Tracking the Success of Nations

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Research Question

The objective of the following paper is to track and analyze the effect that economic and political freedom have on the overall success of a nation.

The paper will first detail which nations are ranked highest/lowest in terms of success as well as which regions throughout the world have the highest rates of success. Further, the paper will investigate if there is a positive correlation between economic freedom and success as well as political freedom and succes, i.e. will the rate of success rise in a consistent, positive trend as the rate of economic freedom or political freedom increases. Finally, the research will track whether there is a greater correlation between the type of government or the economic system in how successful a nation is.

Background

For the research, two data sets were integral - the Heritage Foundation's Index of Economic Freedom and Freedom House's Freedom Rating. The former measures the degree of economic freedom in the world's nations through multivariate statistics and the latter measures the degree of civil liberties and political rights in the world's nations.

Defining Success

In order to calculate the success of a nation, the term "success" must first be defined. For the sake of the following research, a successful nation has been defined as one that has attained high levels of economic prosperity, education, safety, and health among its population as well as an overall positive quality of life. When combined, these five categories should work together to create a successful citizenry and nation.

In order to measure the categories, then, two variables have been assigned to each of the five: economic prosperity (GDP, unemployment rate), safety (crime index, homicide rate), education (secondary school enrollment rate, literacy rate), health (life expectancy, infant mortality), and quality of life/lifestyle (median income, world happiness rating). By measuring each of the five predictors with the same number of variables, no category will be weighted as more crucial in the success of a nation than any of the others.

By including five different categories and weighting them evenly, the risk of preferential treatment towards one category will be removed. In many previous studies of the success of countries, research focused solely on economic factors (or weighted them heavier than other variables). However, under this current study, the goal is to gain a more robust picture of what success means and looks like for a nation; thus, it becomes necessary to weight economic prosperity the same as the remaining four categories.

Calculating Success

To calculate success, proportions were calculated for each of the ten variables.

```r
head(success_na)
```

```
## # A tibble: 6 x 15
##   country_name region econ_freedom poli_freedom     gdp unemployment
##   <chr>        <chr>         <dbl>        <dbl>   <dbl>        <dbl>
## 1 Afghanistan  Asia-~        0.513         0.26 1.07e-3        0.761
## 2 Albania      Europe        0.645         0.68 6.72e-4        0.86
## 3 Algeria      Middl~        0.447         0.35 8.79e-3        0.883
## 4 Angola       Sub-S~        0.486         0.26 6.41e-3        0.934
## 5 Argentina    Ameri~        0.523         0.83 3.29e-2        0.919
## 6 Armenia      Europe        0.687         0.45 5.95e-4        0.811
## # ... with 9 more variables: crime_index <dbl>, homicide <dbl>,
## #   enrollment <dbl>, literacy <dbl>, life_expectancy <dbl>,
## #   infant_mortality <dbl>, median_income <dbl>, happiness <dbl>,
## #   success <dbl>
```

