Exploratory Questions Report

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IDS 701 - Solving Problems with Data Science

I. Executive Summary

Our stakeholder has a global business that produces currency exposure across the globe and is interested in understanding whether Trump's comments on foreign policy will impact the foreign exchange market. Additionally, they seek insights on which countries to prioritize for analysis.

Trump's previous reign in politics led to a time of unpredictability and turmoil not only in America but also on the global scale. During his first term we saw. Firstly, the S&P 500 index experienced a notable increase of nearly 68% due to his tax reforms and deregulation efforts [1]. Secondly, the administration's imposition on tariffs particularly on Chinese goods led to increased market volatility [2]. Lastly, Trump's trade policies influenced currency valuation with the US dollar experiencing fluctuations in response to tariff announcements, trade negotiations and more thereby directly impacting forex trading strategies[3]. Based on this information our client wishes to understand if they can gauge possible impact on foreign exchange markets through announcement made by the President through his platform on X (i.e. Twitter).

To address our stakeholder's request, we first developed a strong foundation of domain knowledge in forex markets and currency fluctuations. Rather than immediately analyzing former President Donald Trump's tweets, we began by identifying which countries' currencies were most relevant for our study. Our initial analysis led us to focus on the most heavily traded currencies, which we categorized into two subgroups: developed and developing economies (see Appendix 1.1).

We then examined the impact of various Trump era's foreign policy categories on these currency groups, identifying potential trends and indicators that could enhance our analysis. This revealed distinct impacts on currency market volatility across developed and developing markets, with the latter demonstrating heightened sensitivity, particularly to sanctions-related statements which generated an 8.56% positive impact versus a 3.39% decline in developed markets. Once our target currencies were established, we built a model to systematically analyze all of Trump's tweets from January 1, 2015, to December 31, 2020. Each tweet was categorized based on key foreign policy themes, such as war, tariffs, human rights and more.

By aggregating this data across multiple dimensions utilizing an LLM, we aimed to identify any direct correlations between Trump's statements on X (formerly Twitter) and currency fluctuations at those moments. We noticed that while the Mexican Peso and Canadian

Dollar showed strong reactions due to their economic ties with the U.S, the Swiss Franc remained stable throughout various foreign policy announcements with limited fluctuation making it a possible safe haven. However, the relatively modest magnitude of these currency fluctuations suggests that the stakeholder should consider these policy announcements as complementary signals alongside fundamental macroeconomic indicators rather than primary trading triggers.

II. Context

The global currency market operates in an environment where political statements can create significant market movements. President Donald Trump's approach to foreign policy, characterized by unpredictability and apparent volatility, draws comparisons to the Nixon-Kissinger era's "madman theory" of international relations and wields significant influence over global markets. This exploratory report addresses this critical knowledge gap by analyzing how these statements affect the top developing and developed countries currencies by trade volume, providing global traders with clear insights into this relationship. Without a clear understanding of how Trump's foreign policy statements influence market volatility, traders are potentially exposed to unnecessary risk and missed opportunities. These insights are crucial for currency traders who navigate market fluctuation driven by political communication and adjust their strategy accordingly ensuring informed risk management. For our analysis we used a kaggle competition dataset (developed using the Twitter API)[4] to examine Trump's tweets from 2015 to 2020, complemented by currency market data that we fetched from yahoo finance (i.e. y finance)[5] & Investing.com[8]. Ultimately, our analysis aims to systemic approach to understand how political rhetoric translates into foreign exchange markets.

III. Strategy

Our analysis explores the complex relationship between Trump's foreign policy announcements and currency market price fluctuations through three interconnected lenses. First, we examine how these announcements differently impact developed versus emerging markets, recognizing that these markets often show varying levels of resilience and sensitivity to external political factors. Second, by evaluating what determines a currency's inclusion in the top developing/developed countries' currencies by trade volume and exploring how domestic political policies influence global trading status, we can better contextualize observed volatility patterns within broader market dynamics. Third, we analyze whether different categories of Trump's foreign policy announcements - from trade and foreign aid to military policy - trigger varying levels of market response, potentially revealing patterns that could help traders anticipate future market reactions. Throughout our investigation, we focus on identifying measurable relationships between these policy

statements and subsequent market movements, considering all historical, immediate, and delayed effects across different currency markets.

IV. Results

Illustrated in Figure 1.1, the analysis of Trump's foreign policy announcements between 2015 and 2020 reveals a clear pattern of differential market impacts in the form of currency movements over a 3-day window. Developing markets consistently showed stronger reactions to policy announcements compared to developed markets. The most striking divergence appears in sanctions related announcements, where developing markets experienced an average positive impact of 8.56% while developed markets saw a negative impact of 3.39%. The differences in impact demonstrate that Trump's foreign policy actions had an asymmetric impact on global markets, with developing markets showing both higher sensitivity and generally more positive responses to policy announcements. The market behavior pattern is valuable context for stakeholders who need to anticipate market movements and manage exposure across different market types during periods of significant foreign policy activity.

