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The Expansion of Chinese Soft Power

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Theory and Background

In recent years, China has expanded its global power and presence nearly tenfold. President Xi Jinping has made it adamantly clear that China will establish itself as a global superpower and surpass the United States through economics, diplomacy, foreign direct investment, and infrastructure. To gain influence with other nations, China aims to expand through means of soft power. We hypothesize that China is targeting resource-rich, developing countries through diplomatic relations to facilitate economic development, and these countries are located primarily in Africa, South America, and the Middle East. Our theory is that China intentionally targets countries with medium to low human development as means for expanding its soft power since many of these countries sit in areas of the world that are considered “resource wealthy” (whether it be coal, oil, or rare earth elements). By systematically targeting corrupt countries, China has bought off many governments for land rights and grants to harvest these resources. Subsequently, by using structural adjustment packages to lend countries money (which China knows cannot be repaid), China builds foreign infrastructure and enhances influence over their domestic economies.

Throughout the last decade, China has dramatically expanded its soft power. In 2014, Xi Jinping proclaimed to the CCP that “We should increase China’s soft power, give a good Chinese narrative, and better communicate China’s message to the world” (Council of Foreign Relations). Soft power, opposite to coercive military force, shapes the preferences and appeals of nations through culture, political values, and foreign policies. China has pitched seven areas of major focus for their expansion of soft power. The first major focus is the Belt and Road Initiative (BRI), an international infrastructure plan to establish a dominating trade presence throughout the world interconnecting back to mainland China. The second major development of soft power stemming from China is economic development in foreign countries, which either

come in grants, foreign direct investment (FDI), or aid packages. Additionally, we have seen a drastic increase in diplomatic soft power. We assess that this is a form of soft coercion as China gains a foothold to influence and change policy within that geopolitical region by expanding diplomatic presence within a country.

However, China's soft power has its limitations. Many world leaders, including the United States have called ethics into question. China has been accused of mass pollution as a result of its infrastructure initiative programs such as the BRI. The quality of the infrastructure has also been called into question as much of it degrades quickly. China has also created state owned enterprises that have, at this point, reached over-capacity, becoming hard to manage as they are spread out through various regions. China's soft power has been ultimately limited by dissonance by the sociopolitical image that China attempts to project to the world. Much of this dissonance comes from the state's crackdown on protesters in Hong Kong, domestic censorship, and global political repression.

Research Design

To predict where China will develop its soft power next, we will use competitive machine learning. To analyze both the economic and diplomatic dimensions of expansion, we will run two separate models, one predicting foreign direct investment (FDI) and the other predicting the level of agreement in voting patterns at the United Nations (UN). FDI is a good indicator of economic expansion because it reveals where Chinese companies believe economic opportunities lie abroad. Voting patterns at the UN also show how often countries align themselves with China on a global stage.

The independent variables used in the model as predictors are the Human Development Index (HDI), type of government, China exports and imports, gross domestic product (GDP), and value of natural resources within a country. HDI serves as a proxy for both the level of

development and corruption within a country. China may also have different motivations depending on whether a government is authoritarian or democratic, so the type of government controls for this divergence. Exports and imports show the depth of economic ties with China, and the GDP controls for the size of the country's economy. Based on our hypothesis, we believe that natural resources are one of China's targets, and their abundance within a country would drive China to invest more in order to secure some profits derived from those resources. To quantify this, the total natural resources rents as a percentage of a country's GDP was used.

After data collection, country names were converted into ISO 3166-1 alpha-3 codes to ensure matching. All data were merged into one final dataset at country-year resolution. Missing data were treated as follows: if the GDP is missing for any given country-year, the entire row would be dropped. The rationale is that GDP is one of the most crucial statistics in economics; if GDP is missing, other variables are likely missing for that country-year as well. For missing imports and exports data, the value was set to a default of \$0; the volume of trade would likely be insignificant. For missing natural resources data, the value was also set to a default of 0% of the GDP; the natural resources industry would likely be negligible in the given economy. Lastly, a missing polity score indicates foreign intervention in the country at the given year, so the score was set to a default of 0, which is neither democratic or autocratic.

Our data would then be processed in order to scale the variables such that the ranges are similar across the independent variables. Two additional categorical variables were also introduced to create a fixed-effects model: the year and the country. The year serves as a control for time-series data, and the country controls for inherent individual differences among countries.

For the economic model, the year range was set to 2005 to 2019 since the earliest available FDI data was from 2005. For the diplomatic model, the year range was set to 2000 to 2012 since the data for UN votes only included 2000 to 2012. The dataset was then split 80%-

20% into training and testing data. Cross-validation was performed with k -fold cross-validation with $k = 10$. Linear regressions, k -nearest neighbors, decision trees, and random forests were used as the machine learning models. To determine the model with the best performance, the root-mean-square error (RMSE) from cross-validation was evaluated, and the model with the lowest RMSE overall was used to predict the “future” economic and diplomatic metrics with the data available from 2020. The results were then visualized on geospatial maps.

Data Sources

FDI data were taken from the American Enterprise Institute’s China Global Investment Tracker’s combined Dataset 1 and 2. This dataset had a company-year resolution from 2005 to the first half of 2022, so we converted this into a country-year resolution by summing up the total value of the investment across all companies within a country in a given year. Total investment in each country for this time frame was also calculated. UN agreement scores were taken from Voeten *et al.*’s United Nations General Assembly Voting Data dataset. These scores were available from 1946 to 2021, and the country codes were converted into country names before filtering for the rows with China.

HDI scores were derived directly from the UN Human Development Reports website; the time series data from 1990 to 2021 were used. Polity5 scores from the Center for Systemic Peace were used for the type of government; specifically, Polity2 indices were drawn from the annual time-series data ranging from 1946 to 2018. We extrapolated the polity indices into 2020 by duplicating the index from 2018, assuming that the type of government would not change significantly between 2018 and 2020. Exports and imports data were taken from the World Bank’s World Integrated Trade Solution portal. “China” was selected as the Country / Region, the maximum year range of 1992 to 2020 was used, data was viewed by “Product,” and “By Country” was used for Partner. The indicators were “Export (US\$ Thousand)” and “Import (US\$

Thousand).” Next, data was viewed by “Partner,” and “Sub-Saharan Africa” was chosen as the Partner. The values were then scaled by 1000 to get the nominal values. GDP was derived from the UN’s Analysis of Main Aggregates (AMA); the Excel sheet from “GDP and its breakdown at current prices in US Dollars” for all countries was used. Natural resource rents were drawn from the World Bank’s Open Data portal’s “Total natural resources rents (% of GDP)” CSV file. GDP and natural resources data were available for 1970 to 2020.

Measurements

Foreign Direct Investment

The investment partners that have benefited the most from Chinese FDI are in Africa and Asia, in particular, Sierra Leone, Laos, Zambia, Chad and Guinea (Figure 1). In some cases, the aggregate investment from China in these countries is equivalent to almost 1.5% of the country’s 2020 GDP. Those countries which received the most investment in absolute terms, such as the US, Australia, the UK, and Russia, received very little in relative terms (Figure 2). In the past, China has focused on Southeast Asia, Central Asia and Sub-Saharan Africa as its main vectors for investment. The data allows us to examine whether past Chinese diplomatic overtures were matched with economic investment and allows our model to predict future targets for economic expansion.

Total Foreign Direct Investment, Normalized by GDP
2005-2022

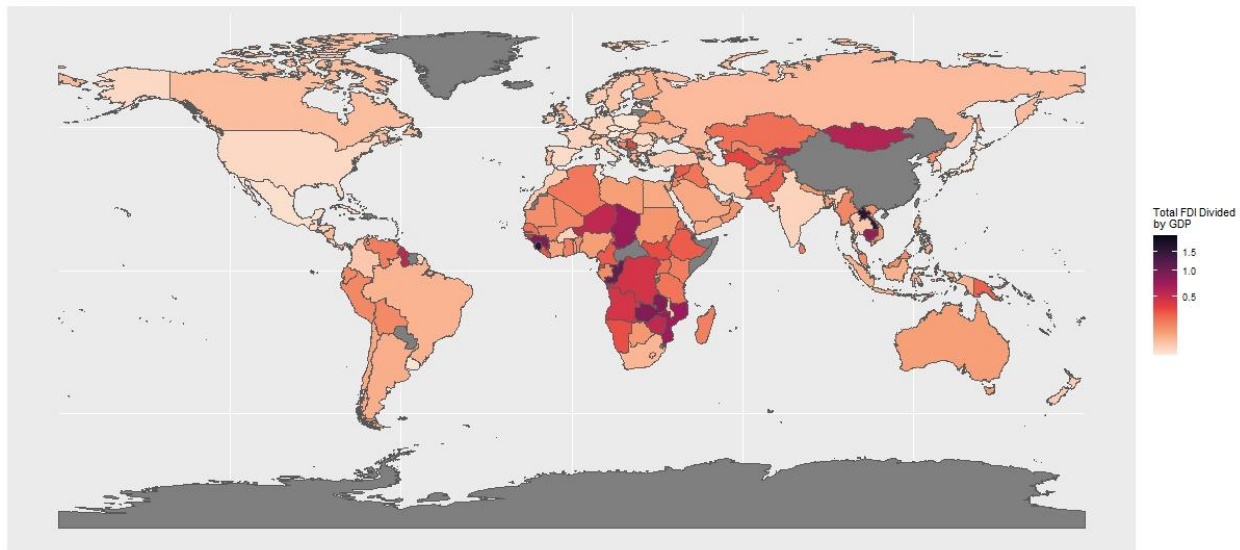


Figure 1: Foreign investment by China 2005-2022, as percentage of country's 2020 GDP