Comparing Economic/Political Freedom and Success

Success Ratings

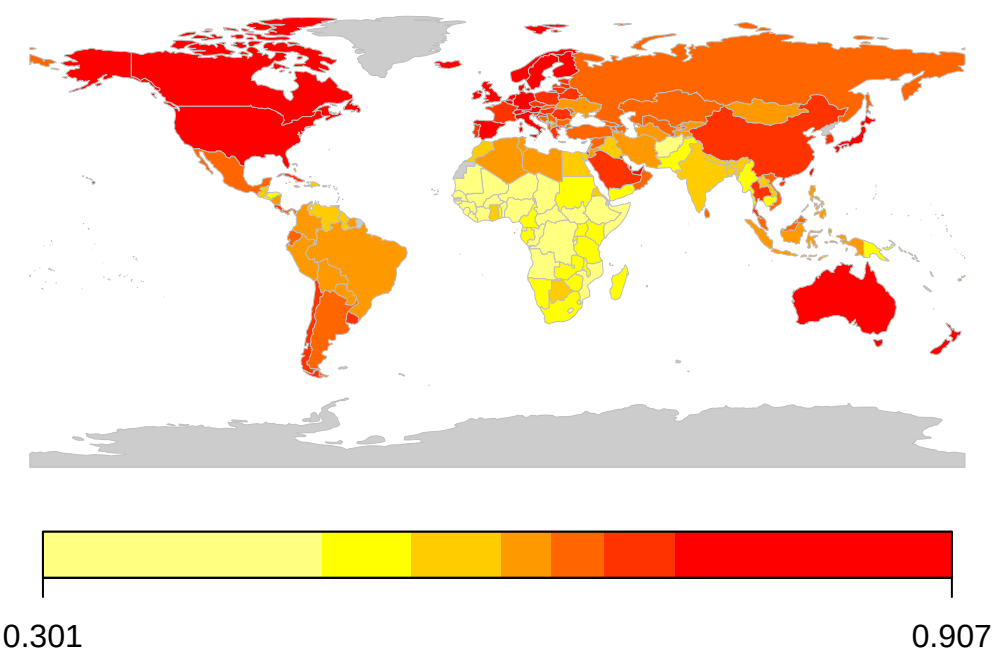
The following map depicts the success within each given nation, with the darker shades showing the more successful free nations and the lighter showing the less free:

```
## Loading required package: sp
```

```
## ### Welcome to rworldmap ###
```

```
## For a short introduction type :   vignette('rworldmap')
```

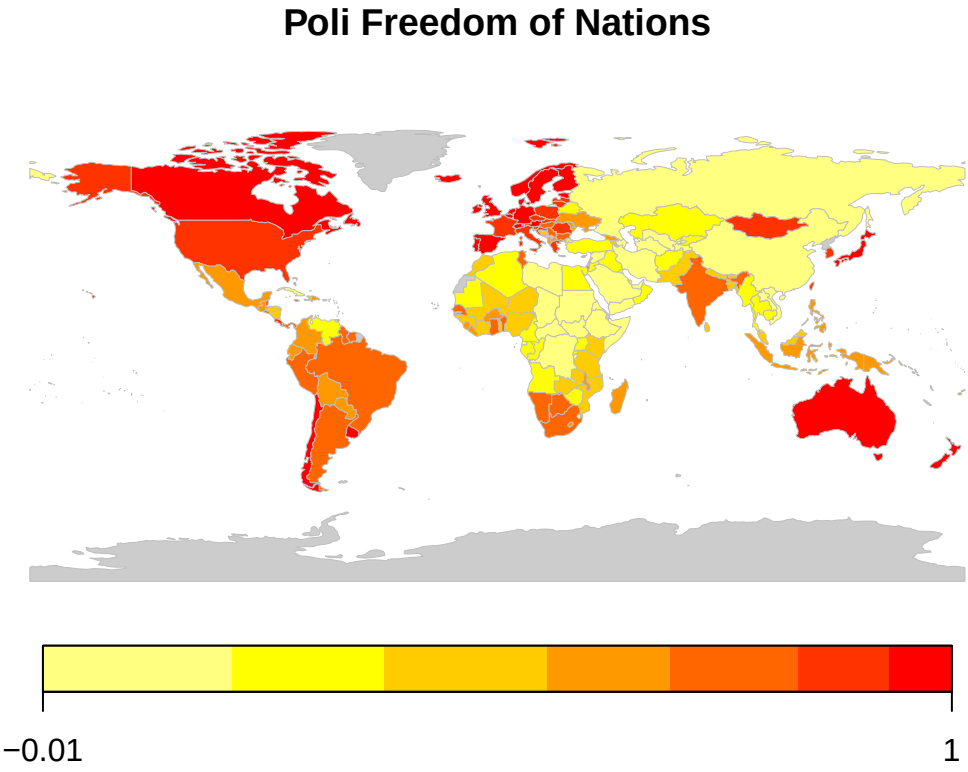
```
## 179 codes from your data successfully matched countries in the map
## 0 codes from your data failed to match with a country code in the map
## 64 codes from the map weren't represented in your data
```



