

Human Freedom Index

Arpi Beshlikyan & Jazmine Toledo

Dr . Albert Satorra and Prof. Ferran Carrascosa

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Summary of the Study

With the use of the Human Freedom Index dataset, we have attempted to analyze the data measuring freedom around the world. Continuous development has been made by the Fraser Institute in an effort to understand the concept of economic freedom and its effect on human well-being. The CATO Institute, in collaboration with the Fraser Institute and the Liberales Institut at the Friedrich Naumann Foundation for Freedom, published a report including both a study of economic freedom and personal freedom to observe the interactions between different types of freedom.

The Human Freedom Index releases data annually beginning in 2005, however we studied only the data from the most recent year, 2016. We went through a rigorous process of creating a reliable data frame. The board index consists of 10 regions. The highest levels of freedom are from North America, Western Europe, and Oceania, while the lower levels come from the Middle East and Northern Africa, Southern Asia, and Sub-Saharan Africa.

The index aims to understand the degrees of freedom people have to enjoy classic civil liberties in the countries that were surveyed. The index focuses on economic freedom and its contribution to human well-being through interactions with various forms of personal freedom, composed of several numerical variables.

The purpose of this project is to answer the following question:

Which category of personal freedom is most significant in predicting economic freedom?

Through our analysis of the data, we concluded that Rule of Law was a significant factor in the forecast of economic freedom. From this we further investigated categories within the Economic Freedom Index to find the category most correlated to Rule of Law, and we noted that Legal Systems appropriately demonstrated the highest correlation.

Development of the Study

Introduction

“The Human Freedom Index presents the state of human freedom in the world based on a broad measure that encompasses personal, civil, and economic freedom.” It is constructed of 162 countries and comprised of 2 sub-indexes: economic freedom and personal freedom. The personal freedom sub-index is made up of 37 numerical variables divided into six categories: *Rule of Law*, *Security and Safety*, *Religion*, *Freedom of Movement*, *Assembly*, and *Identity and Relationships*. The economic freedom sub-index includes 42 numerical variables divided into five categories: *Size of Government*, *Legal System and Property Rights*, *Access to Sound Money*, *Freedom to Trade Internationally*, *Regulation of Credit, Labor, and Business*. Freedom here is defined as the “absence of coercive constraint” by the CATO Institute, with 10 being the most free.

Personal freedom is made up of the following categories:

- Rule of Law- captures if people are protected by the law, and if the law applies to everyone, including authorities.
- Security & Safety- measures the number of crimes committed against individuals, specifically if they were assaulted, kidnapped, or killed, whether by other individuals, the government, organized gangs, or political groups.
- Movement- measures the freedom to travel domestically and internationally
- Religion- measures the freedom to establish religious organizations, as well as harassment and hostility directed towards religious groups and restrictive laws against religious groups.
- Association, Assembly, & Civil Society- measures the freedom to create and participate in political, commercial, and cultural organizations.
- Expression & Information- measures the freedom of speech and press, and the government regulation of internet and cable access.
- Identity & Relationships- measures an individual’s restriction on sexual and gender identity, as well as the acceptance of same-sex relationships, and the equality of divorce rights granted to men and women.

Economic freedom is made up of the following five categories:

- Size of Government-, measure’s taxation, government spending, and government investment in and control of businesses.
- Legal Systems & Property Rights- measures the impartiality of courts, judicial independence, and the enforcement of contracts to protect people’s property rights
- Access to Sound Money- measures the reliability of a country’s monetary system to store value through interest rates and volatility
- International Trading- measure’s tariff rates, nontariff trade barriers, and controls on capital movement
- Regulation of Credit, Labor, and Business- measure the restrictions in competition between businesses and voluntary arrangements among employers and employees through interest rate controls, hiring/firing regulations, licensing restrictions, etc.

The report is co-published by the Cato Institute, the Fraser Institute, and the Liberales Institut at the Friedrich Naumann Foundation for Freedom.

Goals

The purpose of this project is to answer the following question:

Which category of personal freedom is most significant in predicting economic freedom?

Prior to the human freedom index there was no data to help explore the definition of freedom. However, with this study we hope to gain a better understanding of freedom around the world, and more specifically examine the interactions between personal and economic freedom. We will explain the relationships that exist between them by analyzing different indexes that describe different social and economic phenomena. Additionally, with this data set we will examine how these variables behave differently among different regions and how they will ultimately impact economic freedom.

Methodology and Data

With the Human Freedom Index, we will investigate the correlations between personal freedom and economic freedom to observe if one could be a predictor for the other, and more specifically examine the subcategories of the two indexes to see which is the most significant predictor. The personal freedom sub-index is comprised of 34 numerical variables divided into seven categories while the economic freedom sub-index is comprised of 42 numerical variables divided into five categories.

