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

While vast amounts of studies have been released on the effects of political freedom on economic freedom, or vice versa, few studies have attempted to track the effects of either on the overall success of the nation. Thus, well the relationship has been well established in which economic freedom increases political freedom, most studies ignore what role these two might play into other areas.

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. Both data sets are not without their critics; however, the goal is to eliminate some of the potential bias from the data sets through the research design. Hertiage's Index of Economic Freedom drew wide criticism due to its assumption that economic openness inherently leads to growth within a nation. By creating a new measure of success (as outlined below), the goal is to create a more rounded picture of what it means to be a successful nation within this study, including more than just economic indicators.

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

The first step in the research design was to decide which nations would be considered. The list of 196 nations currently recognized by the U.S. Department of State as sovereign was used as the standard measure - thereby eliminating any other countries or territories included in the data sets that were not included within this list. The data from the sovereign nations, economic freedom, political freedom, and the ten variables were then inputted in to R, tidied, and merged into one tibble.

The next step, then, was to calculate success from this tibble. Since variables came in the form of years, dollars, rates, percentages, etc., a standard measure needed to be utilized across all ten of the variable. In order to create this standard measures, proportions were utilized. Taking the maximum value for a variable (or the maximum possible in the case of the freedom scores and happiness rating), each value was divided by its column's maximum. For negative measures, such as homicide rate, where a lower value was ideal, the proportion was then divided by 1. The goal of this was to create a trend across all ten variables in which a higher value would denote more success in the category. The overall success rate was given, then, by calculating the mean of the ten variables for each nation.

In order to ensure that each category continued to be weighted evenly, the issue of missing values needed to be dealt with. Any nation that was missing data from both variables within any of the five categories was, thus, removed from consideration. This ensured that the mean rate that was given in the calculation of success actually represented all five categories rather than four or less. After removing rows (nations) with missing values in both columns of one category or more, 179 or the original 195 nations remained.

Nations were then reordered by their success rating and a rank was given to each nation.

The following tibble was created through this proccess:

```
head(success_order)
```

```
## # A tibble: 6 x 16
##   country_name region econ_freedom poli_freedom      gdp unemployment
##   <chr>        <chr>         <dbl>        <dbl>    <dbl>        <dbl>
## 1 Taiwan       Asia-~        0.766         0.93 NA              0.962
## 2 United Stat~ Ameri~        0.757         0.86  1              0.956
## 3 Switzerland  Europe        0.817         0.96  0.0350         0.97
## 4 Iceland      Europe        0.77          0.95  0.00123        0.972
## 5 Singapore    Asia-~        0.888         0.52  0.0167         0.978
## 6 Norway       Europe        0.743         1     0.0206         0.96
## # ... with 10 more variables: crime_index <dbl>, homicide <dbl>,
## #   enrollment <dbl>, literacy <dbl>, life_expectancy <dbl>,
## #   infant_mortality <dbl>, median_income <dbl>, happiness <dbl>,
## #   success <dbl>, rank <int>
```