Total Foreign Direct Investment
2005-2022

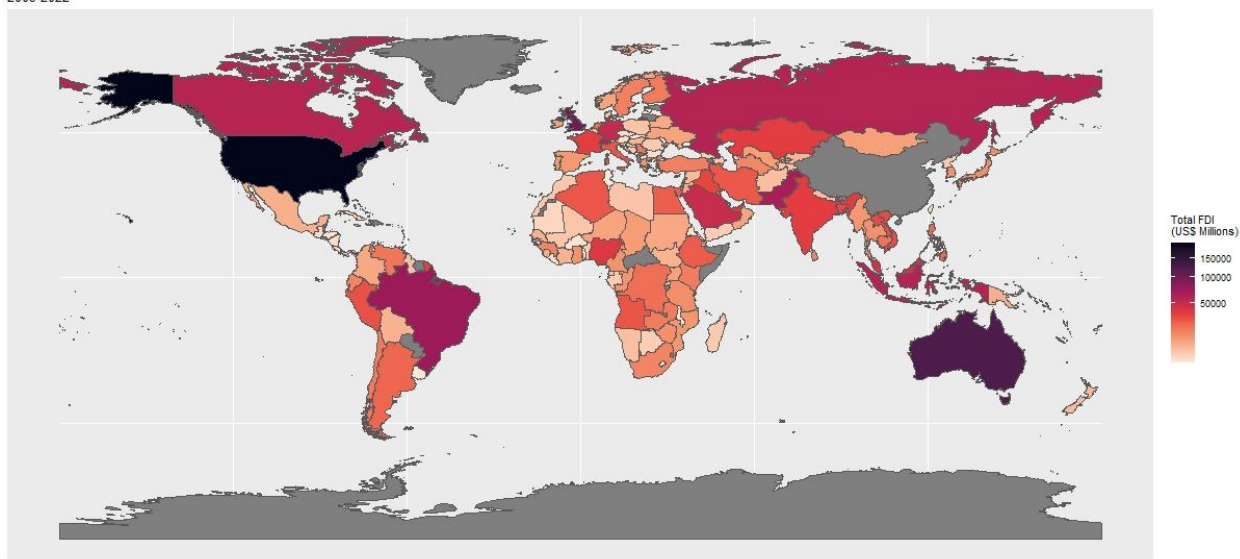


Figure 2: Foreign investment by China 2005-2022, Total, in millions of dollars

United Nations Agreement Scores

A critical sphere of influence revolves around international diplomatic interactions. We emphasize Africa and South America for visualization per our hypothesis. The UN agreement metric is created by drawing from ideal points created by Bailey, Strezhnev, and Voeten in “Estimating dynamic state preferences from United Nations voting data.” Chinese agreement

with any given country in the United Nations is highly dependent on intervening factors of any given year (Figures 3 and 4). For example, dramatic decreases in agreement occurred in 2011 with North African countries likely due to the turbulence of the Arab Spring; thus, changes in agreement are volatile, but in viewing the averages from 2000-2012, China votes with Somaliland, Angola, Chad, South Sudan, and Eritrea in Africa and Suriname, Venezuela, and Guyana in South America most often. Of note, Chinese agreement levels are consistently higher in Africa than in South America. These averages however do not account for significant shifts such as regime change that can affect diplomatic alignment. While UN levels of agreement are volatile and likely subject to significant shifts due to uncontrollable events, the metric still provides a strong metric for our diplomatic model.

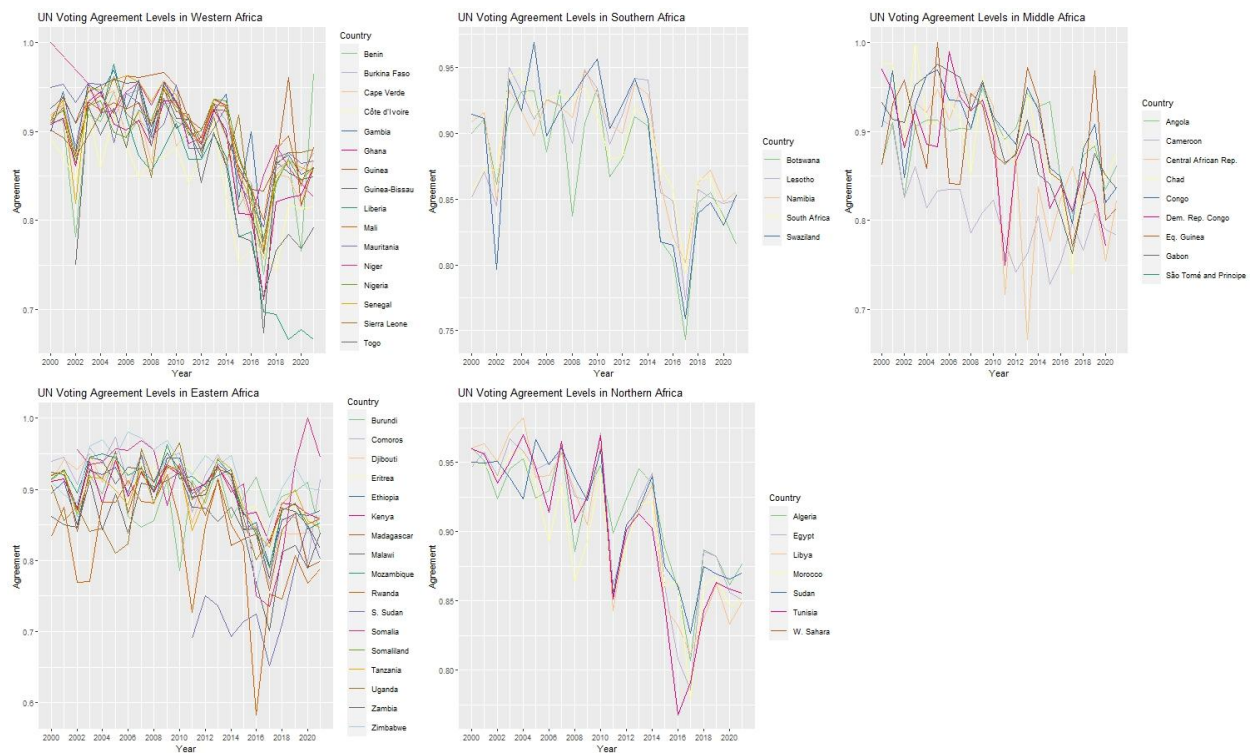


Figure 3: UN Voting Agreement Levels in Africa by Region from 2000-2021

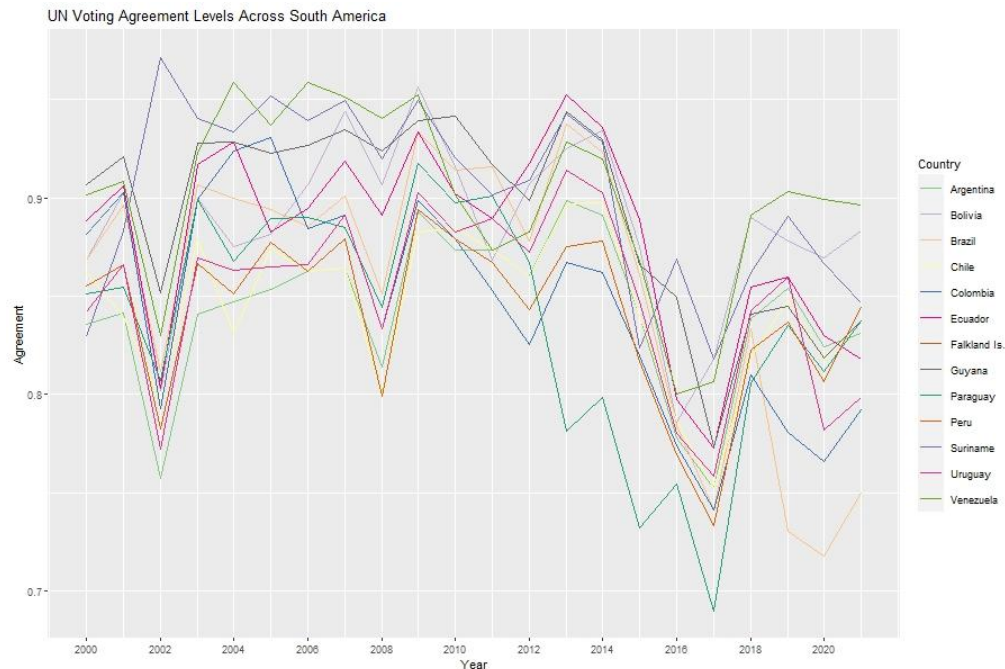


Figure 4: UN Voting Agreement Levels in South America from 2000-2021

The Human Development Index and Corruption

One of the key measurements of corruption in the world is the Human Development Index (HDI). HDI is linked to corruption as it influences different elements for the quality of life such as health, poverty, and education. The metric also allows us to rank countries based on development and corruption (Figure 5); the higher the HDI Score, the higher developed and less corrupt that country is. While some of China's allies sit high within the Human Development Index, we can see that many of the countries that have been economically exploited either sit in medium to low human development (Figures 6 and 7).