The dataset we will be working with was co-published by the Cato Institute, the Fraser Institute, and the Liberales Institut at the Friedrich Naumann Foundation for Freedom in 2018. It consists of indexes for each category listed in Fig. 1.

The dataset includes data starting from 2008, but we will only be examining the index values from 2016. It includes data on 162 countries, classified into 10 regions of the world: Caucasus & Central Asia, East Asia, Eastern Europe, Latin America & the Caribbean, Middle East & North Africa, North America, Oceania, South Asia, Sub-Saharan Africa, and Western Europe.

We will plot economic freedom against the seven categories of personal freedom and observe the bivariate correlations. We will then construct a multiple regression model and analyze the summary to find the R-squared value of the model, as well as the p-value of each independent variable. After finding the category of personal freedom that is most significant in the regression model, we will then switch the independent and dependent variables and break down economic freedom into its five categories. We will do so to find which index is most significantly correlated to the chosen category of personal freedom. Additionally we will construct a multiple regression model to analyze the R-squared value of the model and p-values of each individual category of economic freedom.

PERSONAL FREEDOM

1. LEGAL PROTECTION AND SECURITY

- A. Rule of Law
 - i. Procedural Justice
 - ii. Civil Justice
 - iii. Criminal Justice
- B. Security and Safety
 - i. Homicide
 - ii. Disappearances, Conflicts, and Terrorism
 - a. Disappearances
 - b. Violent Conflicts
 - c. Organized Conflicts
 - d. Terrorism Fatalities
 - e. Terrorism Injuries
 - iii. Women's Security and Safety
 - a. Female Genital Mutilation
 - b. Missing Women
 - c. Inheritance Rights
 - Widows
 - Daughters

2. SPECIFIC PERSONAL FREEDOMS

- A. Movement
 - i. Domestic Movement
 - ii. Foreign Movement
 - iii. Women's Movement
- B. Religion
 - i. Establishing and Operating Religious Organizations
 - ii. Harassment and Physical Hostilities
 - iii. Legal and Regulatory Restrictions
- C. Association, Assembly, and Civil Society
 - i. Association
 - ii. Assembly
 - iii. Establishing and Operating Political Parties
 - iv. Establishing and Operating Professional Organizations
 - v. Establishing and Operating Educational, Sporting, and Cultural Organizations
- D. Expression and Information
 - i. Press Killed
 - ii. Press Jailed
 - iii. Laws and Regulations That Influence Media Content
 - iv. Political Pressures and Controls on Media Content
 - v. Access to Cable/Satellite
 - vi. Access to Foreign Newspapers
 - vii. State Control over Internet Access
- E. Identity and Relationships
 - i. Legal Gender
 - ii. Parental Rights
 - a. In Marriage
 - b. After Divorce
 - iii. Same-Sex Relationships
 - a. Male-to-Male Relationships
 - b. Female-to-Female Relationships
 - iv. Divorce

ECONOMIC FREEDOM

A. Size of Government

- i. Government Consumption
- ii. Transfers and Subsidies
- iii. Government Enterprises and Investments
- iv. Top Marginal Tax Rate
 - a. Top Marginal Income Tax Rate
 - b. Top Marginal Income and Payroll Tax Rate

B. Legal System and Property Rights

- i. Judicial Independence
- ii. Impartial Courts
- iii. Protection of Property Rights
- iv. Military Interference in Rule of Law and Politics
- v. Integrity of the Legal System
- vi. Legal Enforcement of Contracts
- vii. Regulatory Restrictions on the Sale of Real Property
- viii. Reliability of Police
- ix. Business Costs of Crime

C. Sound Money

- i. Money Growth
- ii. Standard Deviation of Inflation
- iii. Inflation: Most Recent Year
- iv. Freedom to Own Foreign Currency Bank Account

D. Freedom to Trade Internationally

- i. Tariffs
 - a. Revenue from Trade Taxes (% of trade sector)
 - b. Mean Tariff Rate
 - c. Standard Deviation of Tariff Rates
- ii. Regulatory Trade Barriers
 - a. Nontariff Trade Barriers
 - b. Compliance Costs of Importing and Exporting
- iii. Black-Market Exchange Rates
- iv. Controls of the Movement of Capital and People
 - a. Foreign Ownership/Investment Restrictions
 - b. Capital Controls
 - c. Freedom of Foreigners to Visit