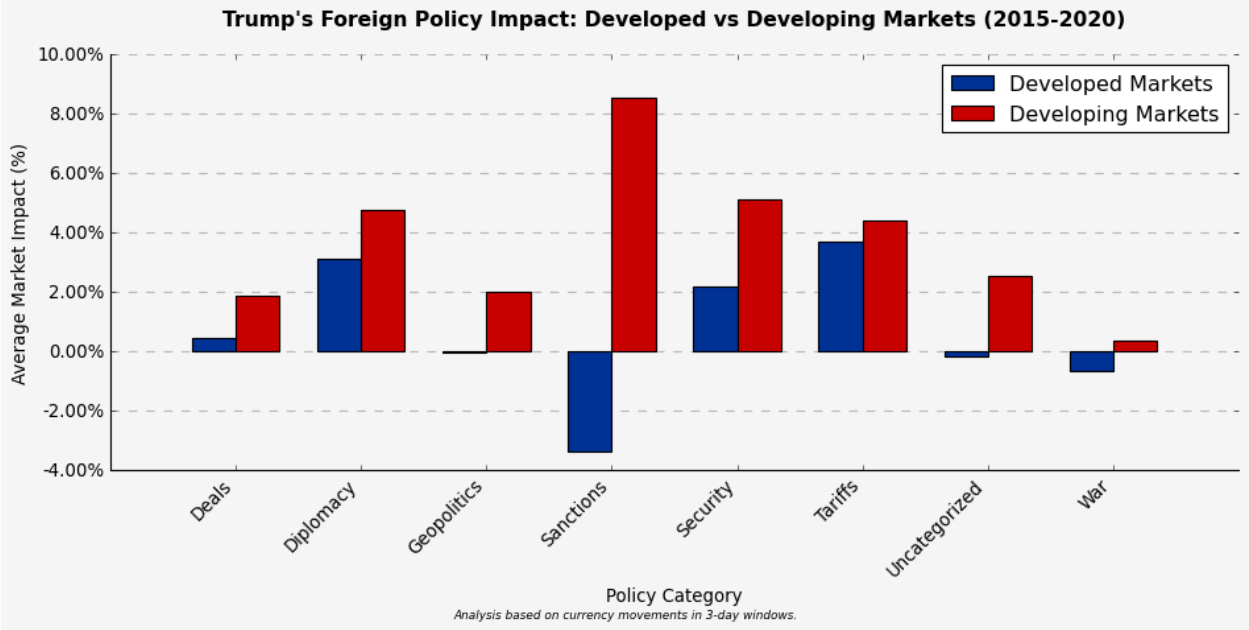

Figure 1.1: Trump's Foreign Policy Tweets' Effect on Developed & Developing Economies

Further analysis explored the determinants of currency trading status and the interplay between domestic policies and global trading positions. The findings revealed distinct patterns among different currencies, with trade relationships and economic dependencies playing crucial roles in their sensitivity to U.S. policy announcements. When selecting currencies for this analysis we also sought to obtain enough representation so that both emerging markets and developed economy currencies could be incorporated.

The Mexican Peso demonstrated particularly strong responses to announcements regarding deals, tariffs, and sanctions, underscoring Mexico's deep economic integration with the United States. Similarly, the Canadian Dollar exhibited heightened sensitivity to these categories, with notably strong reactions to energy policy and tariff announcements. This pattern reflects Canada's significant energy export relationship with the U.S. and its broader trade dependencies. Notably, the Chinese Yuan was excluded from the list of developed countries as the price is set by the People's Bank China (PBOC) on a daily basis. Additionally, volatility is damped since it has strict capital controls and the currency cannot have a price move of more than 2% [6].

The Singapore Dollar (SGD) and Hong Kong Dollar (HKD) serve as good indicators of the health of the Chinese currency given the tight, but economically independent relationship of these economies to China. Yet the HKD currency is much less sensitive in general than both - currencies in emerging markets and currencies in developed economies (Appendix Figure 1.4|1.5). To complement our emerging market representation, we also sought to include the Brazilian Real (BRL) and the South African Rand (ZAR). Both exhibit a close relationship to the Mexican Peso in terms of showing their increased volatility (Appendix Figure 1.5) and high sensitivity to commodity prices - which is a topic often referenced on political tweets in conjunction with sanctions, geopolitics, and tariffs.