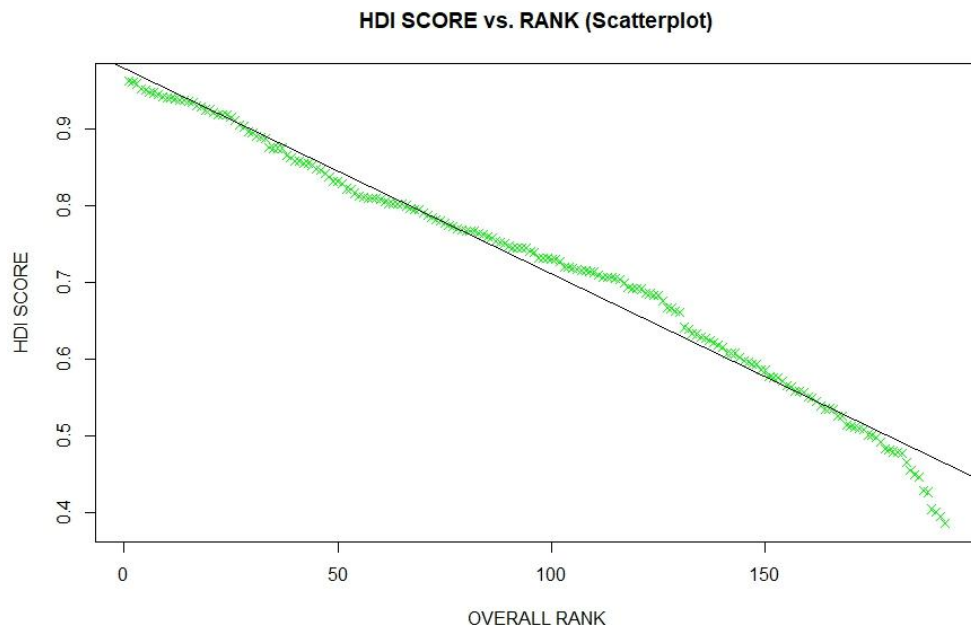


Figure 5: Human Development Score and Rank Correlation

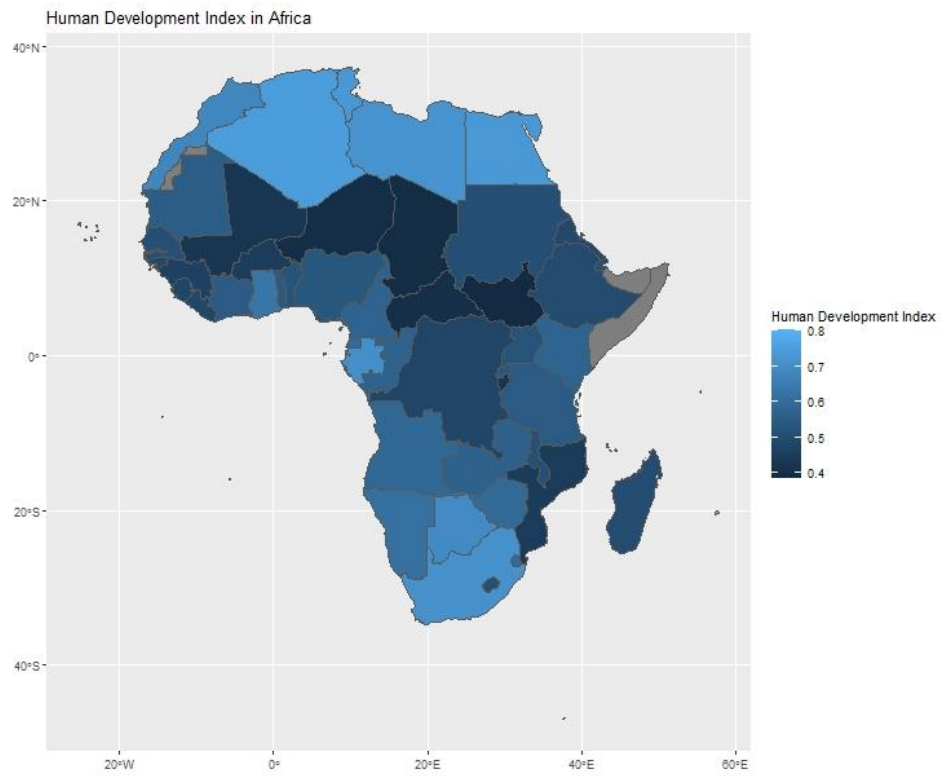


Figure 6: Human Development Score in Africa by Country

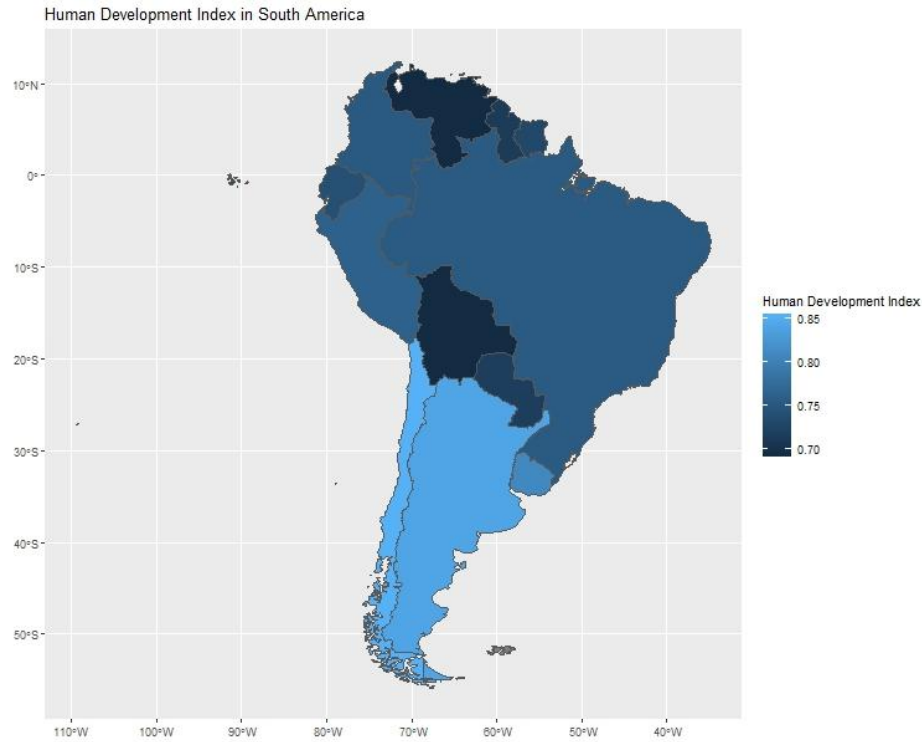


Figure 7: Human Development Score in South America by Country

Polity Scores

Polity scores from Polity5 range from -10 (indicating authoritarian) to 10 (indicating democratic). For much of our analyzed time range, most of the world was on the democratic end of the spectrum (Figure 8). Most of the authoritarian countries lie in Africa, the Middle East, and parts of Asia. Since authoritarian regimes tend to be more corrupt, these areas may prove to be more attractive for China to target with soft power.

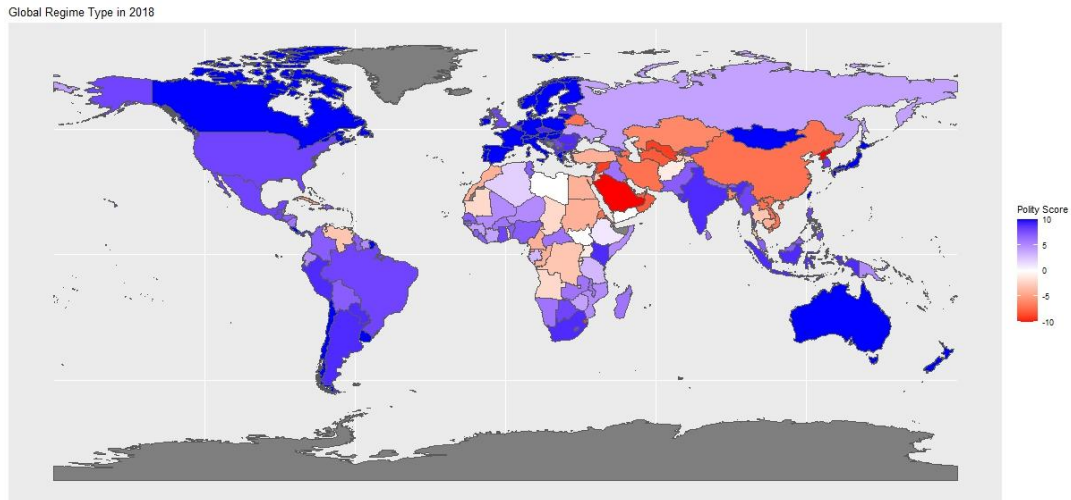


Figure 8: Polity Scores Worldwide

Trade

From our research, we see a huge increasing trend regarding China's trade both worldwide (Figures 9 and 10) and to African regions specifically (Figures 11 and 12). For research purposes, we decided to focus on overall trade volume as we perceive it to be helpful in discussing how Chinese soft power has changed over time.

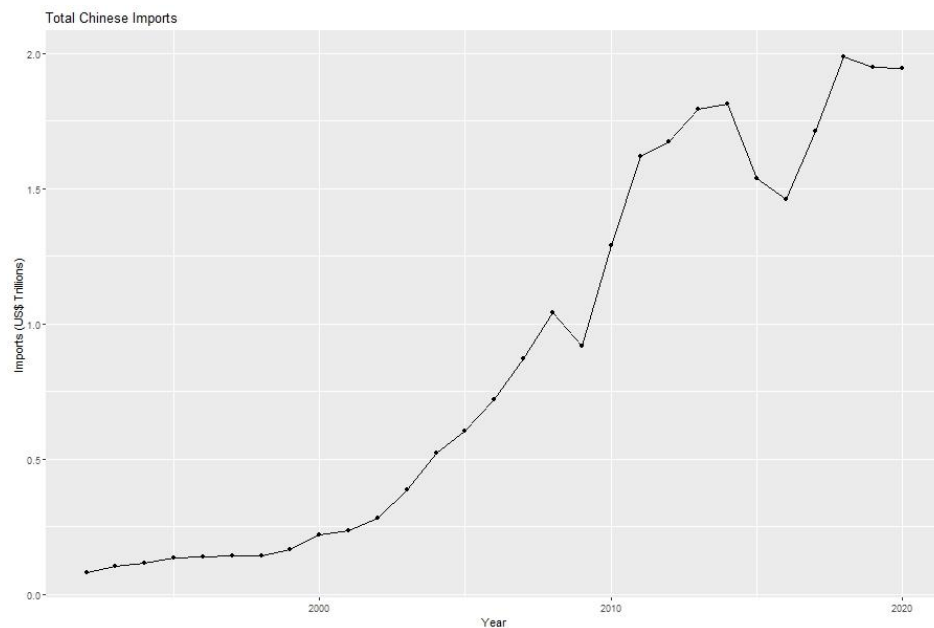


Figure 9: Foreign Trade Imports by China 1992-2020, Total, in trillions of US dollars

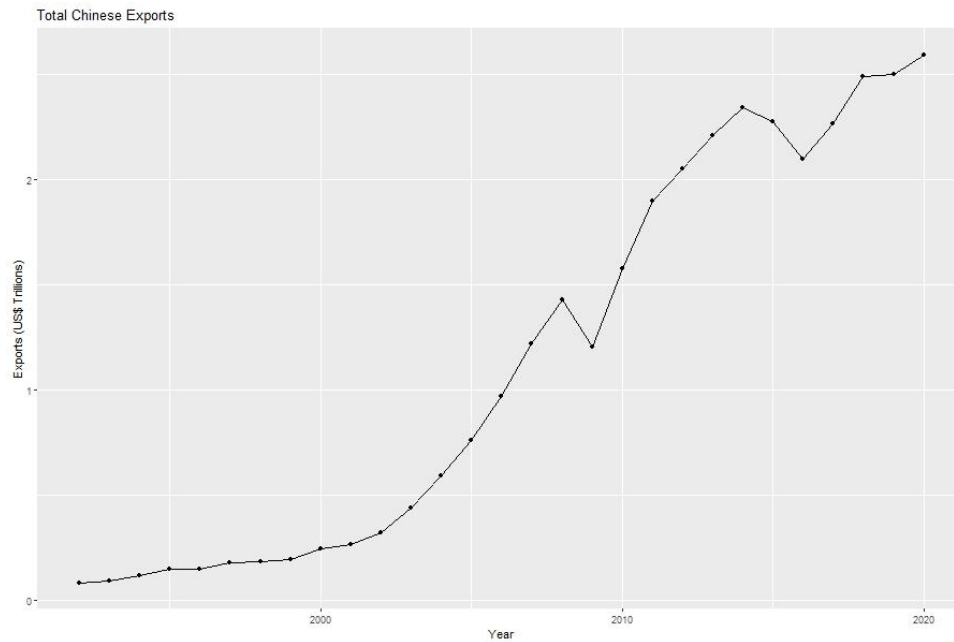


Figure 10: Foreign Trade Exports by China 1992-2020, Total, in trillions of US dollars