E. Regulation

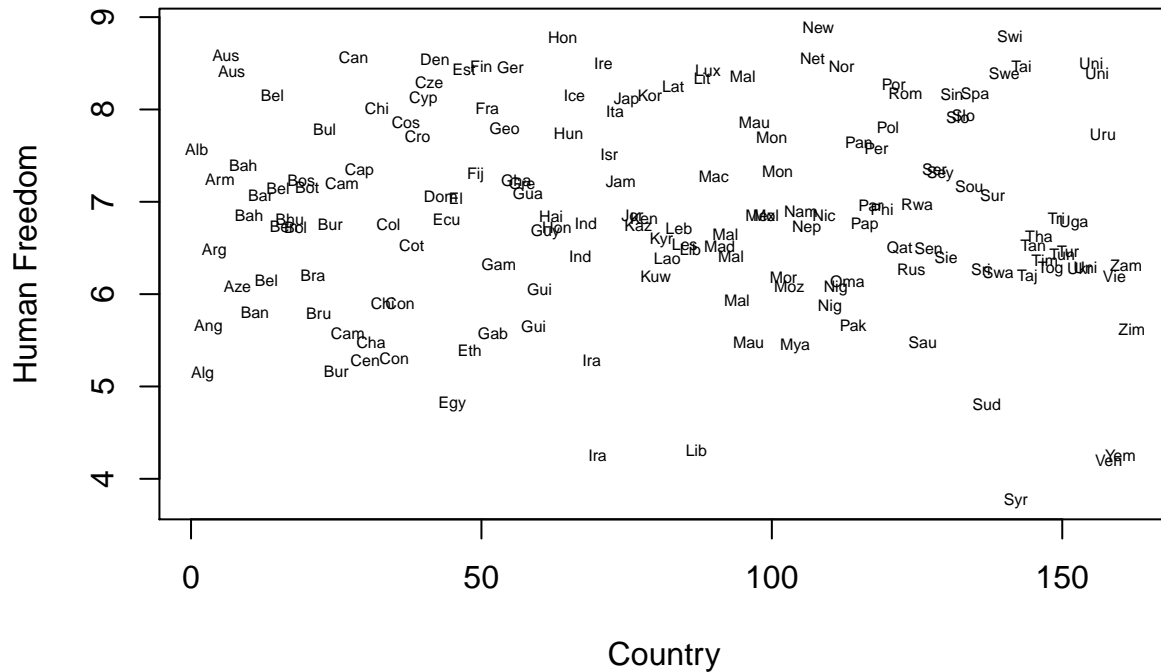
- i. Credit Market Regulations
 - a. Ownership of Banks
 - b. Private-Sector Credit
 - c. Interest Rate Controls/Negative Real Interest Rates
- ii. Labor Market Regulations
 - a. Hiring Regulations and Minimum Wage
 - b. Hiring and Firing Regulations
 - c. Centralized Collective Bargaining
 - d. Hours Regulations
 - e. Mandated Cost of Worker Dismissal
 - f. Conscription
- iii. Business Regulations
 - a. Administrative Requirements
 - b. Bureaucracy Costs
 - c. Starting a Business
 - d. Extra Payments/Bribes/Favoritism
 - e. Licensing Restrictions
 - f. Cost of Tax Compliance

Figure 1: Figure 1. Structure of Human Freedom Index

Analysis and Discussion

The Human Freedom Index of each country encapsulates both economic and personal freedom, with equal weight given to each.

