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The Impact of Trade War on Stock Markets and Currency Markets: A Comprehensive Analysis

by

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The Impact of Trade War on Stock Markets and Currency Markets: A Comprehensive Analysis

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I dedicate this study to my dear Mother Mrs. Nasreen Akhter. It was her unwavering conviction that propelled me to this point in my academic journey. Though she is no longer with me, I am here because of her. Secondly, I extend my dedication to my supervisor, Dr. Nousheen Tariq Bhutta for her support and motivation, it was her constant guidance that enabled me to navigate this long journey. Lastly, I dedicate this work to my beloved sister Ms. Sabeen Shafique, for her steadfast belief in me and for being a pillar of strength during my challenging times. To my brothers, mentors, friends for their valuable guidance and support.

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CERTIFICATE OF APPROVAL

This is to certify that the research work presented in the dissertation, entitled "**The Impact of Trade War on Stock Markets and Currency Markets: A Comprehensive Analysis**" was conducted under the supervision of **Dr. Nousheen Tariq Bhutta**. No part of this dissertation has been submitted anywhere else for any other degree. This dissertation is submitted to the **Department of Management Sciences, Capital University of Science and Technology** in partial fulfillment of the requirements for the degree of Doctor in Philosophy in the field of **Management Sciences.** The open defence of the dissertation was conducted on **October 21, 2024**.

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List of Publications

It is certified that following publication(s) have been made out of the research work that has been carried out for this thesis:-

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(Anum Shafique)

Abstract

This study attempts to investigate the impact of Trade war on the stock markets and the currency markets on the selected countries in relation to US-China and their currencies including Bitcoin. Four trade war proxies have been used in this study. The data for these proxies is obtained for USA and for China separately. A composite variable has also been created separately for both the countries and it is labelled as Trade War Composite variable. It provides a comprehensive overview of the impact of Trade war on the selected markets. Copulas, Generalized Autoregressive Conditional Heteroskedasticity in mean/Dynamic Conditional Correlation research techniques are used to achieve the objectives of the study. Copula analysis reveals a weak negative relationship between the US trade war and most stock markets. The relationship is also negative for China, except for the selected markets with very weak strength. Also, mean spillover from the Trade war composite variable exists for several countries. No volatility spillover is found. From the China perspective, mean spillover is significant for several countries, but no volatility spillover is observed. When applied on the currency market, trade war composite variable exhibit mean spillover to other currency pairs, with varying significance. However, no volatility transmission is found. To sum, the findings vary across market and transmission sources (USA and China). The outcomes of the study may be useful for the investors and policy makers.

Key words: Trade War, EPU, Rigobon and Sack, Bilateral Tariffs, Stock Markets, Currency Markets, Bitcoin.

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Abbreviations

ADCC	Asymmetric Dynamic Conditional Correlation
AIC	Akaike Information Criterion
ARMA-GARCH	Autoregressive Moving Averages Generalized Autoregressive Conditional Heteroscedasticity
ASEAN	Association of Southeast Asian Nations
BT	Bilateral Tariffs
BTC	Bitcoin
CAD	Canadian Dollar
CAD	Canadian Dollar
CFR (2022)	Council on Foreign Relations (2022)
CHF	Swiss Franc
CHIPS	Creating Helpful Incentives to Produce Semiconductors for America Act
CM	Currency Markets
CNY/USD	Currency Pair of Chinese Yuan and Dollar
CPEC	China-Pakistan Economic Corridor
CSR	Corporate Social Responsibility
Copula-Var	Copula-Vector Autoregression
D.M.I.P.	Initials of Dissanayaka (a Sri Lankan Scholar)
DAX	Deutscher Aktien Index
DCC	Dynamic Conditional Correlations
DJIA	Dow Jones Industrial Average
DTRI	Digital Trade Restrictiveness Index
DV	Dependent Variable