Political Freedom

The following map depicts the political freedom within each given nation, with the darker shades showing the more politically free nations and the lighter showing the less free:

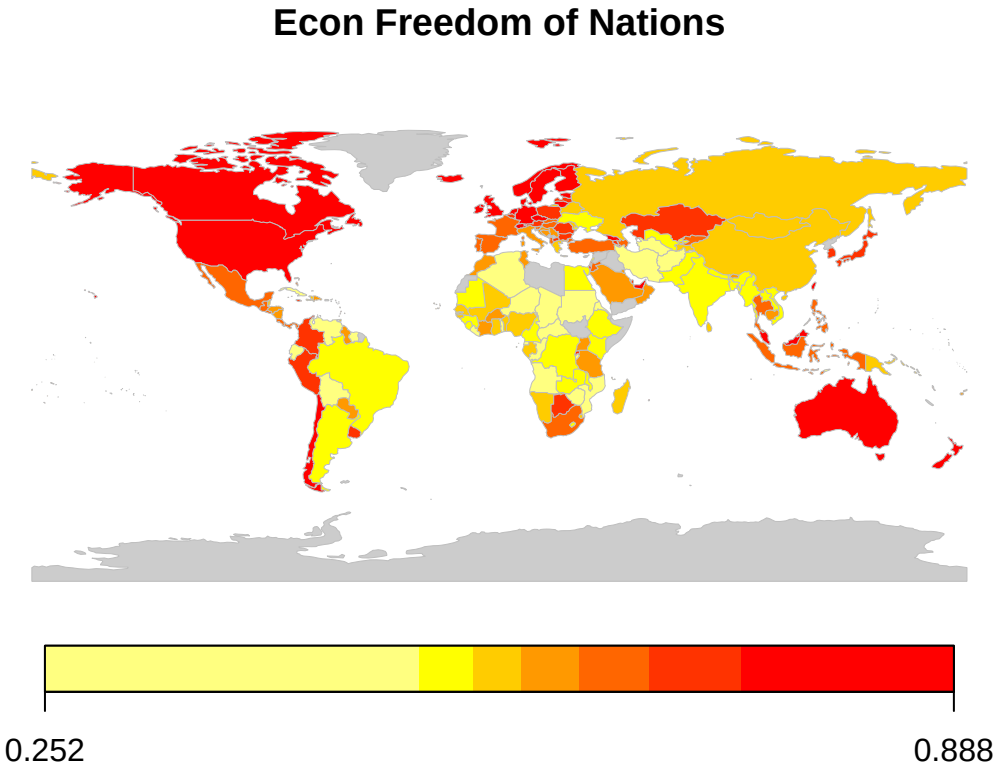
```
## 179 codes from your data successfully matched countries in the map
## 0 codes from your data failed to match with a country code in the map
## 64 codes from the map weren't represented in your data
```



Economic Freedom

The following map depicts the economic freedom within each given nation, with the darker shades showing the more economically free nations and the lighter showing the less free:

```
## 179 codes from your data successfully matched countries in the map
## 0 codes from your data failed to match with a country code in the map
## 64 codes from the map weren't represented in your data
```



Comparing the Three

When comparing the three maps to one another, it becomes clear that the three models rate the regions of the world very differently. Success favors rates the Asia-Pacific region more favorably then either political freedom or economic freedom does. Additionally, success's rating of South America falls much more in line with the political freedom model than economic freedom. Lastly, both political and economic freedom rate the southern region of Africa more favorably than the success rate model does.

Success by Region

The following section investigates this topic further by tracking the numerical differences in success between the regions in the three models.