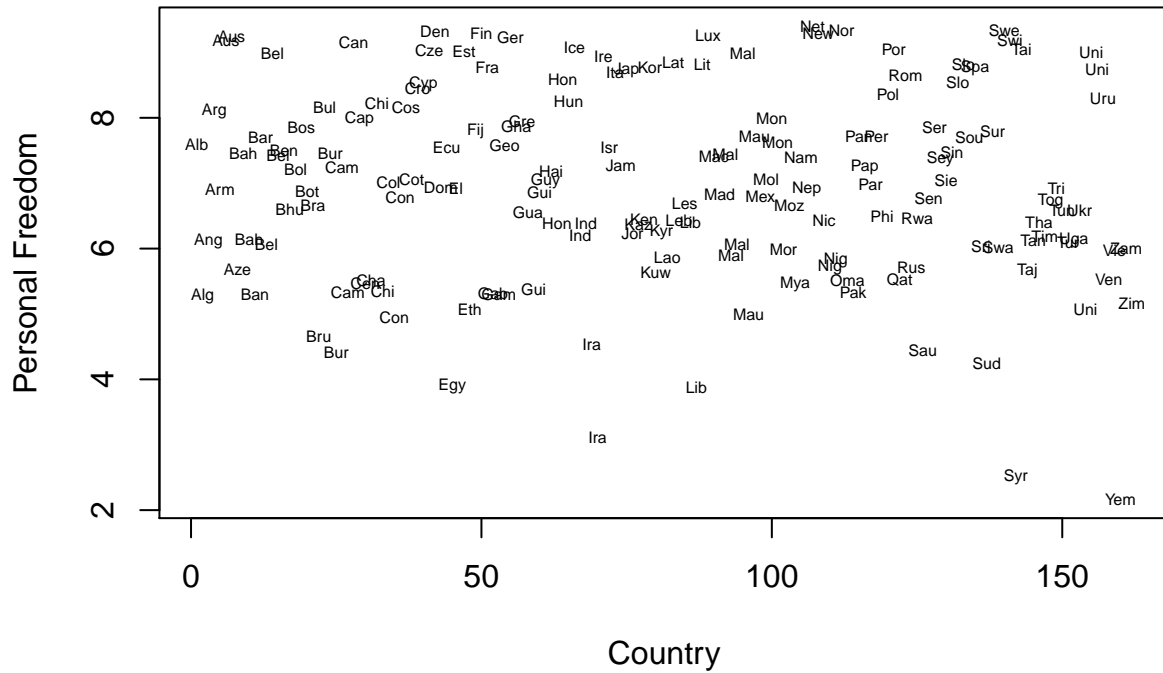
Human Freedom by Country



##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
##	3.766	6.246	6.824	6.890	7.772	8.887

The personal freedom sub-index is comprised of 34 numerical variables divided into six categories. The indicators are rated on a scale of 1 to 10, with 10 representing the most freedom.

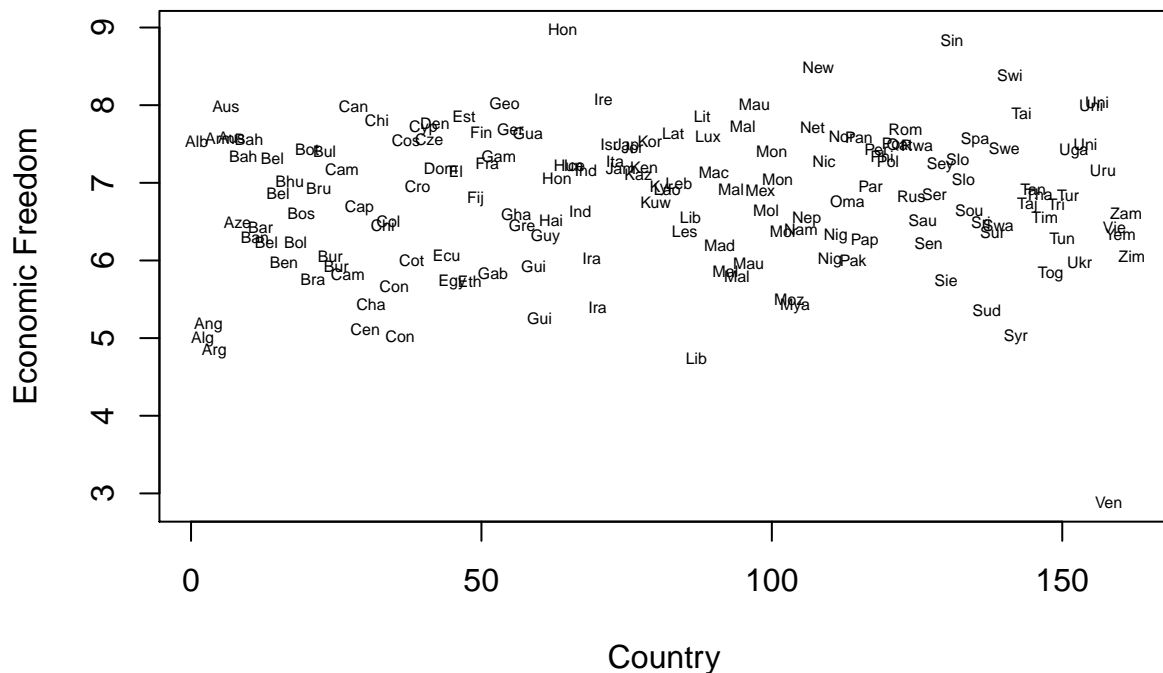
Personal Freedom by Country



##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
##	2.167	6.025	6.932	6.985	8.142	9.399

The economic freedom sub-index is comprised of 42 numerical variables divided into five categories. The indicators are rated on a scale of 1 to 10, with 10 representing the most freedom.