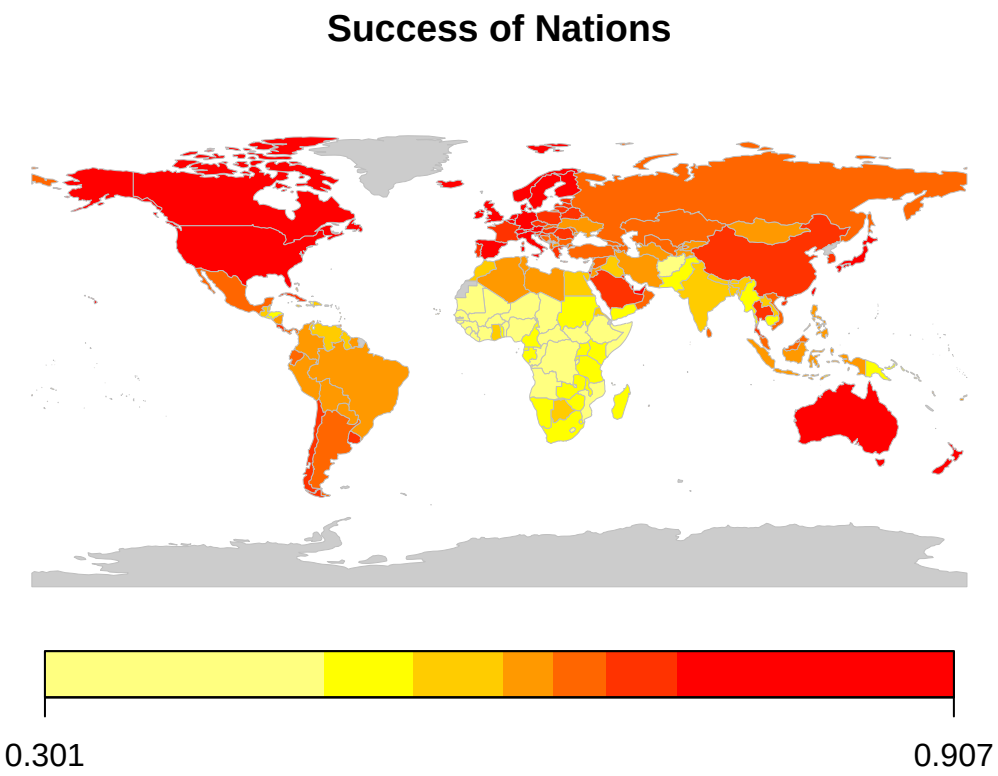
Comparing Economic/Political Freedom and Success