The Japanese Yen emerged as a unique case, showing consistently higher volatility across multiple announcement categories. This pattern aligns with the Yen's established role as a safe-haven currency during periods of global uncertainty. We also sought to include other stable currencies such as the Swiss Franc (CHF), and the Euro (EUR). The first is because of its historical tendency of stability amid geopolitical stability (Appendix Figure 1. | 1.6) [7], the latter because of its trading volume (Figure 1.2) and ability to associate the dollar to some of the world's key developed economies in the European Union.

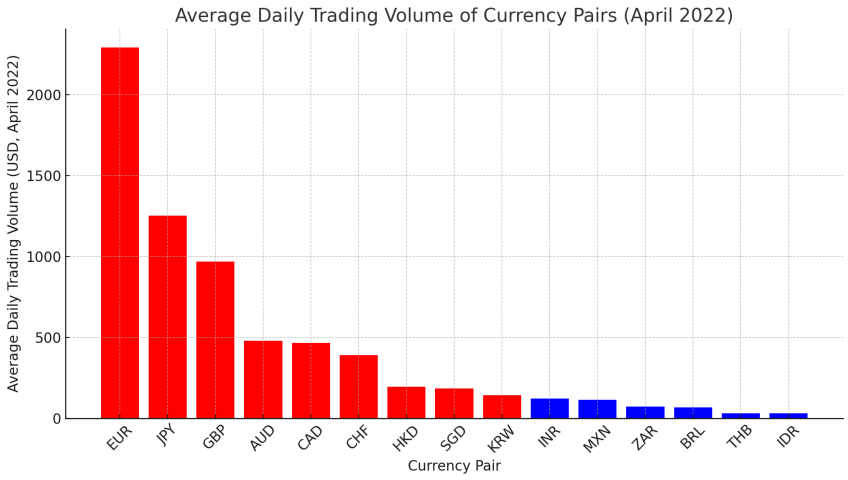

Figure 1.2: Average Trading Volume between USD and Global Currencies

In Figure 1.2, we can see the overall trade volume in USD for the currencies that are in the scope of our analysis. These currencies are most traded in their respective buckets of developed/developing countries and have a lot of liquidity on the FX marketplace, with the Indonesian Rupiah being the least traded with only $29 billion daily volume (1.1 Appendix)

To understand if there exists any direct relation among Trumps statements and currency fluctuation we decided to focus on his tweets posted on X where he tends to disclose his thoughts on foreign policy and his actions for or against developed and developing countries. We wanted to analyze if his tweets around a specific country had any direct impact on the forex exchange between the two. For this, we first gathered all his tweets during his first reign of the presidency from the start of campaigning i.e. 1st Jan 2015 to the end i.e. 31st of Dec 2020.

After cleaning our data as explained in the appendix section 1.2 below, we narrowed down foreign policy topics to 9 sub-categories such as war, tariffs, human rights, and more. Analysis of distinct foreign policy announcement categories revealed varying degrees of impact on foreign exchange markets as seen in graph 1.4.

Announcements related to deals and sanctions consistently produced the most substantial forex fluctuations across currency pairs, suggesting these policy categories carry broader economic and geopolitical implications that directly influence market behavior. Specifically, fluctuations in USD/BRL were among the highest, with energy-policy movements reaching up to 0.0023 and human-rights movements also peaking at 0.004. Similarly, tariffs had a notable impact, with fluctuations reaching 0.0019 in certain currency pairs.