Political Freedom

Under the political freedom model, the most successful region is Europe with an average freedom rating of 0.812 out of 1.0 and the least successful region is the Middle East / North Africa with an average freedom rating of 0.288. The following tibble includes the mean political freedom rating for each of the five regions.

```
df_region_poli
```

```
## # A tibble: 5 x 2
##   region                       mean
##   <chr>                       <dbl>
## 1 Asia-Pacific                0.518
## 2 Europe                      0.812
## 3 Middle East / North Africa 0.288
```

```
## 4 Sub-Saharan Africa         0.452
## 5 Americas                   0.726
```

Economic Freedom

Under the economic freedom model, the most successful region is Europe with an average freedom rating of 0.689 out of 1.0 and the least successful region is Sub-Saharan Africa with an average rating of 0.546. As is evidenced by the following tibble that includes the mean economic freedom ratings for each of the five regions, there is much less variation between the regions than there is under the other two models:

```
df_region_econ
```

```
## # A tibble: 5 x 2
##   region                       mean
##   <chr>                       <dbl>
## 1 Asia-Pacific                0.617
## 2 Europe                      0.689
## 3 Middle East / North Africa 0.615
## 4 Sub-Saharan Africa         0.546
## 5 Americas                   0.601
```

Success Rating

Under the success model, the most successful region is, again, Europe with an average rating of 0.711 out of 1.0 and the least successful region is Sub-Saharan Africa with an average rating of 0.491. The following tibble includes the mean success ratings for each of the five regions:

```
df_region
```

```
## # A tibble: 5 x 2
##   region                       mean
##   <chr>                       <dbl>
## 1 Asia-Pacific                0.630
## 2 Europe                      0.711
## 3 Middle East / North Africa 0.649
## 4 Sub-Saharan Africa         0.491
## 5 Americas                   0.624
```

Comparing the Three

Under all three models, Europe is consistently the region with the highest average score - making it the most politically/economically free as well as the most successful. There is somewhat more variation in the lowest average scores. Sub-Saharan Africa is the least economically free and least successful while the Middle East / North Africa is the least politically free.

Most Successful Nations

The most successful nations are shown below:

```
success_top3
```

```
## # A tibble: 10 x 4
##    country        econ  poli success
##    <chr>         <dbl> <dbl>   <dbl>
##  1 Australia     0.809  0.98   0.776
##  2 Denmark       0.766  0.97   0.787
##  3 Finland       0.741  1      0.783
##  4 Iceland       0.77   0.95   0.799
##  5 Norway        0.743  1      0.789
##  6 Qatar         0.726  0.24   0.786
##  7 Singapore     0.888  0.52   0.796
##  8 Switzerland   0.817  0.96   0.810
##  9 Taiwan        0.766  0.93   0.907
## 10 United States 0.757  0.86   0.842
```

Least Successful Nations

The least success nations are shown below:

```
success_bot3
```

```
## # A tibble: 10 x 4
##    country                       econ  poli success
##    <chr>                        <dbl> <dbl>   <dbl>
##  1 Afghanistan                  0.513  0.26   0.384
##  2 Burkina Faso                 0.6    0.6    0.369
##  3 Central African Republic     0.492  0.09   0.374
##  4 Chad                         0.493  0.18   0.325
##  5 Democratic Republic of Congo 0.521  0.17   0.440
##  6 Gambia                       0.523  0.41   0.429
##  7 Guinea-Bissau                0.569  0.41   0.359
##  8 Niger                        0.495  0.49   0.411
##  9 Somalia                     NA      0.07   0.409
## 10 South Sudan                 NA      0.02   0.301
```

Political Freedom and Success

```
mean_poli_prop
```

```
## # A tibble: 10 x 2
##    prop_success mean_success
##    <chr>              <dbl>
##  1 0 - 0.1          NaN
##  2 0.1 - 0.2        NaN
##  3 0.2 - 0.3        NaN
##  4 0.3 - 0.4        NaN
##  5 0.4 - 0.5          0.26
##  6 0.5 - 0.6          0.524
##  7 0.6 - 0.7          0.581
##  8 0.7 - 0.8          0.784
##  9 0.8 - 0.9          0.910
## 10 0.9 - 1.0          0.93
```