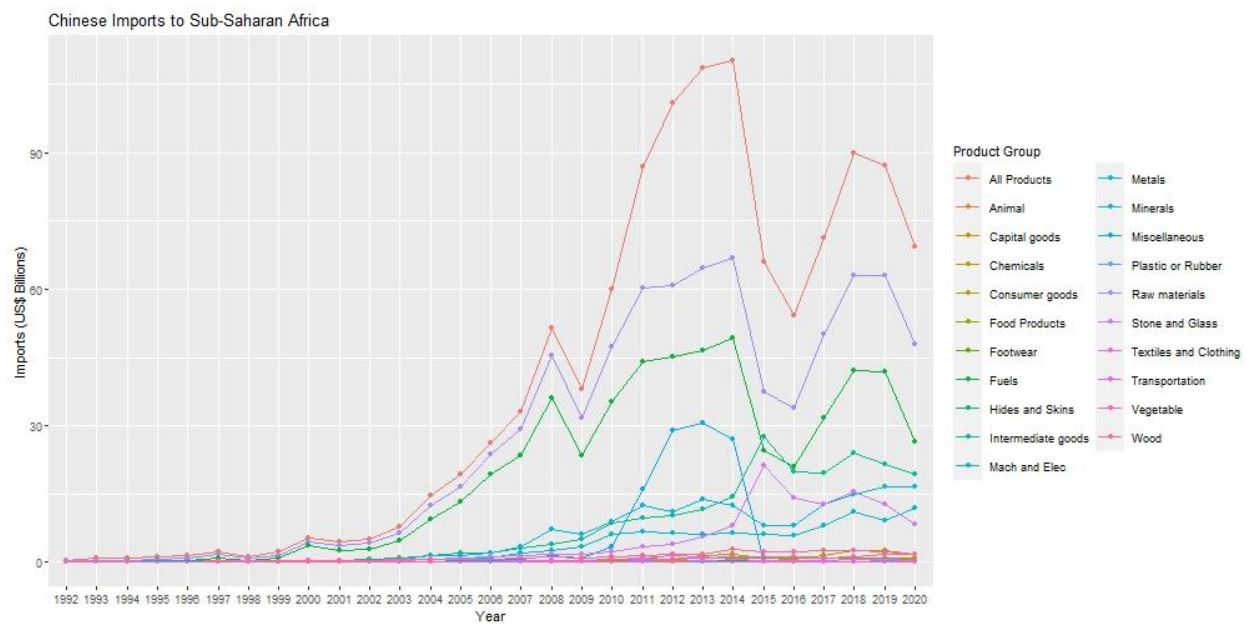


Figure 11: Imports by China from Sub-Saharan Africa 1992-2020, Total, in billions of US dollars

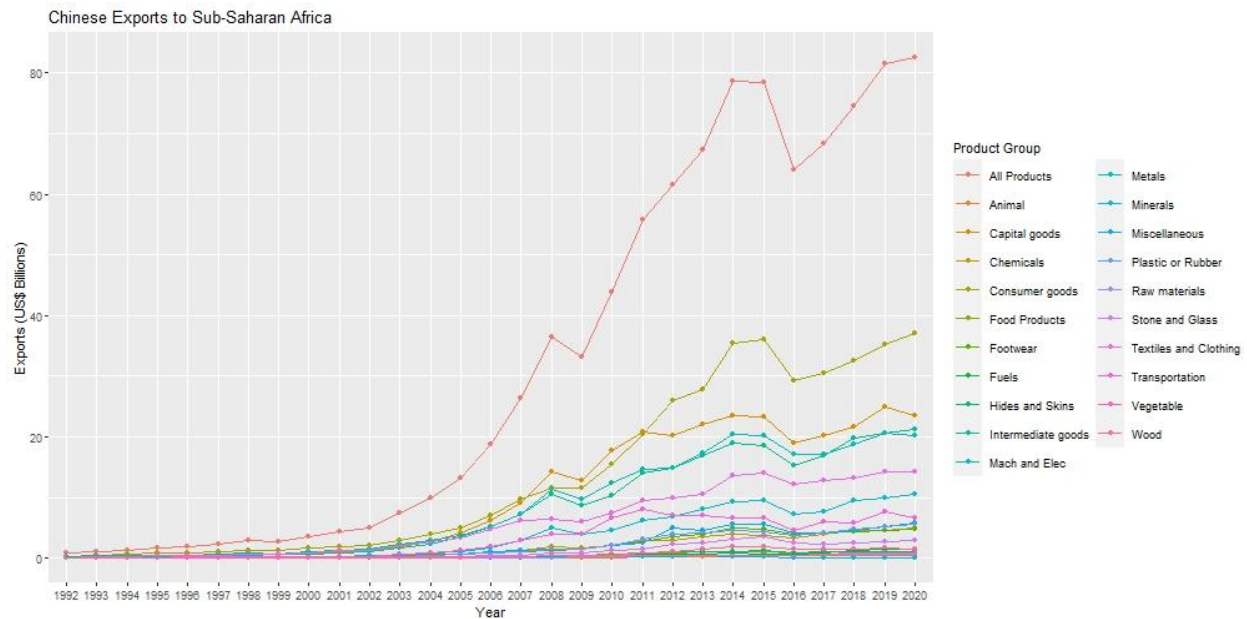
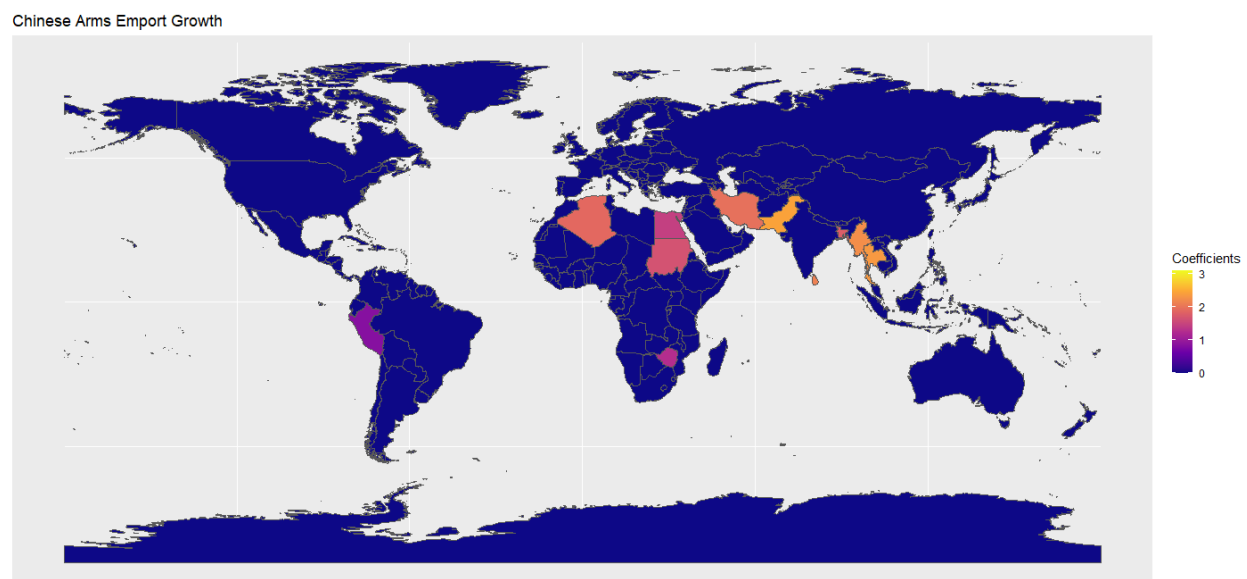


Figure 12: Exports from China to Sub-Saharan Africa 1992-2020, Total, in billions of US dollars

We gathered that China has imported numerous goods from these regions over a span of 30 years, ranging from animal products to wood, but mostly raw materials (Figure 11). Chinese imports from other areas have seen a dramatic shift in 30 years as their imports in 2020 are more than ten times higher than in 1992. We see a similar trend with Chinese exports where 2020 exports are higher than 1992 exports more than tenfold. These trends support how much influence China has over these regions. The more China exports, the more other countries rely on



its resources, implying that China's influence on other countries has expanded over time due to their dominance in the world trade industry. The same can be said for Chinese imports. Chinese imports roughly equals their exports, showing that China's influence has grown to the point where it is able to take as much as it gives out. It should also be noted that Chinese exports were ahead of their import total for a long time, which can be attributed to a rapidly developing nation using its massive population to produce exports. Its increased soft power as a result shows in its eventual symbiotic reliance on imports as well.

GDP

The GDP of nations in 2020 was sharply skewed (Figure 13). Most countries had a relatively small economy (half had a GDP less than \$25 billion), but there were a handful of very rich countries (well into the trillions). Many of the poorer countries lay in Africa (Figure 14), which means that China could devote smaller amounts of money here and still make a significant impact.

