   0.1881     0.2079   0.905   0.3671
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 5.821 on 159 degrees of freedom
##   (31 observations deleted due to missingness)
## Multiple R-squared:  0.00512,    Adjusted R-squared:  -0.001137
## F-statistic: 0.8183 on 1 and 159 DF,  p-value: 0.3671
```

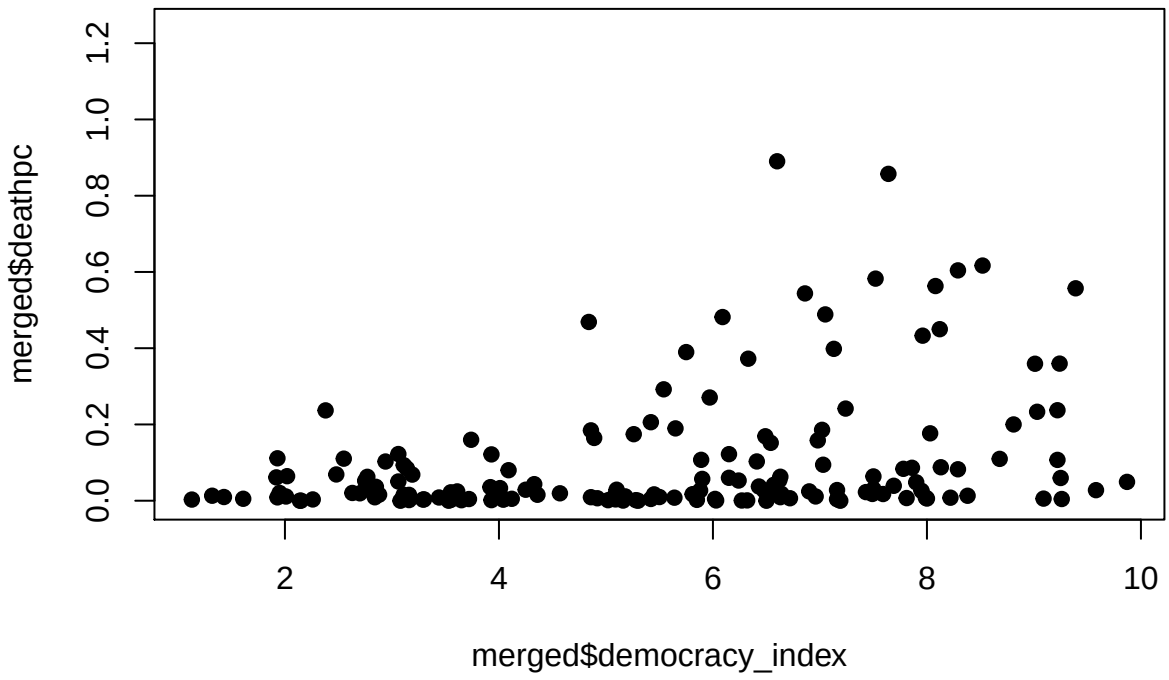
```
plot(merged$democracy_index, merged$casepc, pch=19)
```




```
summary(lm(formula = deathpc ~ democracy_index, data = merged))
```

```
##
## Call:
## lm(formula = deathpc ~ democracy_index, data = merged)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.20046 -0.09643 -0.04124  0.03439  0.75582
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -0.040348   0.033648  -1.199    0.232
## democracy_index  0.026489   0.005678   4.666 6.49e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1589 on 159 degrees of freedom
##   (31 observations deleted due to missingness)
## Multiple R-squared:  0.1204, Adjusted R-squared:  0.1149
## F-statistic: 21.77 on 1 and 159 DF,  p-value: 6.492e-06
```

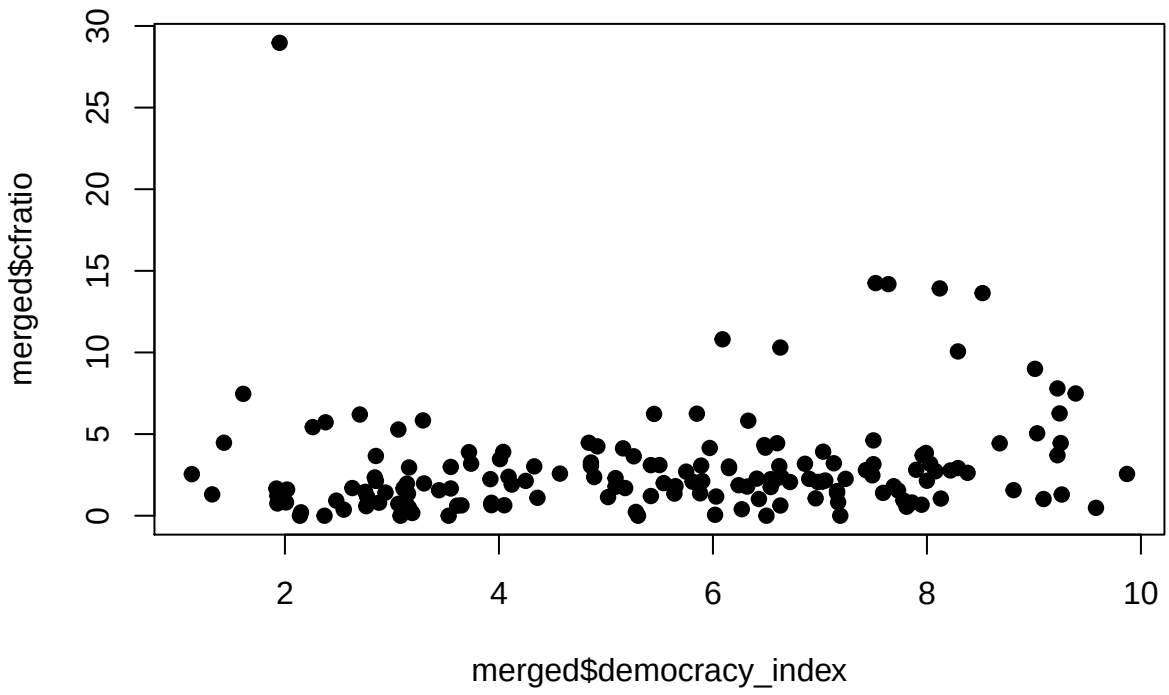
```
plot(merged$democracy_index, merged$deathpc, pch=19)
```