Economic Freedom and Success

```
mean_econ_prop
```

```
## # A tibble: 6 x 2
##   prop_success mean_success
##   <chr>               <dbl>
## 1 0.70 - 0.75         0.689
## 2 0.75 - 0.80         0.751
## 3 0.80 - 0.85         0.787
## 4 0.85 - 0.90       NaN
## 5 0.90 - 0.95         0.766
## 6 0.95 - 1.0        NaN
```

Overall Correlation between Freedom Type and Success

In order to calculate the correlation between economic freedom, political freedom, and success within the same model, a multiple linear regression test will be utilized.

```
lm_both
```

```
##
## Call:
## lm(formula = success ~ econ_freedom + poli_freedom, data = success_na)
##
## Coefficients:
##  (Intercept)  econ_freedom  poli_freedom
##      0.21008       0.62008       0.04259
```

As the outcome of the linear regression shows, economic freedom has a much stronger correlation to the success of a nation than political freedom does. An economic freedom rating of 100 percent will increase a nation's success rating by 62.008 percent whereas a political freedom rating of 100 percent will only increase a nation's success rating by 4.259 percent.

Determing the Effect of the Economic Prosperity Indicators

When calculating the economic freedom of the country, the Heritage foundation utilized both the GDP and unemployments rates in their calculations. Since both of these variables were utilized in the calculation of success as indicators of economic prosperity, it is important to run a second linear regression to test the correlation between success and freedom rates with these two variables removed.

The second multiple linear regression considers only the remaining four categories - safety, education, health, and lifestyle - when calculating the success of a given country:

```
lm_both_four
```

```
##
## Call:
## lm(formula = success ~ econ_freedom + poli_freedom, data = success_four)
##
## Coefficients:
##  (Intercept)  econ_freedom  poli_freedom
##      0.21008       0.62008       0.04259
```

Given that the correlation coefficients for economic freedom and political freedom remain the same (0.62008 and 0.04259, respectively) even when the economic prosperity category has been removed from consideration, we have ensured that the correlation was not skewed in favor of economic freedom by sharing two of the same indicators.

When testing the correlation between the five indicators and the success rate for a nation, the results show that health indicators had the strongest correlation with a nation's success while economic factors had the weakest correlation. Thus, it is less surprising that the removal of the economic prosperty category had no effect on the overall correlation between economic freedom/political freedom and success.

```
lm_five
```

```
##
## Call:
## lm(formula = success ~ econ + safe + educ + health + life, data = success_combine)
##
## Coefficients:
## (Intercept)         econ         safe         educ       health
##    -0.01689      0.13347      0.15458      0.16478      0.35033
##        life
##     0.16021
```

Data Limitations

While the ideal would have been to compare changes in success over the years, to analyze the effects that an increase in political freedom and economic freedom might have on a nation over time, this was not feasible due to the limitations of the data. Data reporting was infrequent from most nations, making it so that some variables had to be a combination of data from 2000 until 2017 to gain enough countries' results to make the set complete enough to work with. Thus, comparing the data over time was not feasible when the variables themselves were not individual years. Further, since a nation that was missing data from both variables within any of the given five categories had to be deleted from the set, this would create an even further lack of nations if the variables were considered by year, leaving only a handful of nations left.

Further limitations of the data may be the way by which success was measured. While the goal was to create a measure of success that was not biased in favor of any one category, the variables that were included could be considered a "westernized ideal of success", meaning that certain variables included may be important to how a western nation views success of their nation but may not be important to other regions of the world. While this is certainly not the goal of this measure of success and including items such as the World Happiness Rating was meant to eliminate some of these biases, it is a factor to consider when reviewing this report.

Conculsion

The United States has a tendency to assume that the political freedom of a nation factors much more heavily into the success of a nation than it actually does. While

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