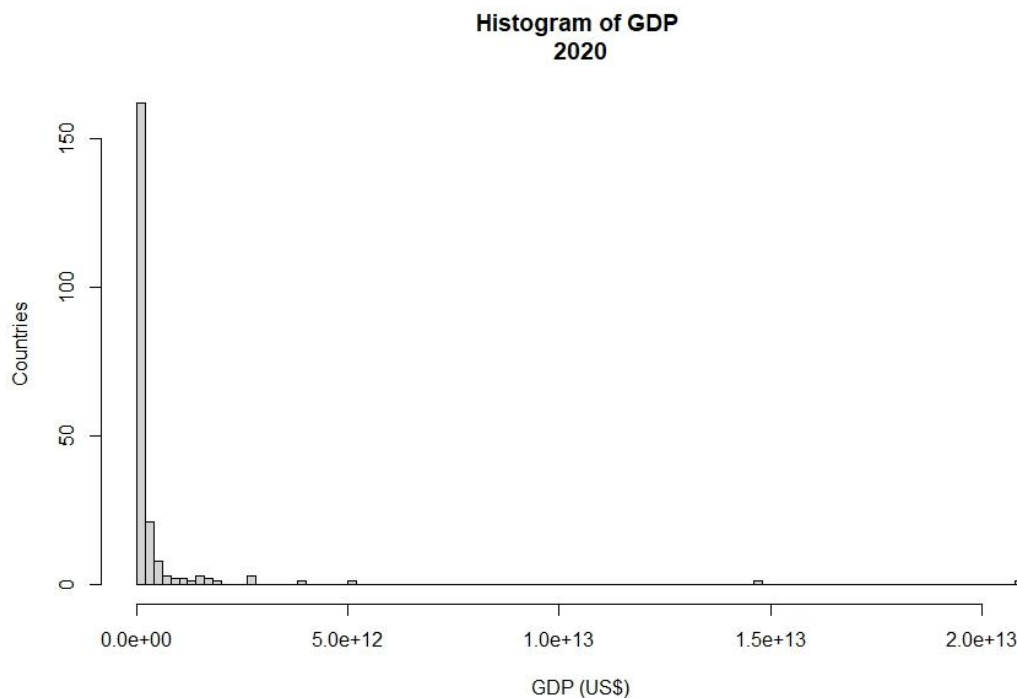


Figure 13: GDP Histogram

GDP Across the World

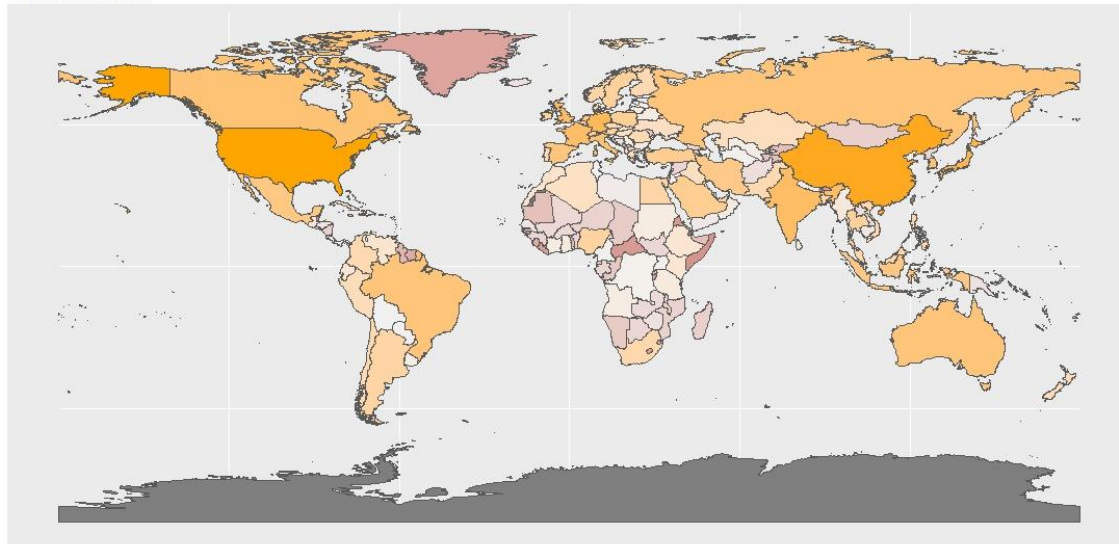


Figure 14: GDP Worldwide by Country

Resources

For most nations, natural resources account for a small proportion of their economy (Figure 15). In fact, for 84% of all countries, natural resources rents make up less than 10% of the GDP. However, there are also a few countries that are heavily dependent on natural resources, and many of these are in Africa and the Middle East (Figure 16).

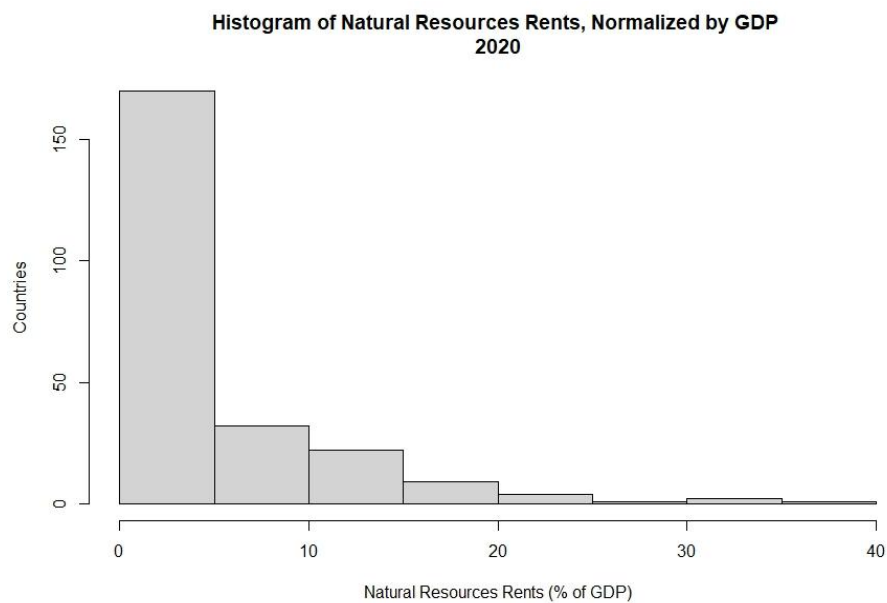


Figure 15: Natural Resources Rents Frequency by Country

Share of Economy Natural Resources Accounts for Across the World

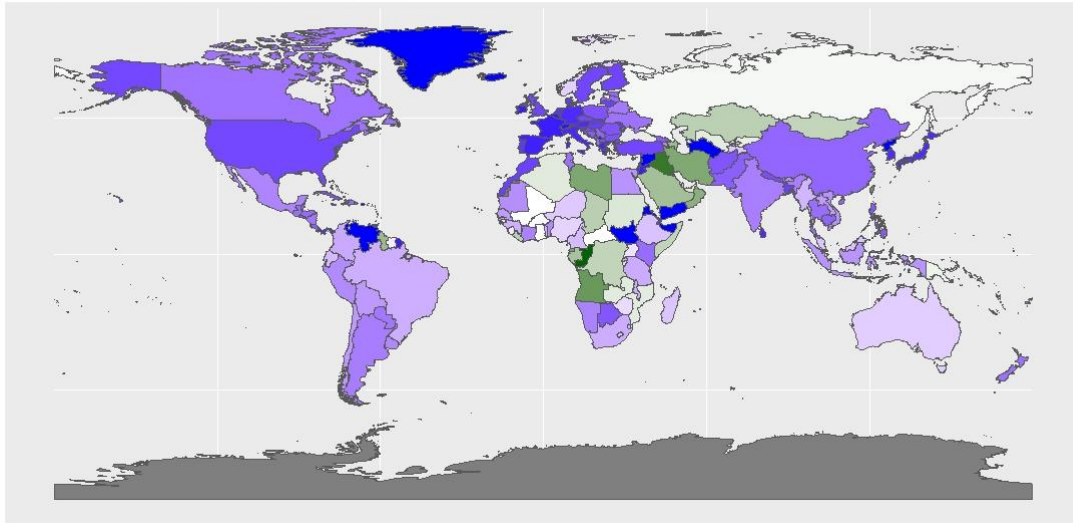


Figure 16: Natural Resources Rents Worldwide

Results and Findings

Of the four model types, the random forest yielded the lowest RMSE during cross-validation for both the economic and diplomatic model (Figures 17 and 18). Thus, the random forest model was used to predict future expansion using the data available for 2020.

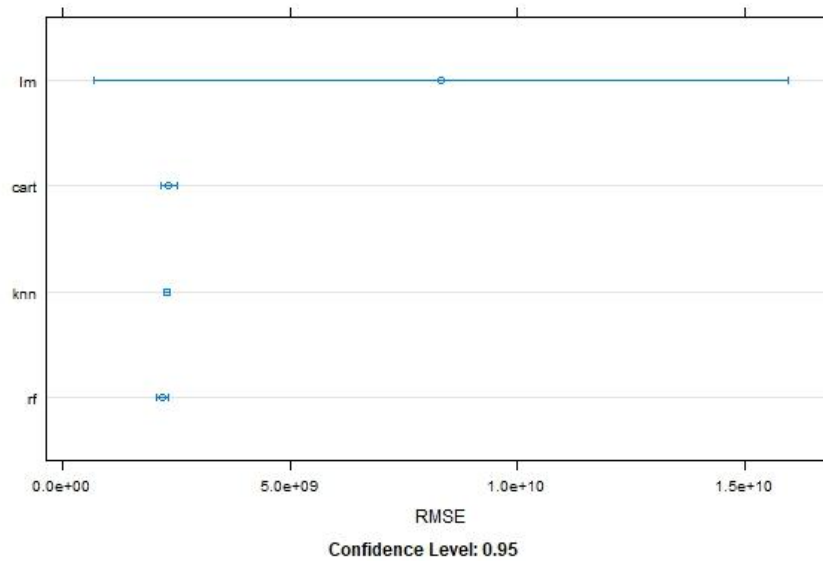


Figure 17: Cross-Validation RMSE for Economic Models

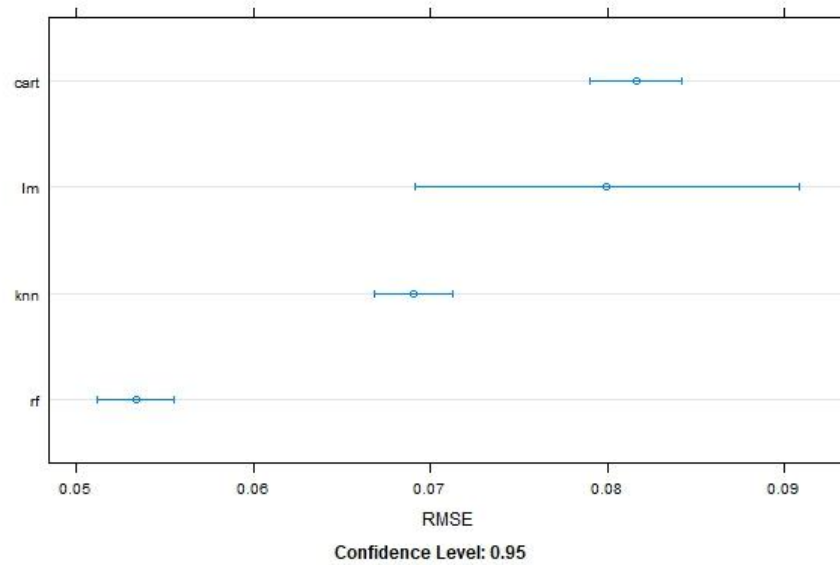


Figure 18: Cross-Validation RMSE for Diplomatic Models

The economic model predicts that the most foreign direct investment would be targeted at the United States (\$14 billion), the United Kingdom (\$8.6 billion), Australia (\$7.1 billion), Nigeria (\$6.9 billion), and Canada (\$5.4 billion) (Figure 19).

