

$$\text{cases\_log} = \beta_0 + \beta_1 v2x\_polyarchy + \epsilon$$

```

Residuals:
    Min       1Q   Median       3Q      Max
-2.31471 -0.69695 -0.00291  0.79433  2.83502

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   1.9619    0.2034   9.646  < 2e-16
v2x_polyarchy  1.4940    0.3450   4.330 2.61e-05

(Intercept) ***
v2x_polyarchy ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.091 on 161 degrees of freedom
Multiple R-squared:  0.1043, Adjusted R-squared:  0.09876
F-statistic: 18.75 on 1 and 161 DF, p-value: 2.608e-05

```

The R-square suggests that the independent variable has a very narrow possibility to influence the dependent variable. The coefficient reveals that if the democratic index score of Polyarchy increases with one unit, the case log increases with 1.4940. However, the p-value suggests that there is little possibility to reject the null-hypothesis.

$$\text{cases\_log} = \beta_0 + \beta_1 v2x\_libdem + \epsilon$$

```

Residuals:
    Min       1Q   Median       3Q      Max
-2.32986 -0.67076  0.06097  0.79488  2.77711

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   2.0592    0.1605  12.828  < 2e-16
v2x_libdem    1.6922    0.3302   5.125 8.44e-07

(Intercept) ***
v2x_libdem ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.069 on 161 degrees of freedom
Multiple R-squared:  0.1402, Adjusted R-squared:  0.1349
F-statistic: 26.26 on 1 and 161 DF, p-value: 8.441e-07

```

The R-square suggests that the independent variable has a very narrow possibility to influence the dependent variable, even though this variable is slightly higher than the previous one. The coefficient reveals that if the democratic index score of Libdem increases with one unit, the

case log increases with 1.6922. However, the p-value suggests that there is little possibility to reject the null-hypothesis.

$$\text{cases\_log} = \beta_0 + \beta_1 v2x\_partipdem + \epsilon$$

```
Residuals:
    Min       1Q   Median       3Q      Max
-2.30577 -0.71433  0.00464  0.77544  2.82720

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   1.9880     0.1725  11.523 < 2e-16
v2x_partipdem  2.2494     0.4389   5.125 8.43e-07

(Intercept) ***
v2x_partipdem ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Residual standard error: 1.069 on 161 degrees of freedom  
Multiple R-squared: 0.1403, Adjusted R-squared: 0.1349  
F-statistic: 26.27 on 1 and 161 DF, p-value: 8.434e-07

The R-square suggests that the independent variable has a very narrow possibility to influence the dependent variable, even though this variable is slightly higher than the previous one. The coefficient reveals that if the democratic index score of Participatory increases with one unit, the case log increases with 2.2494. However, the p-value suggests that there is little possibility to reject the null-hypothesis.

$$\text{cases\_log} = \beta_0 + \beta_1 v2x\_polyarchy + \beta_2 v2x\_libdem + \beta_3 v2x\_partipdem + \epsilon$$

```
Residuals:
    Min       1Q   Median       3Q      Max
-2.20338 -0.69834 -0.02883  0.76655  2.74390

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   2.6622     0.2562  10.392 < 2e-16
v2x_polyarchy -5.5996     1.6452  -3.404 0.000842
v2x_libdem     4.1004     1.4380   2.852 0.004928
v2x_partipdem  4.0546     1.6687   2.430 0.016219

(Intercept) ***
v2x_polyarchy ***
v2x_libdem **
v2x_partipdem *
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Residual standard error: 1.036 on 159 degrees of freedom  
Multiple R-squared: 0.2016, Adjusted R-squared: 0.1866  
F-statistic: 13.39 on 3 and 159 DF, p-value: 7.792e-08

The R-square suggests that the independent variable has a narrow possibility to influence the dependent variable, even though this variable is slightly higher than the previous ones. Also, every variable receives a lower t value, then when they were being compared singularly. The coefficient reveals that Polyarchy has the largest impact, and yet, it is negative and not positive as the other variables. Similar with the other variables, the p-value suggests that there is little possibility to reject the null-hypothesis.

$$\text{cases\_log} = \beta_0 + \beta_1 v2x\_polyarchy + \beta_2 \text{popdata2018} + \epsilon$$

Residuals:

Min	1Q	Median	3Q	Max
-2.2351	-0.6518	0.0457	0.8279	2.5522

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	1.769e+00	2.005e-01	8.823	1.90e-15
v2x_polyarchy	1.654e+00	3.326e-01	4.972	1.70e-06
popdata2018	2.371e-09	5.233e-10	4.531	1.15e-05

(Intercept) \*\*\*  
v2x\_polyarchy \*\*\*  
popdata2018 \*\*\*  
---

Signif. codes:

0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.032 on 159 degrees of freedom

(1 observation deleted due to missingness)

Multiple R-squared: 0.2024, Adjusted R-squared: 0.1924

F-statistic: 20.18 on 2 and 159 DF, p-value: 1.554e-08

Interestingly, by inserting population polyarchy now has a positive coefficient, and not negative, as the variable were with the other indexes. The R-square is still relatively low, but higher than the variables singularly. This model also lacks difficulties with the p-value, while the t-value is more balanced than the previous model with several indexes.

### Corona cases by population size

Residuals:

Min	1Q	Median	3Q	Max
-126058	-5668	-3062	-2828	563297

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	2934	4380	0.670	
Casespercitizen	23234272	4847142	4.793	

```

(Intercept)          0.504
Casespercitizen 3.72e-06 ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 50320 on 160 degrees of freedom
(1 observation deleted due to missingness)
Multiple R-squared:  0.1256, Adjusted R-squared:  0.1201
F-statistic: 22.98 on 1 and 160 DF, p-value: 3.721e-06

```

I am not sure if I have understood the instructions here correctly, since it was stated which variable that was supposed to be dependent, but not independent. Cases are thus tested against cases per citizens, which may be a error given the fact that cases are accounted for twice. A more interesting approach would most likely be to test how well democratic indexes can predict corona cases, if population was taken into account. I have inserted a new variable, were the cases are divided accordingly, but I am unable to match these with the indexes, due to the length difference between the variables. I have not been able to figure this out yet.

As for this model, the p-value is too high, whilst the R-square is too low.

Repeat your analysis using popdata2018popdata2018. Do the results change? How?

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Residuals:
    Min       1Q   Median       3Q      Max
-2.43092 -0.91635  0.08845  0.81136  2.46753

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  2.673e+00  9.066e-02  29.490  < 2e-16
popdata2018  2.053e-09  5.565e-10   3.689  0.000308

(Intercept) ***
popdata2018 ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 1.106 on 160 degrees of freedom
(1 observation deleted due to missingness)
Multiple R-squared:  0.07838, Adjusted R-squared:  0.07262
F-statistic: 13.61 on 1 and 160 DF, p-value: 0.0003082

```

For this question, I was also unsure which analyse to repeat, and what variable to replace population with. Whereas the R-square is lower in this model, the p-value is relatively low which is a good indicator. However, the t value is comparatively low.