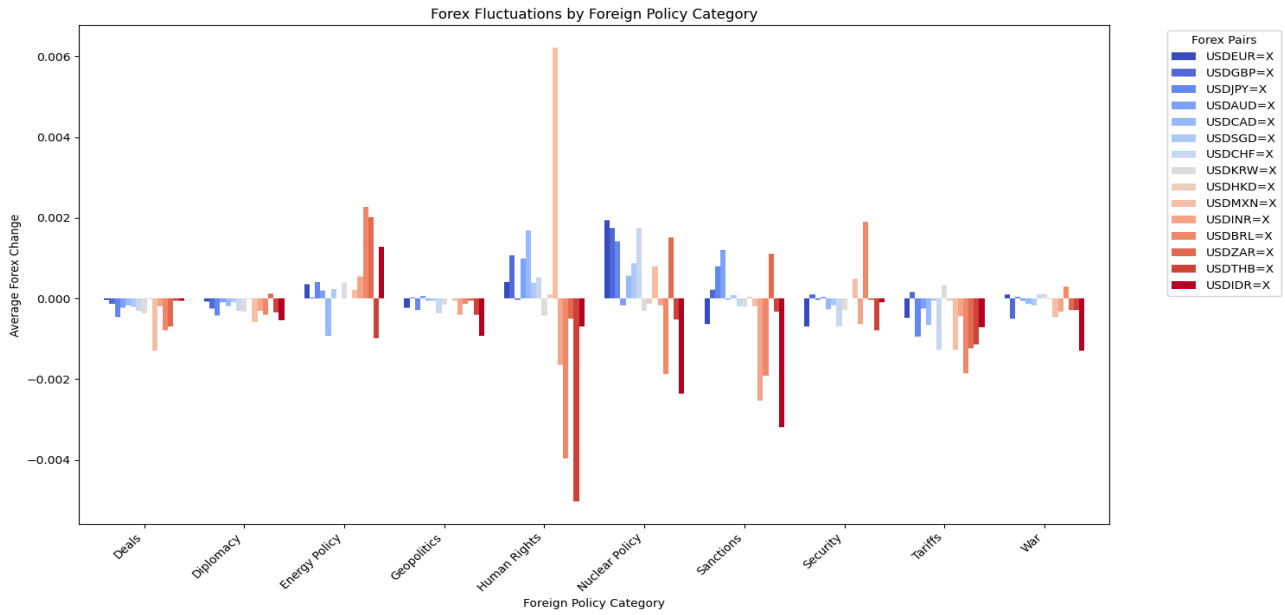

Figure 1.3: Forex Fluctuations by Foreign Policy Category

In contrast, announcements concerning human rights and energy policy demonstrated notably muted effects on currency movements. The limited market response to human rights-related announcements was particularly consistent across all currency pairs, indicating that while these statements may carry significant diplomatic weight, they typically lack immediate economic implications that would drive forex market reactions.

War and security-related announcements exhibited a distinctive pattern, producing moderate but widespread effects across currency pairs. This pattern suggests these announcements primarily influence global risk sentiment rather than creating localized market impacts. This finding aligns with established forex market dynamics, where periods of heightened security concerns typically drive investors toward traditional safe-haven currencies such as the Japanese Yen and Swiss Franc.

For further details on specific forex pairs and categories, refer to the heat map in Appendix 1.5, which visualizes the extent of forex fluctuations across various policy announcements.

Despite these observed fluctuations, the overall magnitude of currency movements remains relatively small, suggesting that these policy announcements—while influential—may not be primary drivers of forex volatility on their own. The limited scale of these shifts implies that other market forces, such as broader macroeconomic trends, interest rate expectations, and investor sentiment, likely play a more significant role in shaping currency dynamics. This raises the possibility that while these announcements contribute to short-term market reactions, they may not be sufficient catalysts for sustained forex trends, particularly when considered in isolation.

V. Conclusion

This report aims to highlight the complex relationship between President Donald Trump's foreign policy announcements from 2015-2020 and its impact on foreign exchange markets. His announcements generated volatile market responses, with emerging markets demonstrating notably higher sensitivity compared to developed markets. This divergence was most pronounced in sanctions-related announcements, where developing markets showed positive swings while developed markets displayed negative swings, highlighting the differential influence of U.S. foreign policy across global market categories. Our explanatory analysis indicates that while the Presidents statements did generate a short term fluctuation in the currency these movements were of extremely small values. The most significant impacts were observed in developing markets where currencies like Mexican Pesos and Brazilian Real showed high sensitivity towards human rights and tariffs announcements. It is worth highlighting these two currencies are historically volatile, and

further analysis is necessary to evaluate: 1. The proportion of volatility attributed to news announcement & tweets relative to 2. The elevated volatility these currencies experience on average.

Our finding suggested that while Trump's foreign policy rhetoric did influence forex markets one should consider these as complementary signals rather than primary drivers for their trading strategies. The tweets put out by the President may be impactful in the short run but seem to be overshadowed by other macroeconomic factors across the spectrum such as interest rates and geography-specific economic & fiscal policies. As such, similar to any fundamental analysis, these political signals should be considered alongside other factors and integrated with robust quantitative analysis to develop a well-rounded strategy that accounts for multiple levers influencing market dynamics.

VI. Appendix

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Appendix 1.1 Developed vs Developing Currency Trading Volume

The two tables below lay out the net-net basis (removal of duplicate trades) of the average daily trading volume of the most traded developed and developing countries' currencies in the FX market. The left column is the abbreviated currency ticker symbol, and the right column is the average daily trading volume from April 2022.

Developing Countries	
Currency Pair	**Average Daily Trading Volume (April 2022)**
MXN	**$114.1 billion**
INR	**$122.0 billion**
BRL	**$66 billion**
ZAR	**$73 billion**
THB	**$31 billion**
IDR	**$29 billion**

Developed Countries	
Currency Pair	**Average Daily Trading Volume (USD, April 2022)**
EUR	**$2,293 billion**
JPY	**$1,253 billion**
GBP	**$969 billion**
AUD	**$479 billion**
CAD	**$466 billion**
CHF	**$390 billion**
HKD	**$194 billion**
SGD	**$183 billion**
KRW	**$142 billion**