EMH	Efficient Market Hypothesis
EPU	Economic Policy Uncertainty
EUR	Euro
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GARCH-M	Generalized Autoregressive Conditional Heteroskedasticity - M
GATT	General Agreement on Tariffs and Trade
GBP	British Pound
GDP	Gross Domestic Product
GJR-GARCH	Glosten-Jagannathan-Runkle Generalized Autoregressive Conditional Heteroscedasticity
GMM	Generalized Methods of Moments
ICP	Information and Communication Technology
ICT	Information and Communication Technology
IPR	Intellectual Property Rights
IV	Independent Variable
JPY	Japanese Yen
KSE/PSX	Karachi Stock Exchange / Pakistan Stock Exchange
MFN	Most Favored Nation
MXR	Mexican Peso
OECD	Organisation for Economic Co-operation and Development
OTRI	Overall Trade Restrictiveness Index
RCEP	Regional Comprehensive Economic Partnership
RMB	Renminbi (Chinese Currency)
S&P	Standard and Poor
SLR	Sri Lankan Rupee
SM	Stock Markets
STRI	Services Trade Restrictiveness Index
TP	Trade Policy
TTRI	Trade Tariff Restrictiveness Index
TVP Var	Time-Varying Parameter Vector Autoregression
TW	Trade War

TWC	Trade War Composite
TWCHN	Trade War China
TWS	Trade War Shocks
TWUS	Trade War United States
UK	United Kingdom
USA	United States of America
USEPU	United States Economic Policy Uncertainty
USMCA	United States-Mexico-Canada Agreement
WTO	World Trade Organization

Symbols

α	alpha
β	beta
γ	gamma
ρ	rho
ω	Small omega
Ω	Capital omega

Chapter 1

Introduction

1.1 Background

Financial markets play a critical role in economic growth and country development. It affects various aspects including savings, investments, corporate governance, social responsibility, etc. It offers a combination of risk and return opportunities to investors for their investments and for making optimal portfolios through effective and efficient asset allocation Sanyal (2021). These markets are supposed to be efficient, as proposed by Fama (1965) (Miller et al., 1970). The research discusses the random walk model and the underlying theory. It states that the stock prices actually involve two separate hypotheses. Firstly, that the successive price changes are independent and second that the price changes tend to conform to some probability distribution.

The literature on market efficiency states that the financial markets are efficient and asset prices reflect all publicly available information. It also assumes that the market already reflects all the information in the current asset prices. Furthermore, the efficient market hypothesis suggests that any new information, news or event is immediately reflected in the asset prices Malkiel (1989). Researchers have published several studies to investigate whether the stock markets are efficient during turbulent environments due to geopolitical tensions. These researches have brought meaningful insights to these questions. For instance, Fox and Sklar (2009) found that EMH is accountable for the financial crisis because it underestimates

the dangers of financial bubbles. It is important to note that volatility is not dependent on a single factor. In addition, there are different levels, such as economic and political, at which any event or action by the stakeholders may cause it.

A trade war between US and China has been debated in contemporary times. Especially since the time Trump era has gained popularity. However, it is not a new friction. The issue has a history of such retaliatory measures that have labelled it a trade war.

1.1.1 History of Trade War

There has been a substantial increase in the economic relations between China and USA in the past three decades. In 2016, the mutual trade between the two countries increased from 2 billion dollars to 579 billion dollars (Total merchandise), making China the second largest trading partner of the USA. The country (China) has tapped the largest export destination and has a big import source in the USA. The benefits of this mutual trade are the same for both countries. The imports of US from China provide cost-effective goods for its consumers. On the other hand, the USA is a large export market for China. It is pertinent to note that China is the second largest holder of US Treasury securities (Li et al., 2018).

Besides the prospective elements that portray a bright picture of China and USA trade relations, there is a darker side to it, which relates to the disputes between the two countries. These disputes are becoming more intense day by day. There are numerous concerns over both ends. For instance, for USA, the following areas of concern are important in relation to China:

1. A large amount of trade surplus.
2. Relatively ineffective record of enforcing Intellectual property rights (IPR)
3. Discriminatory Innovation Policies.
4. Mixed record on implementing WTO obligations.