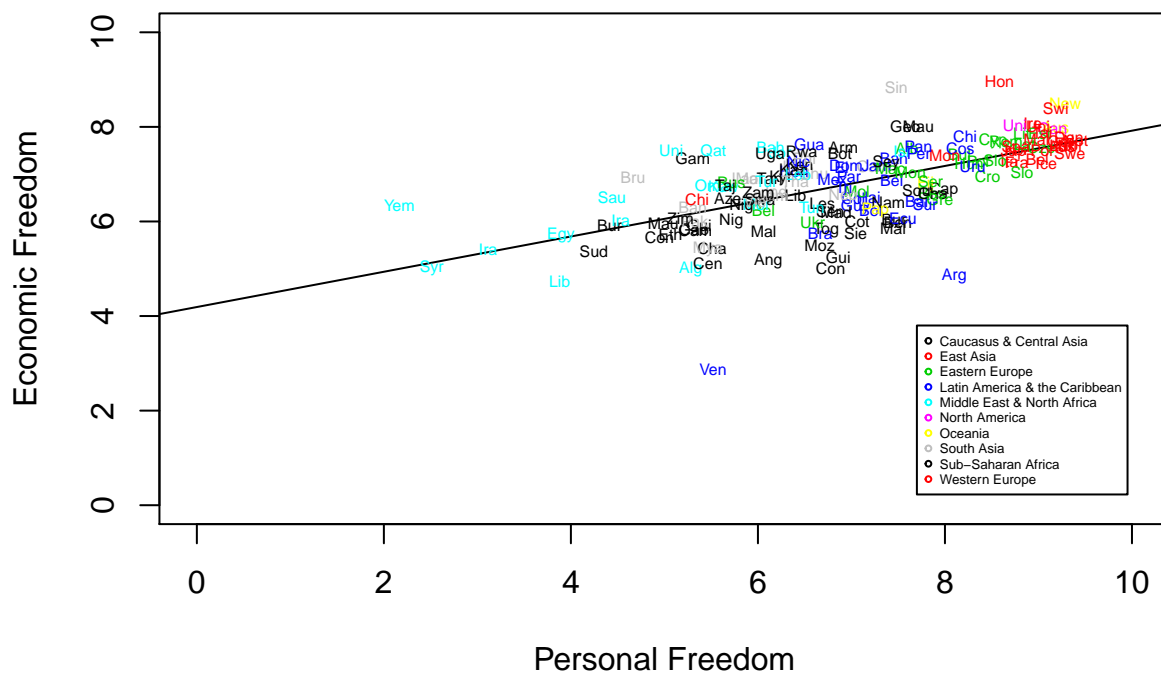
Economic Freedom by Country



##	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
##	2.880	6.260	6.905	6.795	7.468	8.970

The average economic freedom rating for 162 countries in 2016 was 6.76 and the average personal freedom was 6.99 on a scale of 0 to 10, where 10 represents more freedom. Several countries ranked consistently high in economic freedom and high in personal freedom. However, there were also countries that ranked high in personal freedom but low in economic freedom. For instance, Venezuela scored 5.52 in personal freedom and had an economic freedom score of 2.88 and Argentina ranked 8.10 in personal freedom and had an economic freedom score of 4.84. Similarly, other countries ranked higher in economic freedom while lower in personal freedom. For example, Singapore scored 7.47 in personal freedom and scored a 8.84 in economic freedom, United Arab Emirates scored 5.07 in personal freedom and scored a 6.29 in economic freedom, and Qatar scored 5.53 in personal freedom and scored a 7.49 in economic freedom. The correlation between economic freedom and personal freedom was 0.63.

Economic Freedom vs. Personal Freedom



There is a clear positive correlation between personal and economic freedom, with a correlation of 0.63.

To see the correlations between economic freedom and each category of personal freedom, we construct the following linear regressions:

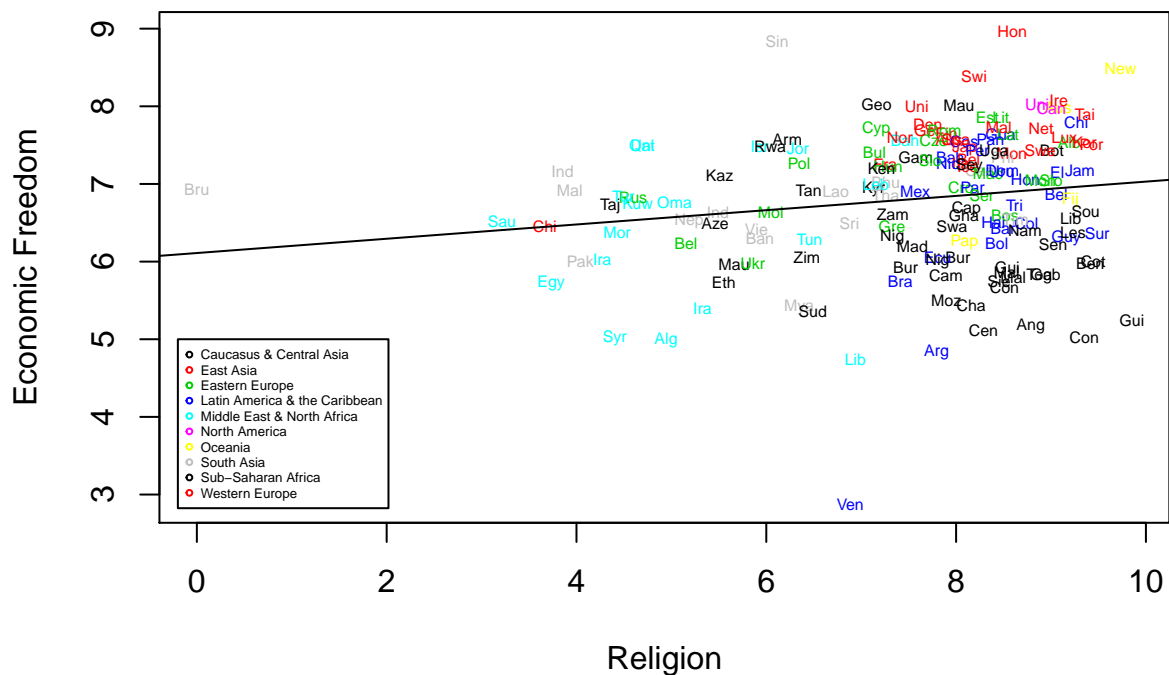
This scatter plot illustrates the relationship between the Rule of Law (X-axis) and Economic Freedom (Y-axis) across various countries. The X-axis ranges from 2 to 8, and the Y-axis ranges from 3 to 9. A positive linear trend line is shown, indicating that higher Rule of Law scores generally correspond to higher Economic Freedom scores. Countries are color-coded by region:

- Caucasus & Central Asia: Black circle
- East Asia: Red circle
- Eastern Europe: Green circle
- Latin America & the Caribbean: Blue circle
- Middle East & North Africa: Cyan circle
- North America: Magenta circle
- Oceania: Yellow circle
- South Asia: Grey circle
- Sub-Saharan Africa: Dark grey circle
- Western Europe: Red circle

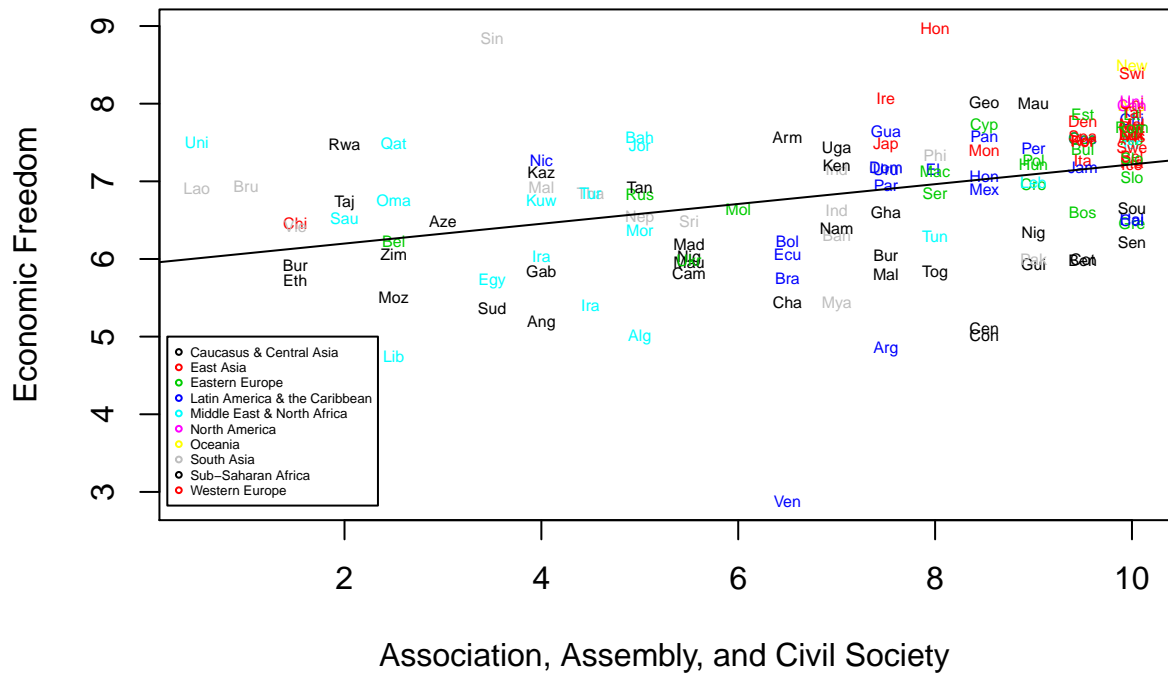
Key countries plotted include: Ven, Lib, Cen, Syr, Ira, Con, Cam, Gui, Eth, Moz, Ang, Con, Alg, Egi, Pap, Mad, Zim, Hai, Lib, Taj, Tim, Hon, Uga, Phi, Nic, Ken, Gua, Cam, Pan, Den, Kaz, Per, Bul, Arm, Alb, Mol, Mon, Bos, Cro, Bos, Nam, Eri, Gha, Uru, Slo, Ita, Fra, Chi, Uni, Lit, Tai, Mal, Sp, Kor, Jap, Ice, Bel, Lux, Aus, Ger, Ne, Der, Sui, Hon, Sin, New, and Swi.