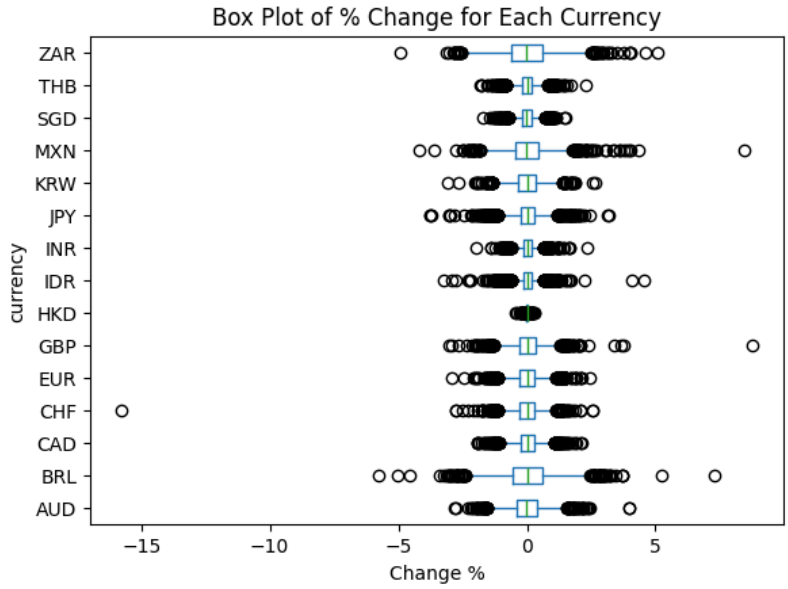

Figure 1.4 - Box Plot for Currency % Change with upper and bottom quartile

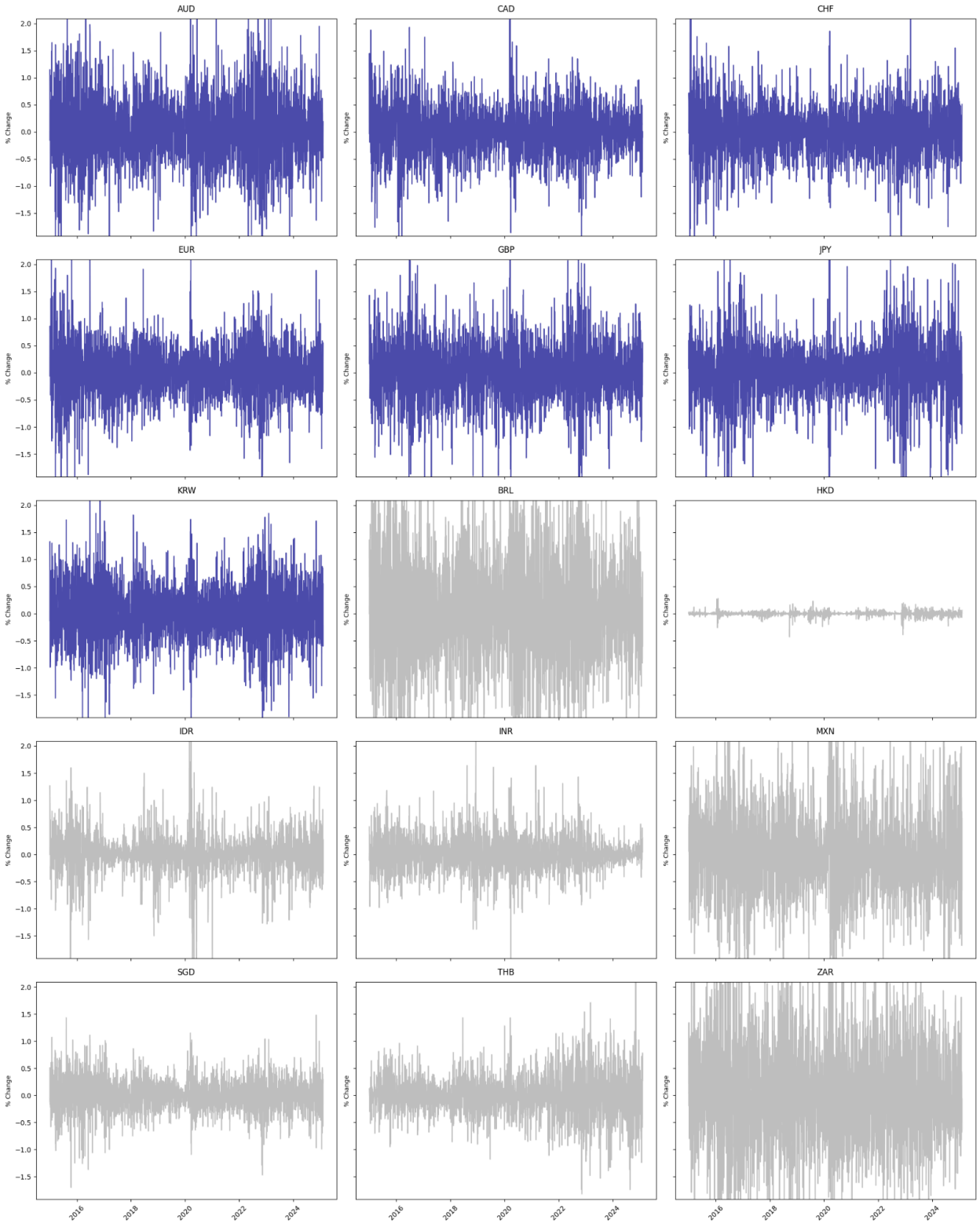

Figure 1.5 - Currency Fluctuation for Developed Market Currencies (Blue) vs Emerging Market Currencies (Grey)

In Figure 1.4, the box plots are computed to obtain a better understanding of how currencies fluctuate on average. In Figure 1.5, we see that the Brazilian Real(BRL), the Mexican Peso (MXN), and the South African Rand (ZAR) exhibit substantially higher volatility than all other currencies under consideration. Note these three currencies pertain to our class of emerging markets. However, not every emerging market currency(marked in grey) follows that pattern. The Indonesian Rupiah(IDR), the Indian Rupee(INR), the Hong Kong Dollar(HKD), the Singapore Dollar (SGD), and the Thai Baht(THB) illustrate that in some emerging economies, currency fluctuation relative to the dollar could be diminished. The degree to which these later currencies fluctuate can, in fact, be lower than the magnitude by which developed economy currencies vary.

currency	mean_change_pct	stddev_change_pct
AUD	0.01199	0.63522
BRL	0.03488	1.02198
CAD	0.00884	0.46089
CHF	-0.00164	0.57741
EUR	0.00722	0.49281
GBP	0.01039	0.59358
HKD	0.00024	0.04157
IDR	0.01134	0.38726
INR	0.01304	0.31242
JPY	0.01053	0.56564
KRW	0.01226	0.53686
MXN	0.01598	0.80892
SGD	0.00131	0.30561
THB	0.00188	0.37740
ZAR	0.02246	0.97665

Figure 1.6 - Mean and Standard Deviation for Each Currency

1.2 Data Cleanse:

We are obtaining our data from Kaggle that covers Trump's tweets along with tweets with his account mentioned from the years 2009 to 2020. We filter our data to focus on tweets made from the 1st of January 2015 till the 31st of December 2020. Once we have found these tweets we focus on those written specifically by the account holder and filter out all the tweets that have just mentioned him. Once we have then dropped any text rows containing NA, we filter out the tweets that have a country mentioned in it by using the 'geonamescache' library and mark them to be possible foreign policy tweets. After this, we created a script that categorizes tweets or text data based on foreign policy topics using