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
```

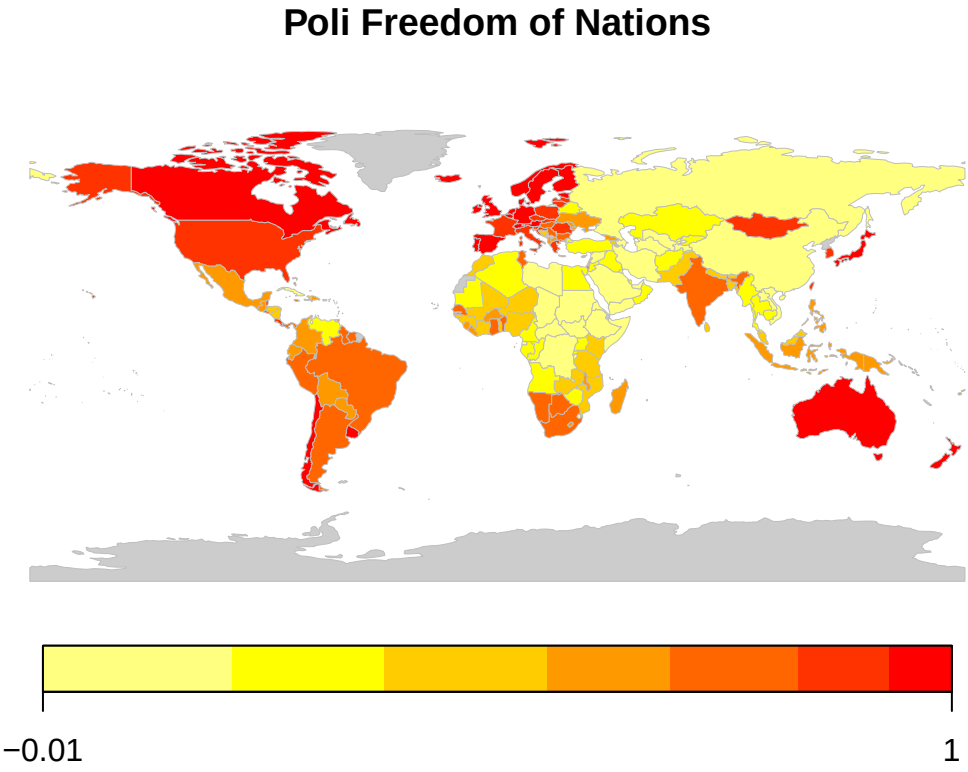
```
## ### Welcome to rworldmap ###
## For a short introduction type :   vignette('rworldmap')
## 179 codes from your data successfully matched countries in the map
## 0 codes from your data failed to match with a country code in the map
## 64 codes from the map weren't represented in your data
```



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:

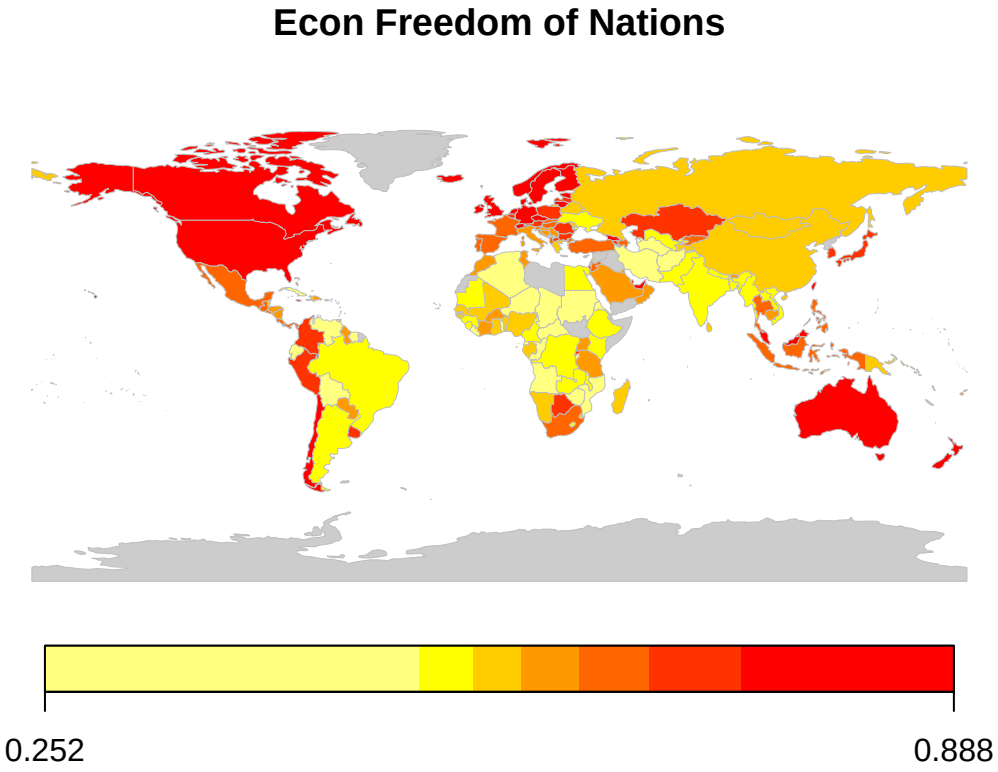
```
## 179 codes from your data successfully matched countries in the map
## 0 codes from your data failed to match with a country code in the map
## 64 codes from the map weren't represented in your data
```



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
```

Of note when considering the top ten most successful nations in the world, the region fluctates much more than it does within the least successful. Four different regions are represented within the most successful nations - Europe, Middle East / North Africa, the Americas, and Asia-Pacific. Further, the rate of economic freedom is consistently high within the top ten. The mean rate of economic freedom for the top ten is 0.7783, compared to the average economic freedom rate for the whole data set which is 0.6126. While political freedom remains higher than the average for the whole data set, as well, with a mean of 0.841 for the top ten and 0.5809 for the entire set, there appears to be a much greater flucatation among the top ten in political freedom ratings.

In terms of economic freedom, the minimum economic freedom rating for the top ten is 0.726, which is still over 0.10 higher than the mean for the set. Political freedom, on the other hand, shows a much different pattern. The lowest political freedom rating among the top ten most successful nation is 0.24 for the nation of Qatar. This is over 0.3 lower than the mean for political freedom in the whole data set. Thus, it is through this portion of data, that we begin to see the closer correlation between economic freedom and success than exists between political freedom and success.