Predicted FDI Expansion, US\$

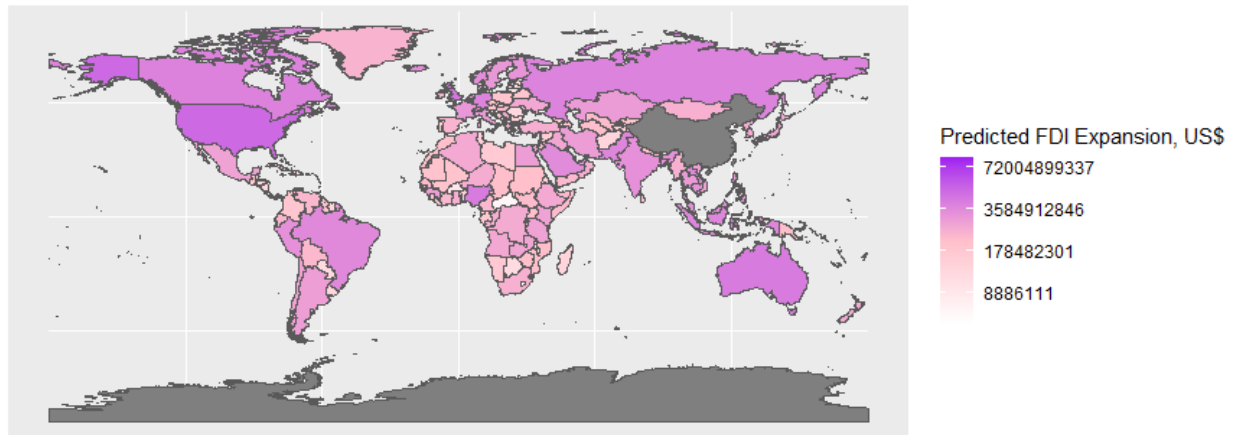


Figure 19: Predicted FDI Expansion Worldwide by US dollars

However, after normalization using a country's GDP, we found that Nauru (1.9 times its GDP), Marshall Islands (1.0), Kiribati (0.57), Palau (0.42), and Somalia (0.26) were the biggest targets relative to economic size (Figure 20).

Predicted FDI Expansion, Normalized by GDP

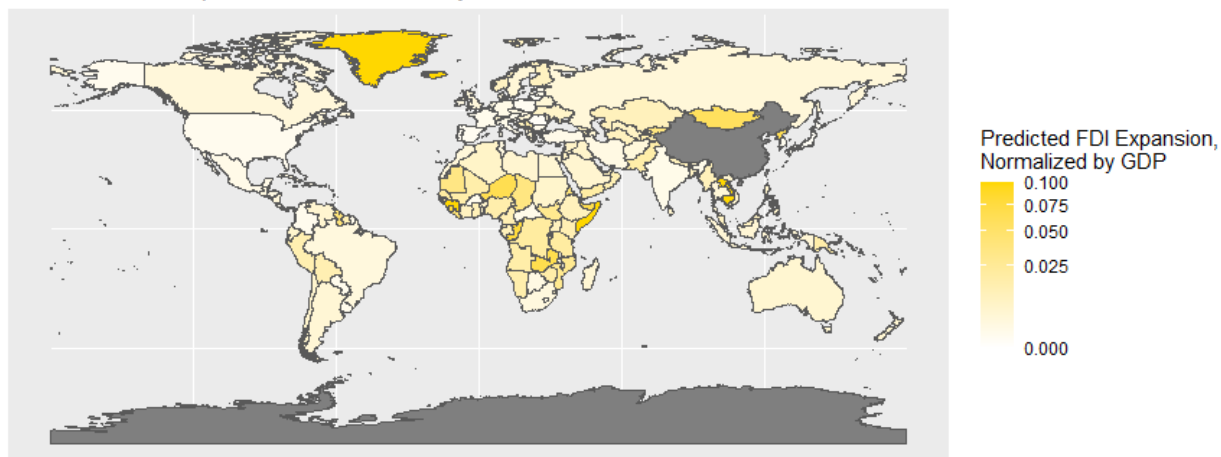


Figure 20: Predicted FDI Expansion Worldwide Divided by GDP

Outside of Oceania, we can also see significant hotspots in Greenland and Africa, and some emerging in the Middle East, Southeast Asia, and South America.

For the diplomatic model, we found that the countries most likely to agree with China at the United Nations in the future are Laos, Sudan, North Korea, Niger, and the Democratic Republic of the Congo (all agreeing 94%-95% of the time) (Figure 21). These are strong candidates for nations where China expands diplomatically. On the other hand, the biggest predicted detractors are Israel (28% agreement), the US (31%), Canada (46%), the UK (58%), and Australia (59%). Across the board, Africa, the Middle East, South America, and Asia are predicted to agree with China consistently.

Predicted UN Agreement with China

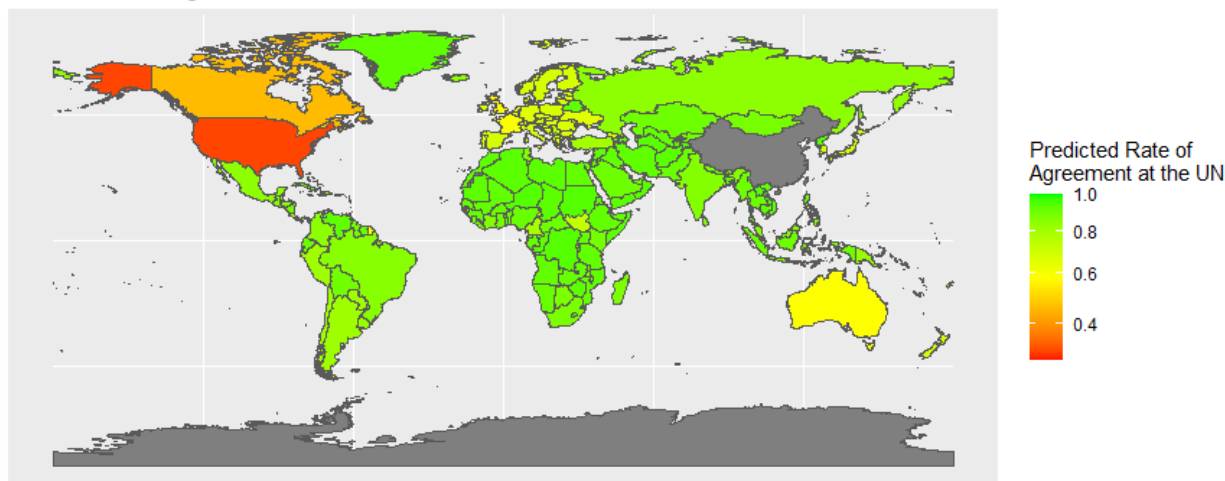


Figure 21: Agreement Rate with the UN by Country

Validity and Assumptions

There are several assumptions we have made that could affect the validity of our paper. In one example, data sources may not be a perfect measurement of the desired variable. Specifically, the measurement for corruption originally consisted of two components: HDI and government transparency. The data on government transparency was taken from the 2021 Transparency International Corruption Perception Index. The data assigned a score to each country, on a scale of 1 to 100, which determined the corruption level of each country (100 represented the least amount of corruption, while 1 represented the most amount of corruption).

The data was modeled using six networks which compared countries in different regions: the Americas, Asia, Africa, Europe, the Middle East, and Oceania. The mindset behind using networks was that the network would group similarly scored countries together. This would aid the prediction model by showing which nations were most related and using that to anticipate expansion from one country to another. Unfortunately, this presented errors as specious links between countries were created. Furthermore, the data was not an accurate fit for the network model as it did not clearly show relationships between China and other countries. For these reasons, the HDI measurement provided a much more robust outcome for how corruption impacts Chinese soft power expansion.

Data also may be missing, manipulated, or inaccurate due to the sensitive nature of some variables. Throughout our research, we also examined arms trade deals, financial diplomacy, and intergovernmental organization participation (Appendix A), but the rate of missing data was so high that these variables were deemed unusable for machine learning; interpolation was not possible with the sparsity of data. Some data may also be hard to acquire as it would require security protocols to obtain (such as information on arms deals). Additionally, much data comes from the Chinese government or state media, and they may have an incentive to publish statistics

rosier than reality. Lastly is time dependency and time lag. While we were able to control for time fixed-effects by introducing time as a categorical variable, our model would be unable to predict what fixed-effects the future would have. We also make the critical assumption that trends would still continue into the future, and extrapolation is always risky since there is no guarantee that patterns will hold constant. The diplomatic metric is also subject to time issues since diplomatic changes are likely slower moving. Growth in soft power may not reflect immediately in diplomatic closeness, meaning our model may be picking up diplomatic effects from a few years prior.

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Appendix A: Other Examined Variables

Arms Trade Deals

We also perceived a standout trade in the form of arms between China's imports and exports. China imports numerous arms from Western countries in Europe, and then we notice they trade these arms to more poor countries in sub-saharan Africa. The pattern in arms implies that China is attempting to expand their outreach to these third world regions due to being able to provide goods that these regions would have difficulty obtaining from elsewhere or produce on their own. Thus, the continuing trade of arms will allow China to gain more influence from smaller countries due to their willingness to export arms and painting China's perception as a reliable source of goods and a reliable ally. The arms trade also displays China's influence as China is one of the only countries willing to export arms, which would lead to more third world countries to call on China for help.