```
summary(lm(formula = cfratio ~ democracy_index, data = merged))
```

```
##
## Call:
## lm(formula = cfratio ~ democracy_index, data = merged)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.4009 -1.7426 -0.8331  0.4885 26.7486
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)       1.7960     0.7039   2.551   0.0117 *
## democracy_index   0.2178     0.1188   1.833   0.0687 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 3.357 on 161 degrees of freedom
##   (29 observations deleted due to missingness)
## Multiple R-squared:  0.02044,    Adjusted R-squared:  0.01436
## F-statistic:  3.36 on 1 and 161 DF,  p-value: 0.06866
```

```
plot(merged$democracy_index, merged$cfratio, pch=19)
```



From these plots, it appears that democracy index isn't a good predictor of poor Covid-19 outcomes, but when you look at deaths-per-capita, there is a trend where the highest deaths-per-capita are in high democracy index countries.

Regressions on GHSI subcomponent scores and democracy index

```
summary(lm(formula = deathpc ~ prev_emergence_pathogens + early_detection + rapid_response + robust_heal
```

```
##
## Call:
## lm(formula = deathpc ~ prev_emergence_pathogens + early_detection +
##     rapid_response + robust_health_sector + commitments + risk_environment,
##     data = merged)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.24343 -0.09617 -0.03097  0.02926  1.06549
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              -0.0572402  0.0707584  -0.809   0.4197
## prev_emergence_pathogens  0.0019346  0.0016234   1.192   0.2350
## early_detection           0.0007213  0.0009224   0.782   0.4353
## rapid_response            0.0005515  0.0014949   0.369   0.7126
## robust_health_sector      0.0003239  0.0016682   0.194   0.8463
## commitments              -0.0021397  0.0013917  -1.538   0.1260
```

```
## risk_environment          0.0025010  0.0010405   2.404   0.0173 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.1744 on 173 degrees of freedom
##   (12 observations deleted due to missingness)
## Multiple R-squared:  0.167,  Adjusted R-squared:  0.1381
## F-statistic: 5.781 on 6 and 173 DF,  p-value: 1.654e-05
```

```
summary(lm(formula = deathpc ~ prev_emergence_pathogens + early_detection + rapid_response + robust_heal
```

```
##
## Call:
## lm(formula = deathpc ~ prev_emergence_pathogens + early_detection +
##     rapid_response + robust_health_sector + commitments + risk_environment +
##     democracy_index, data = merged)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.29076 -0.08874 -0.02786  0.03473  0.74255
##
## Coefficients:
##                            Estimate Std. Error t value Pr(>|t|)
## (Intercept)              -0.0469463  0.0692812  -0.678    0.499
## prev_emergence_pathogens  0.0024589  0.0015975   1.539    0.126
## early_detection           0.0002292  0.0008463   0.271    0.787
## rapid_response            0.0007765  0.0013472   0.576    0.565
## robust_health_sector      0.0016919  0.0015707   1.077    0.283
## commitments              -0.0009898  0.0013449  -0.736    0.463
## risk_environment         -0.0008516  0.0014801  -0.575    0.566
## democracy_index           0.0113503  0.0088928   1.276    0.204
##
## Residual standard error: 0.153 on 153 degrees of freedom
##   (31 observations deleted due to missingness)
## Multiple R-squared:  0.2152, Adjusted R-squared:  0.1793
## F-statistic: 5.993 on 7 and 153 DF,  p-value: 3.508e-06
```

For this regression, we see that the democracy index coefficient is statistically significant.