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
```

The first topic of note when considering the least successful nation is the lack of diversity in the regions represented. Only two regions - Sub-Saharan Africa and Asia-Pacific - appear in the bottom top nations whereas four different regions appeared in the top ten.

The mean rate of economic freedom for the bottom ten is 0.5257, compared to the mean economic freedom

overall for the whole set which is 0.6126. The mean rate of political freedom for the bottom ten is 0.27, compared the mean political freedom overall which is 0.5809. As was the trend with the top ten, there is significantly less fluctation in the economic freedom in the bottom ten countries than there is within the political freedom rating. While almost all the values in both columns stayed consistently below the means for political and economic freedom, political freedom had one outlier that managed to surpass the mean - Burkina Faso.

Political Freedom and Success

Under the initial research design for this paper, the goal was the track which economic systems and types of government saw the highest/lowest rates of success. While there was no readily available data set of economic systems outside of the economic freedom ratings, there was an alternative data set to political freedom that would have provided types of government, including autocracy, closed anocracy, open anocracy, democracy, and full democracy. This data set, however, included fewer nations within its study than Freedom House's Freedom Index.

Further, while the categories provided by the polity data sets would have been ideal (i.e. the types of government), the each type of government only fell into one range of polity scores, with no outliers in the set. This meant that an autocracy would only fall between the polity score range of -10 to -6, closed anocracy between the range of -5 and -1, etc. Thus, little was gained from this model when these artifical ranges could also be introduced into Freedom House's Freedom Index. Since the Freedom Index included more nations, this seemed like the clear option.

Below is the tibble created with proportional ranges and success scores. Each propoortional range represents a section of political freedom (i.e. a political freedom rating between 0 to 0.1, 0.1 to 0.2, etc.) and its corresponding average of success.

```
mean_poli_prop
```

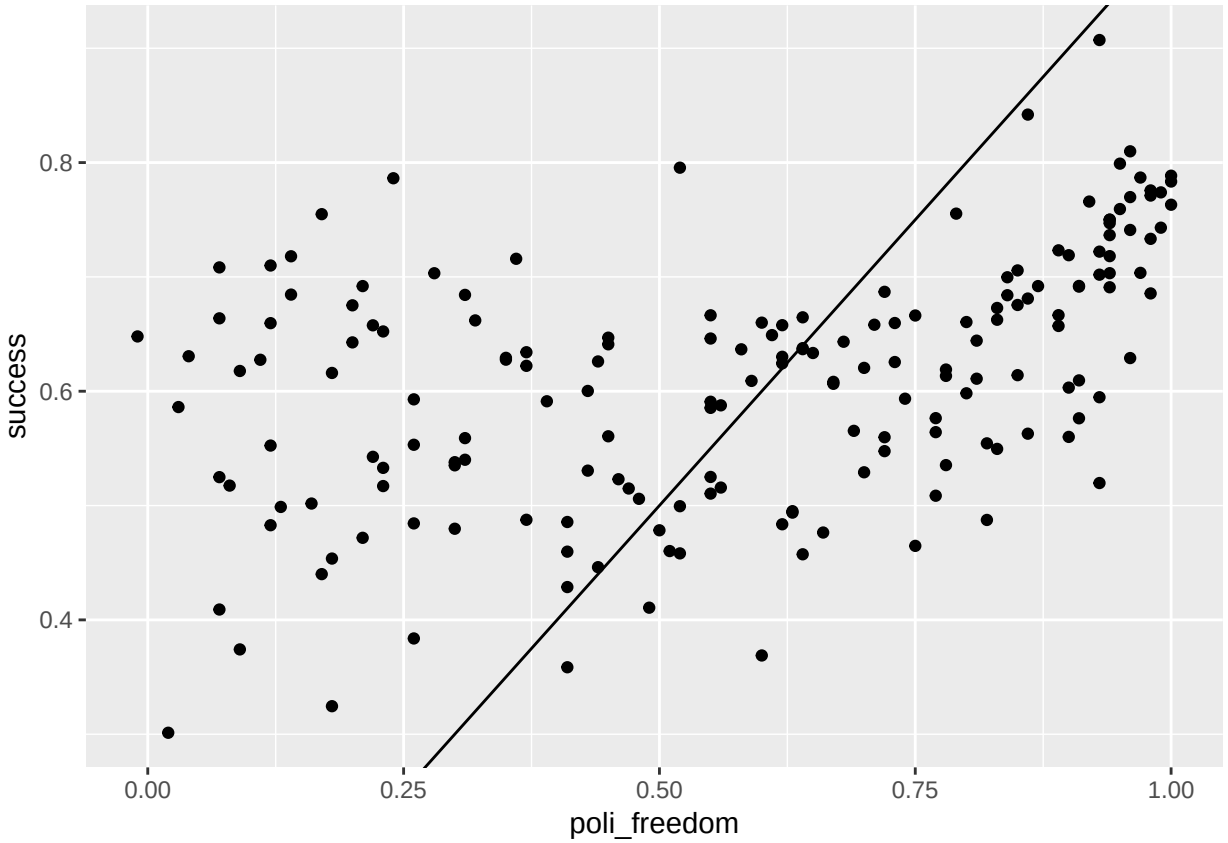
```
## # A tibble: 10 x 2
##    prop_success mean_success
##    <chr>               <dbl>
##  1 0 - 0.1           NaN
##  2 0.1 - 0.2         NaN
##  3 0.2 - 0.3         NaN
##  4 0.3 - 0.4         NaN
##  5 0.4 - 0.5           0.26
##  6 0.5 - 0.6           0.524
##  7 0.6 - 0.7           0.581
## 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