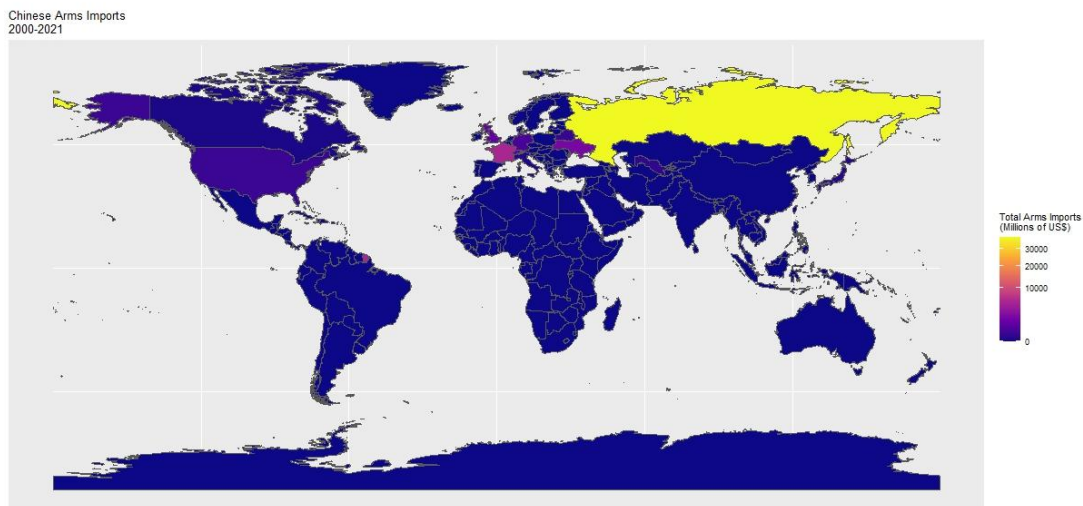


Figure 22: Chinese Arms Imports by Country

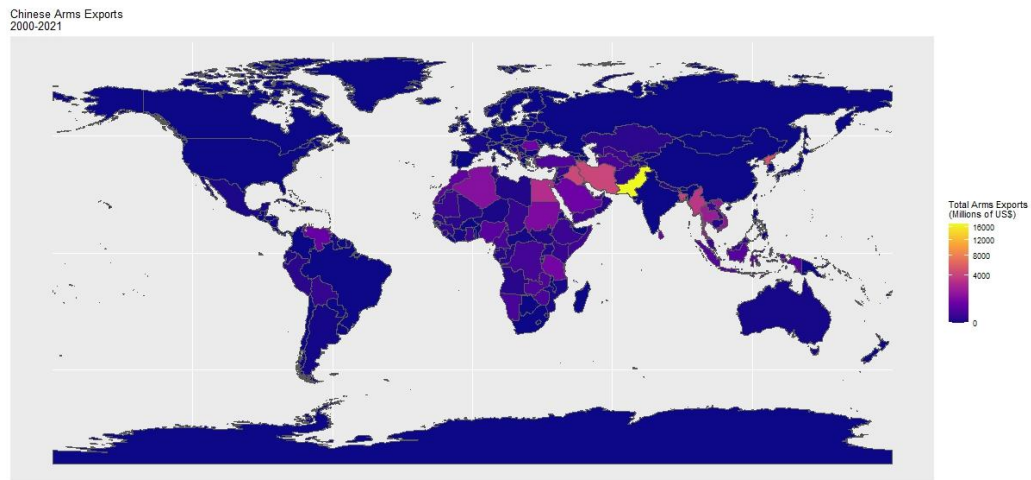


Figure 23: Chinese Arms Exports by Country

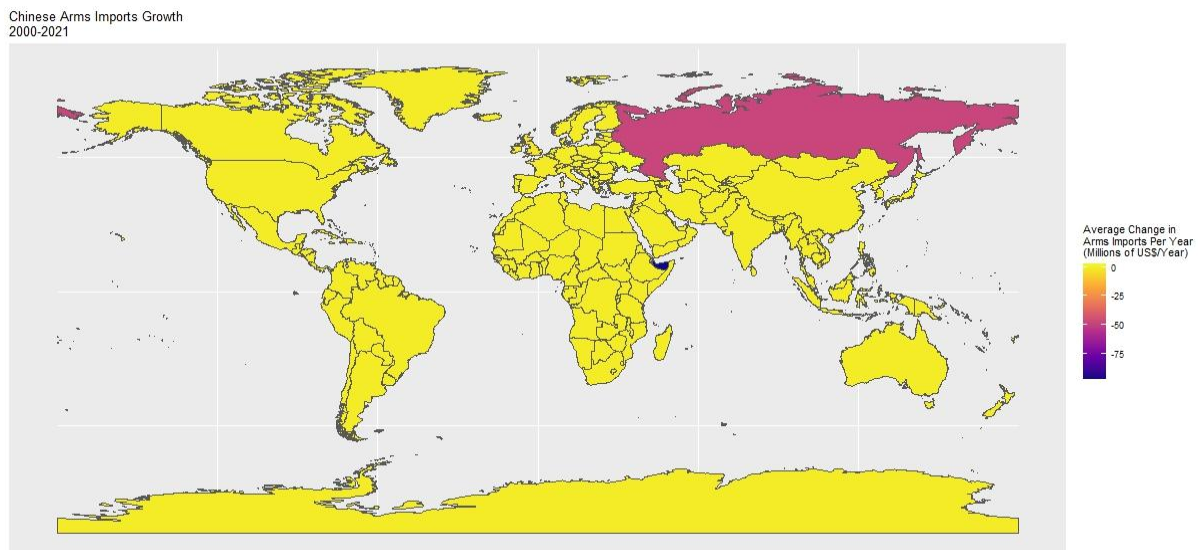


Figure 24: Average Change in Chinese Arms Imports Per Year

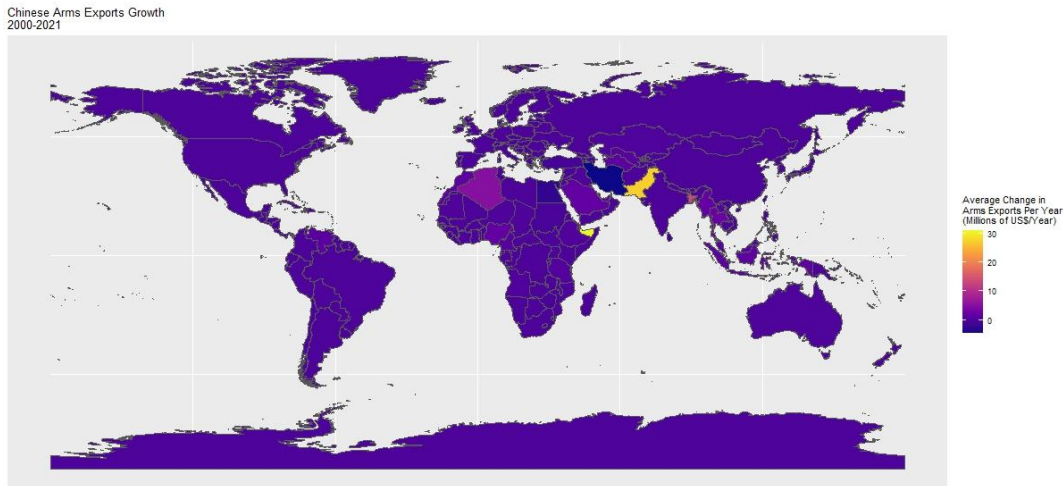


Figure 25: Average Change in Chinese Arms Exports Per Year

Financial Diplomacy

Based on the analysis of China's activity of financial diplomacy, defined as China utilizing financial tools such as loans, grants, etc. as a form of diplomacy, China has been focusing primarily in Africa followed by Asia (Figure 26). China's top 10 countries that got the most financial engagement are as follows; Angola is first followed by Cambodia, Myanmar, Sudan, Pakistan, Indonesia, DR Congo, Laos, Ethiopia, and lastly Tanzania. The most frequent form of financial engagement was found to primarily be grants followed by loans (Figure 27). It was also found that the most heavily invested sectors by China were as follows; Education first followed by Health, Government & Civil Society, Transport and Storage, Energy, Emergency Response, and more. Lastly, after analyzing the intent behind the investment, we found that development was overwhelmingly the purpose of these investments (Figure 28). So based on these findings, we can see that China is utilizing primarily grants and loans as their financial tool in diplomacy for other countries, focusing primarily on Education as their sector for investment in Africa and Asia for primarily development.