keyword matching, stemming, and Named Entity Recognition (NER). It first defines a dictionary of categories with related keywords, covering topics such as War, Tariffs, Deals, Sanctions, Diplomacy, and Energy Policy. The text is preprocessed by converting it to lowercase, tokenizing words, and applying stemming (reducing words to their root forms) to capture variations (e.g., "sanction" vs. "sanctions"). Using regular expressions (regex), it checks for exact keyword matches, and if a match is found, assigns the corresponding category. If no match is found, the script utilizes Named Entity Recognition (NER) with the "en_core_web_sm" model from spaCy, which detects geopolitical entities, organizations, or events, assigning the category "Geopolitics" if relevant. If neither method finds a match, the text is labeled as "Uncategorized." Finally, this categorization function is applied to the tweet texts, tagging each entry with its identified foreign policy category. Once the categories are allocated, we then filter out our data to remove the uncategorized tweets and compare how each category does across forex volatility, which we have calculated using forex data obtained via the yfinance package available.

Appendix 1.3 Tweet Distribution

This bar plot shows the distribution of foreign policy categories in the dataset of categorized foreign policy tweets from 2014 to 2020. The x-axis represents the different foreign policy categories, ordered by their frequency, and the y-axis represents the count of tweets in each category. The plot provides a visual representation of how many tweets fall into each foreign policy category over the specified date range.