As can be seen in the above tibble, the average success rating rises consistently along with the political freedom with no outliers. Considering this under the terms of the afformentioned polity scores, then, this would mean that the success rating would rise as the polity score rose, leaving the democracies as the most successful type of government and the autocracy as the least successful.

Correlation between Political Freedom and Success

Turning the attention, then, towards the statistical relationship between political freedom and success, we will start by analyzing a linear regression graph of the two.

```
ggplot(data = success_na) +
  geom_point(mapping = aes(x = poli_freedom, y = success)) +
  geom_abline()
```



As the graph shows, there is a positive correlation between political freedom and success; however, the data is much more scattered compared to the later graphing of economic freedom and success.

```
lm_poli_f
```

```
##
## Call:
## lm(formula = success ~ poli_freedom, data = success_na)
##
## Coefficients:
##  (Intercept)  poli_freedom
##       0.5134        0.1692
```

A futher calculation of linear regression reveals that while the relationship between political freedom and success is statistically significant (with a p value of 8.067e-11), the correlation between the two is much weaker than that of economic freedom and success, with a correlation coefficient of only 0.1692. This means that when the political freedom rating is at 100, the success rate of a nation will only rise (on average) 16.92 points.

```
lm_poli_f
```

```
##
## Call:
## lm(formula = success ~ poli_freedom, data = success_na)
##
```

```
## Coefficients:
##  (Intercept)  poli_freedom
##       0.5134        0.1692
```