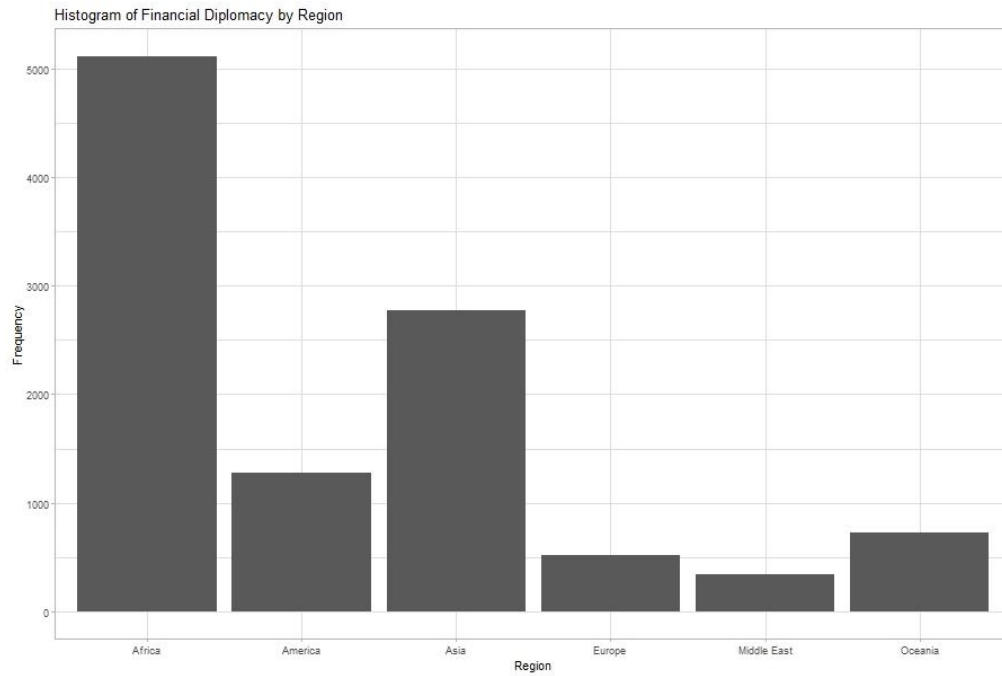


Figure 26: Financial Diplomacy Frequency by Continent

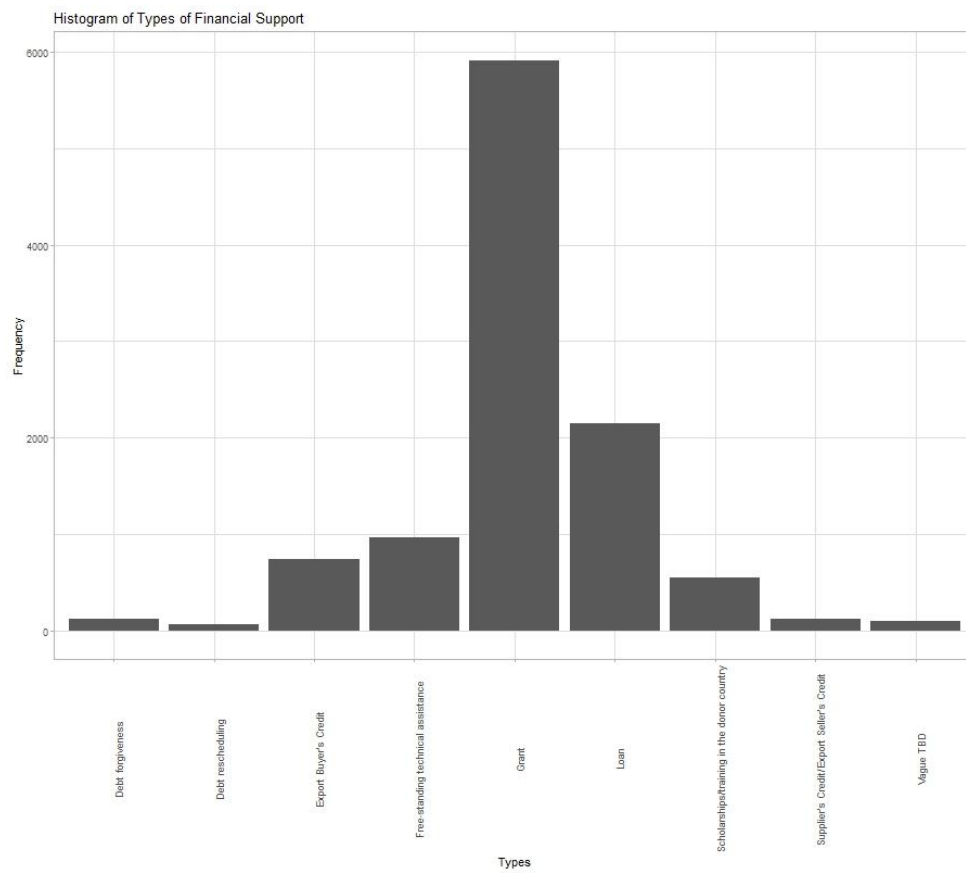


Figure 27: Financial Support Frequency by Type

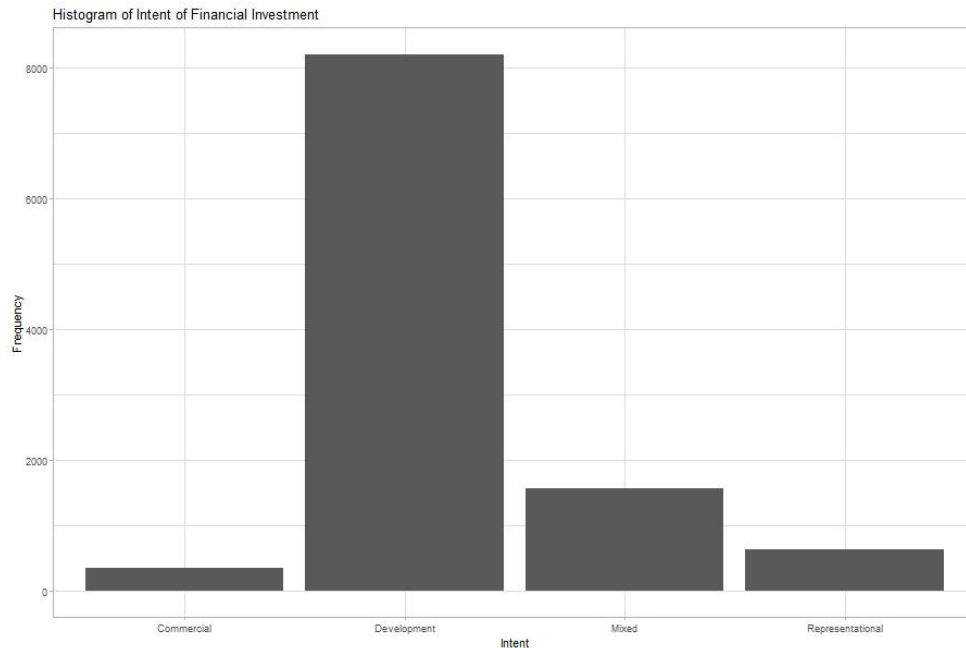


Figure 28: Financial Investment Frequency by Intent

In regards to other forms of diplomacy such as public diplomacy, after cleaning and attempting to analyze the dataset, we found that the public diplomacy dataset had too many missing values in order for it to be useful for analysis with some variables having 97% of their entries as N/A values. As a result, the dataset was not used nor analyzed. However, two other datasets regarding Confucius Institutes and the world's perception of China but it should be noted that these two datasets weren't as large as the financial one to get an in depth analysis, so the analysis isn't as deep. On average, about 72.93% of world leaders from low to middle income countries say that China is quite influential or very influential in directing domestic policy. For the institutes, the majority of them are located in Europe followed by the Western Hemisphere region however no data on where new institutes are being developed. In summary, because of the data limitations of China's actions in regards to public diplomacy along with the smaller size of the data of global perceptions of China and Confucius Institutes, our analysis on those aspects are limited at best. Even though the financial data was a lot more comprehensive than the others, there were still limitations on how much and what kind of analysis could be done. On a final

note, the data has been sourced from Aiddata who focused on trying to quantify China's public diplomacy tools and activities spanning between the years 1999 to 2021.

Intergovernmental Organization Participation

IGO participation represents international cooperation. The data comes from Correlates of War and tracks alignment across all countries for over 450 international organizations. Again, Africa and South America were our emphasized units of analysis. Correlates of War provides a dyadic data set in which every country's participation is compared. We narrowed the data to only China, Africa and South American intersections, added 1 for every instance of mutual participation and normalized the data to be between 0 and 1.

Intergovernmental organization alignment appears more stable and insulated from intervening global events. There is little change in our alignment between two countries year over year. In South America, China participates in the most IGOs with Brazil, Argentina, Chile and Colombia (Figure 29). In Africa, China participates in the most IGOs with Eritrea, Eswatini, Mauritania, Uganda, and Côte d'Ivoire (Figure 30). In South America, these countries are fairly developed and more globalized than other countries in the same region. This might account for their engagement with China and presents limitations with our use of IGO participation as a predictor of soft power expansion.

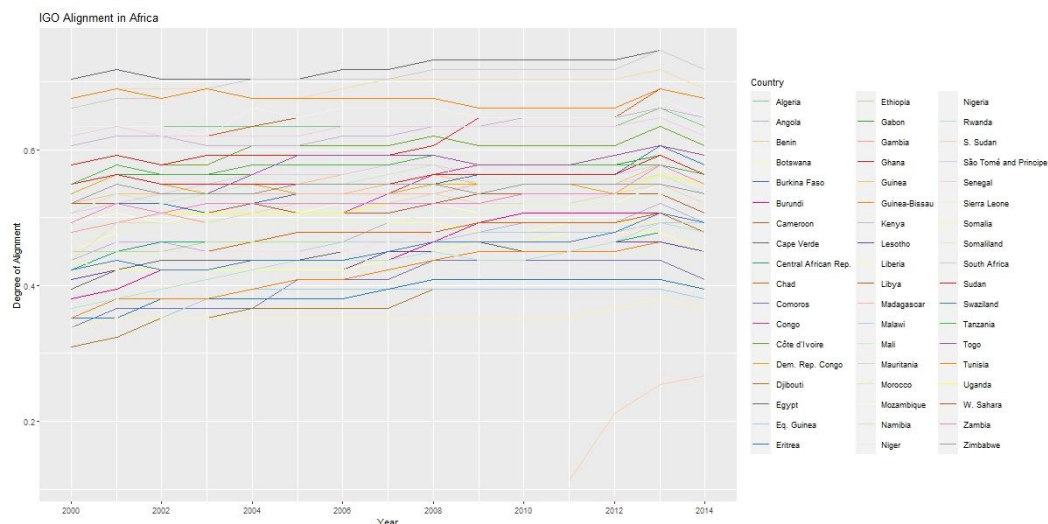


Figure 29: IGO Alignment Degree in Africa by Country

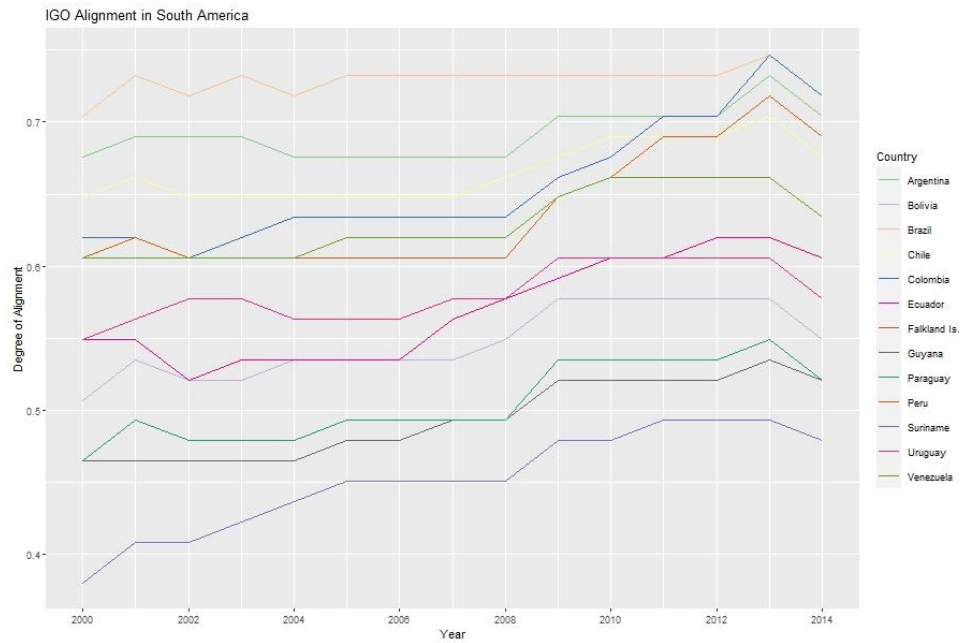


Figure 30: IGO Alignment Degree in South America by Country

Appendix B: R Code

See the attached HTML file produced by RMarkdown.