A scatter plot showing the relationship between Economic Freedom (Y-axis, 3 to 9) and Security and Safety (X-axis, 4 to 10). The plot includes a positive linear regression line and data points for various countries, color-coded by region. The legend identifies the following regions: Caucasus & Central Asia (black dot), East Asia (red dot), Eastern Europe (green dot), Latin America & the Caribbean (blue dot), Middle East & North Africa (cyan dot), North America (magenta dot), Oceania (yellow dot), South Asia (grey dot), Sub-Saharan Africa (dark grey dot), and Western Europe (orange dot). Countries like Iran (Ira), Syria (Syr), and Libya (Lib) are in the Middle East & North Africa region. Many countries in Latin America and the Caribbean (blue) and Eastern Europe (green) are clustered in the upper right quadrant, indicating higher scores in both metrics. A few countries like Venezuela (Ven) and Chad (Cha) are outliers with lower scores in both dimensions.

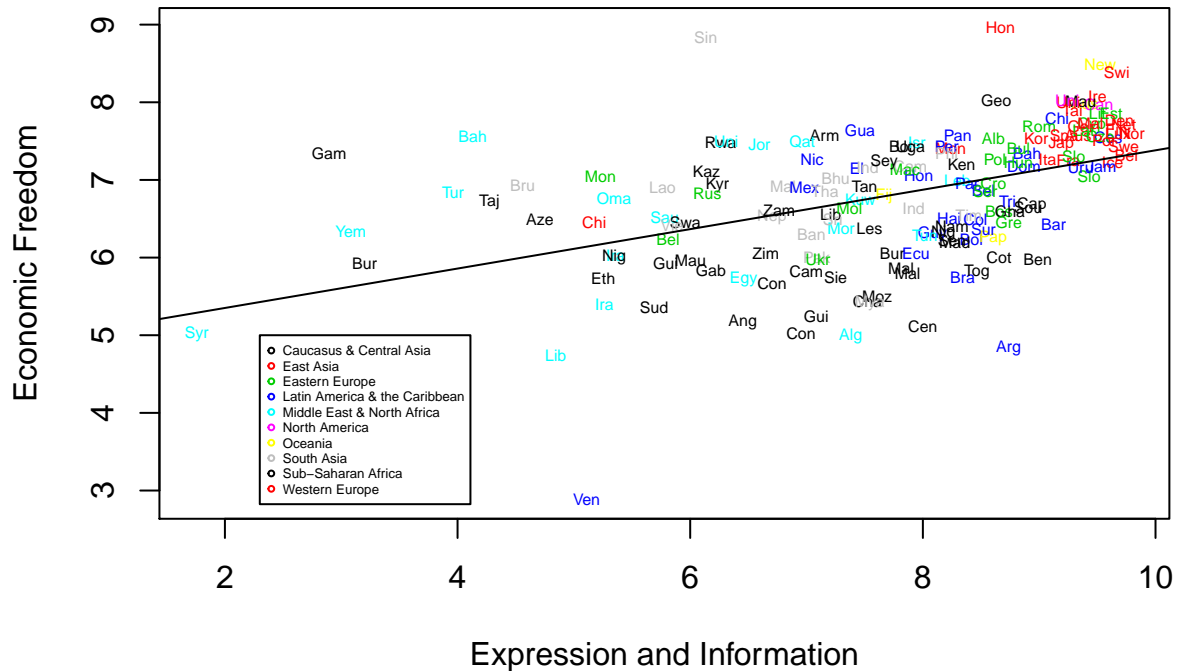
Economic Freedom vs. Religion



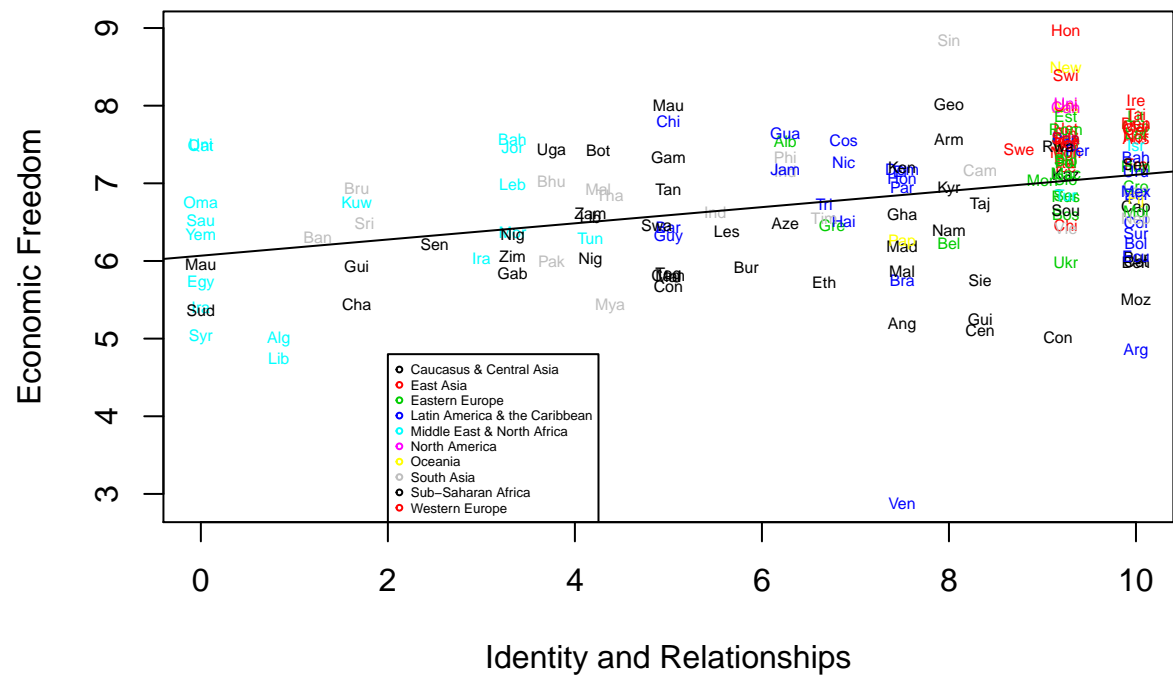
Economic Freedom vs. Association, Assembly, and Civil Society