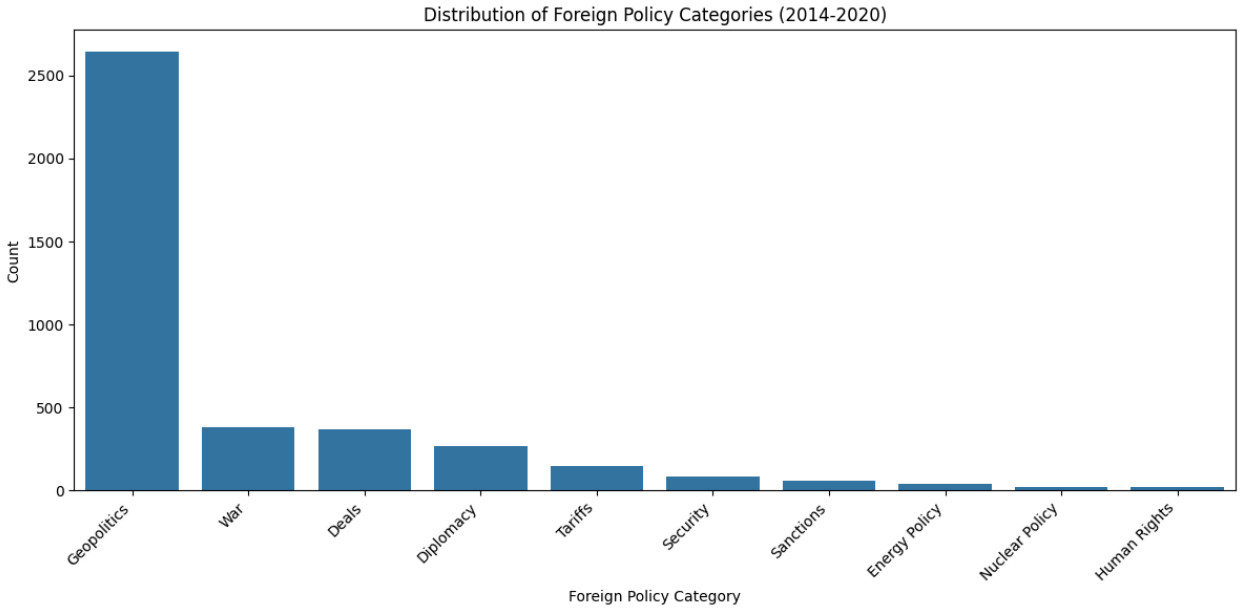

Figure 1.7 - Distribution of Foreign Policy Categories

Appendix 1.4 Overall Forex Change

This bar plot visualizes the average daily returns of various forex pairs over the specified period. Each bar represents a different forex pair, and the height of the bar indicates the average change in the exchange rate for that pair. The x-axis lists the forex pairs, while the y-axis shows the average forex change. The bars provide a visual distinction between positive and negative average changes. The x-axis labels are rotated for better readability.

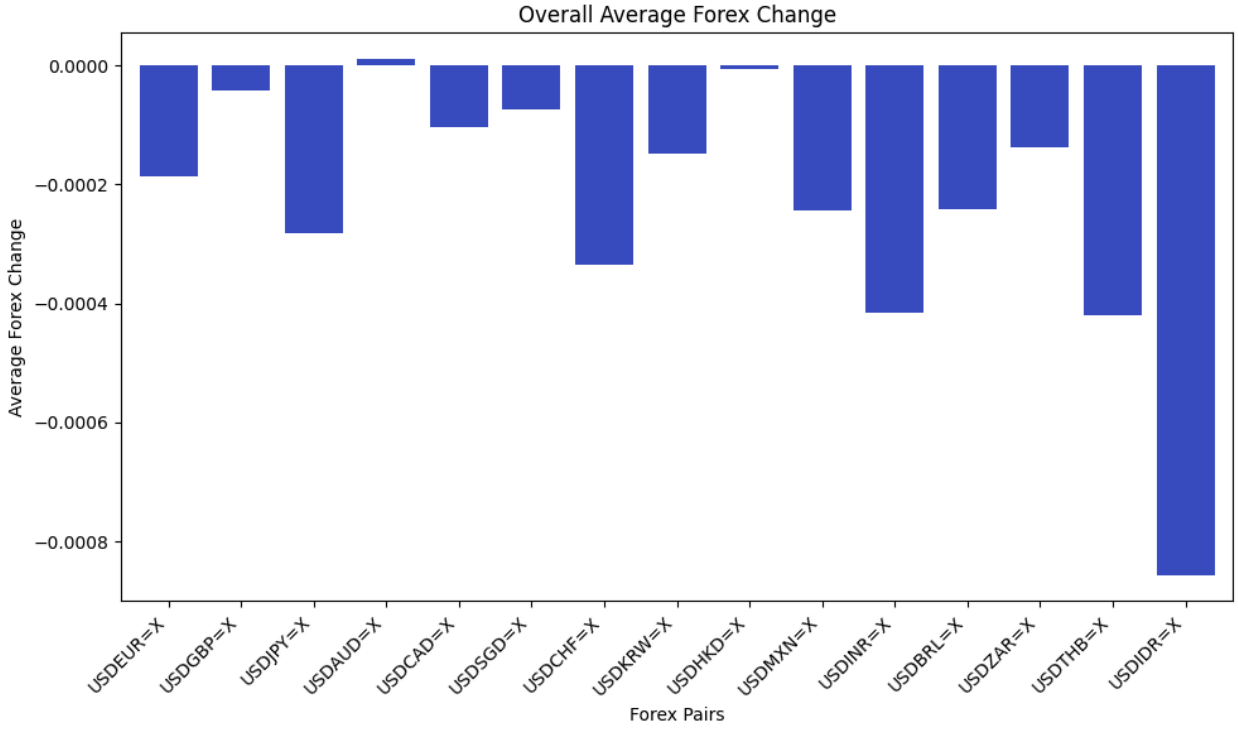

Figure 1.8 - Overall Average Forex Change

Appendix 1.5 Heat Map:

This heatmap visualizes the fluctuations in foreign exchange (forex) rates based on different foreign policy categories. The x-axis represents various forex currency pairs (e.g., USD/AUD, USD/CAD, USD/EUR), while the y-axis represents different foreign policy categories (e.g., Deals, Diplomacy, Energy Policy, Geopolitics, etc.). Blue shades indicate smaller or negative fluctuations, red shades highlight higher fluctuations, and the color intensity represents the magnitude of changes in forex rates. Lastly, the value in each cell represents the numerical value of forex rate changes corresponding to a specific foreign policy category and currency pair.

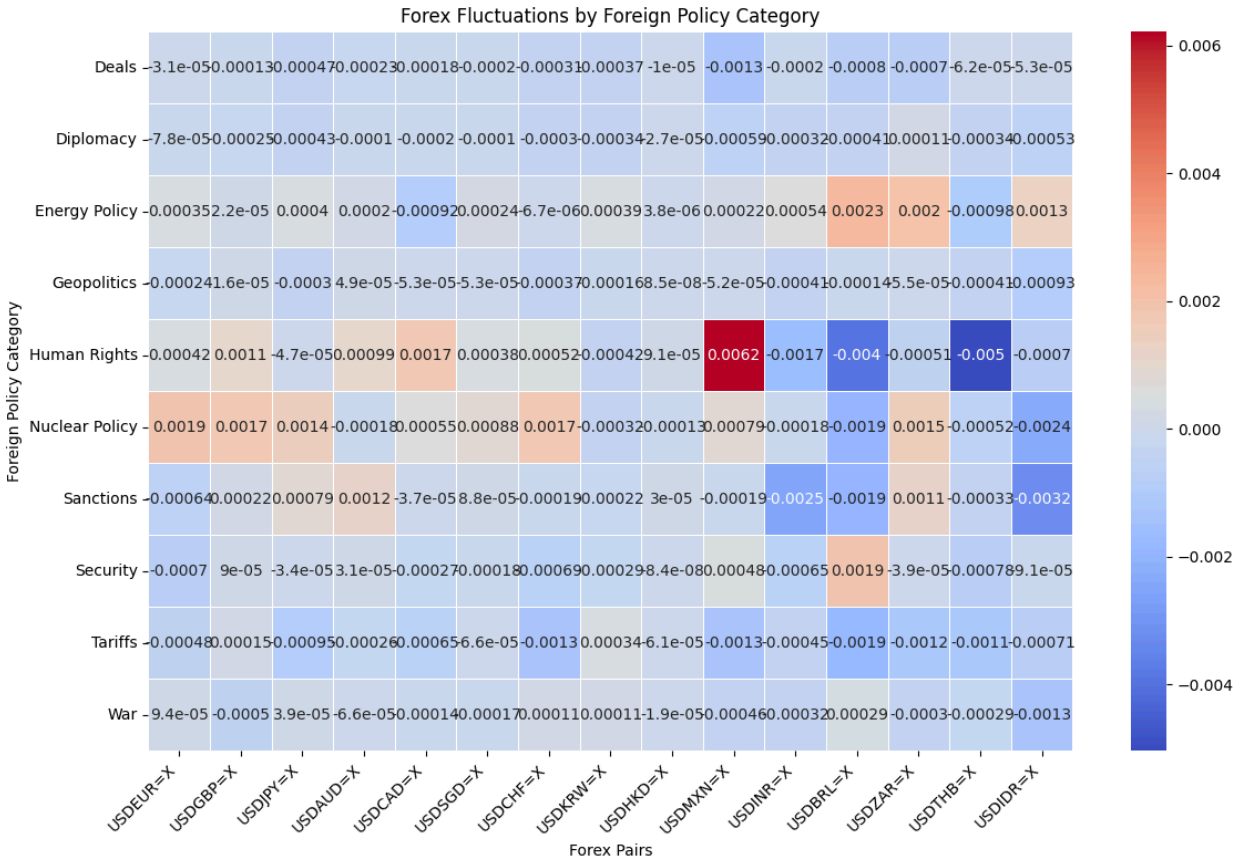

Figure 1.9 - Heat Map of Forex Fluctuations by Foreign Policy

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