Economic Freedom and Success

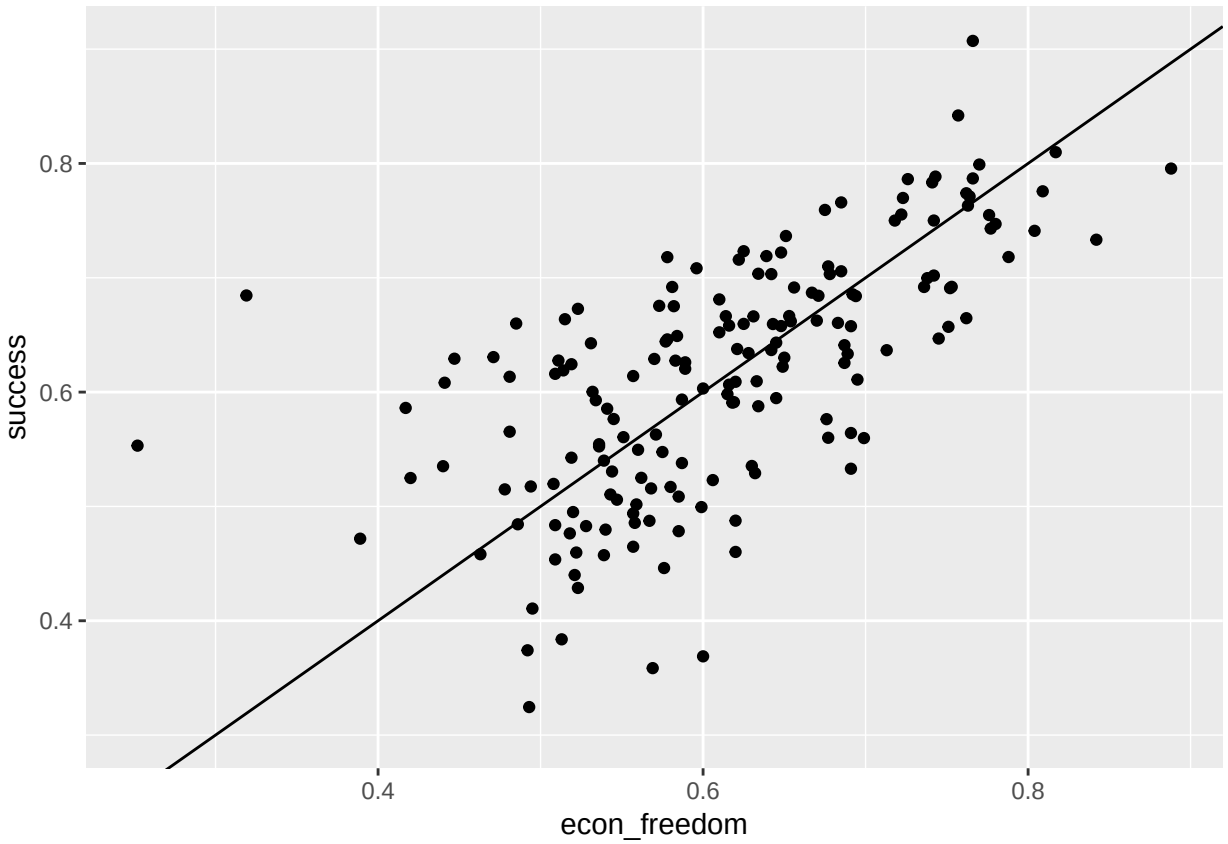
```
mean_econ_prop
```

```
## # 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
```

Correlation between Economic Freedom and Success

```
ggplot(data = success_na) +
  geom_point(mapping = aes(x = econ_freedom, y = success)) +
  geom_abline()
```

```
## Warning: Removed 6 rows containing missing values (geom_point).
```




```
lm_econ_f
```

```
##
## Call:
## lm(formula = success ~ econ_freedom, data = success_na)
##
## Coefficients:
##  (Intercept)  econ_freedom
##       0.1950        0.6862
```

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 the country gained its freedom by battling a monarchy and has gone to war over its perceived "noble" goal of spreading democracy throughout the world, this study provides some evidence that political freedom within a country may not be as important as other factors. While democracies do hold higher success ratings than other types of government, political freedom is not the deciding factor between a successful nation and a failing one. Among the most successful nations in the world, political freedom was largely mixed - instead, it was the economic freedom that factored much mor heavily into their success. With such a high correlation between economic freedom and success, attention should perhaps be turned away from promotting political freedom and instead towards promoting economic freedom.

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