Economic Freedom vs. Expression and Information



Economic Freedom vs. Identity and Relationships



We construct a multiple regression model to fit the relationship between economic freedom and the subcategories of personal freedom.

```
##
## Call:
## lm(formula = data$economicfreedom ~ data$rol + data$religion +
##      data$expression + data$safety + data$relationships + data$movement +
##      data$assembly)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.82288 -0.34787 -0.01219  0.37809  1.32904
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)    4.039267   0.450908   8.958 3.32e-15 ***
## data$rol        0.301251   0.051946   5.799 4.92e-08 ***
## data$religion   -0.005481   0.046958  -0.117  0.9073
## data$expression -0.008769   0.079106  -0.111  0.9119
## data$safety     0.121946   0.062657   1.946  0.0538 .
## data$relationships -0.006516  0.023991  -0.272  0.7864
## data$movement   0.044263   0.029082   1.522  0.1305
## data$assembly   0.005833   0.039250   0.149  0.8821
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6266 on 128 degrees of freedom
## (26 observations deleted due to missingness)
## Multiple R-squared:  0.5607, Adjusted R-squared:  0.5367
## F-statistic: 23.34 on 7 and 128 DF, p-value: < 2.2e-16
```

We observe upon closer inspection that Rule of Law is the most significant, with a p-value of 4.92×10^{-8} . Therefore, we examine the correlation between the Rule of Law index and the subcategories of economic freedom to find which sub-index is most significantly correlated to Rule of Law.

```
##      [,1]      [,2]
## [1,] "Gov Size"    "-0.328255694438231"
## [2,] "Legal Systems" "0.90449332414679"
## [3,] "Money"        "0.522755354935322"
## [4,] "Trade"        "0.67804130214078"
## [5,] "Regulation"   "0.685274991389977"
```

From this summary we notice that the legal system has the highest correlation of 0.90. From this correlation we are able to conclude that the two variables have almost a perfect positive correlation. It was interesting to notice that the size of government had a negative correlation of -0.32, which implies they have an inverse correlation whereby they move in the opposite direction.

Conclusion

Which category of personal freedom is most significant in predicting economic freedom?

The Human Freedom Index assisted in providing a measure of freedom for 162 countries from around the world. The index does not convey a clear goal for this data but rather a data set that is available to analyze and to make correlations between sub-categories of personal freedom and economic freedom. While analyzing the data and plotting sub-categories against economic freedom we noted that Rule of Law was a significant category in the prediction of economic freedom.

We then analyzed the sub-index of Rule of Law specifically to investigate which category of economic freedom it was most significantly correlated to. In fact from this analysis, we were able to conclude that the Legal System index had the highest positive correlation, which has an intuitive explanation. Then the second and third highest correlations were with Freedom to Trade Internationally and Regulation of Credit, Labor, and Business indexes. This makes sense, because the more laws there are to protect individuals from infringement on their freedom and right to property, the easier it is for businesses to exist in a competitive environment with economic freedom.

We conclude that the Rule of Law index is the category of the Personal Freedom Index that best predicts a country's Economic Freedom Index, with a significance of 4.92×10^{-8} and an estimated correlation of 0.73.

Bibliography

Vásquez, Ivan and Počnik, Tanja. “The Human Freedom Index 2018.” Cato Institute, 2018, object.cato.org/sites/cato.org/files/2018-07/human-freedom-index-2018-revised.pdf.

Annexes

Webpages of the data: Human Freedom Index: <https://www.kaggle.com/gsutters/the-human-freedom-index>