Concerns of China include;

1. US restrictions on China for its exports from US on high technology products.

2. Unfair treatment of US of China's Market Economy Status.

3. Unreasonable Trade Sanctions on China.

The literature suggests that although these issues exist, they are gradually increasing. The overall economic relations between the two countries have been positive. However, the situation does not seem to persist in the previous political scenario given the orientation of the Trump Administration, which has explicitly adopted an aggressive stance on China. Certain measures with respect to economic relations provide evidence of this claim. For instance,

- Levying 45% punitive tariffs on imports from China.
- Levying 35% punitive tariffs on imports from Mexico.
- Trade bargaining is used to adjust trade imbalance and foreign exchange rate.

Li et al. (2018) studied different dimensions that the China and US trade wars should reflect. The study reveals that each country is affected with respect to welfare, GDP, manufacturing, and trade. Among all the factors illustrated, the strongest effect is on production. However, the retaliatory measures adopted by China attempt to counter these negative effects. The country is affected, however, the negative effects are bearable.

The strongest impact on the USA is with respect to its welfare. It gains welfare, GDP and non-manufacturing production, but other aspects such as manufacturing employment and trade are adversely affected. It is important to mention if China implements retaliatory measures towards the USA, the United States may anticipate to experience a decline in manufacturing production. In a nutshell, it is clearly visible that both countries will lose due to a trade war, but China will lose more. It may be why the USA is initiating trade war so that possible economic concessions may be negotiated with China.

The roots of the Trade War between China and the US are linked to three reasons that play a major role. These factors include trade deficit, i.e., import and export towards China, Technology theft by China and finally national security and the maintenance of the hegemonic position of the US in the global market (Liu and Woo, 2018).

Moreover, different events aggravated the situation in this regard. The launch of China Vision 2025, whose goal was to make China the Manufacturing hub especially in the high-tech field and strengthen the country's global position, has raised concerns of various US critics (Balderrama and Trejo, 2018; Hsu et al., 2012). The country aims to achieve a global position by investing in companies focusing on new technology in countries like the US and Europe. Liu and Woo (2018) depicted that the country needs to become self-sustained by making itself a manufacturing powerhouse. Notably, 70% of the products, i.e., many parts, are already produced in China.

A book on trade war by Mor (2018) states the main cause of trade disputes. In this book, the author asserts that the USA lacks manufacturing, and the import increase from China is the main bone of contention. It is due to the fact that this factor is causing erosion of the industrial base from the US. Moreover, US critics often grill the China Model regarding the double standards the country exercises. According to Warner Wijayasiri and Wijesinha (2021), the trade barriers imposed by China are huge, it causes difficulty for the US companies to invest in Chinese firms. There are other protectionist policies as well due to the country's Communist model. For instance, the ownership of foreign companies cannot be more than 49%. A study conducted by Liu and Woo (2018) also affirms the notion that the ownership structure of China requires the firms that intend to operate in China to merge it with the government through a Joint Venture.

Mor (2018) asserts that the trade war is an American problem as the country was the first to initiate the retaliation and is bearing the consequences of China's economic rise. Also, it relies more on China for its consumption demand, which is financed by debt. It further reveals that the country lacks in production, increases in consumption, and has debt that has reduced the savings that could have been used for further domestic investments as well.

The literature on the trade war is in the development stage. It is pertinent to note that it impacts the two economies hugely and the other closely connected economies. Conversely, the trade war may affect the countries' stock markets in the global scenario, while it is also apprehensive for the forex markets, keeping in view the context of the currency war. It is due to the fact that US accuses China of initiating a currency war by preventing the yuan from appreciating. (reference) Meanwhile, China accuses the US of indulging in a currency war through quantitative easing (Mor, 2018). It is important to note that investors made informed decisions by looking at key indicators such as the political stability of the country, interest rates by the banks, and economic policies.

1.1.2 Contemporary Situation on Trade War

With the end of the Trump era and President Joe Biden's inauguration, there has been a general shift in the policies between US and China and in the context of trade war. Ezrati (2022) asserts that although continuity exists, President Biden has taken it to new levels by introducing modifications and new policies. For instance, he has maintained the tariffs imposed during President Trump's time. In addition to this, the administration has administered new measures such as export controls, visa limits and restrictions on investment flows. These actions by the administration show the commitment to address broader issues in the economic relationship between US and China.

Further, the introduction of the CHIPS (Creating Helpful Incentives to Produce Semiconductors) for America Act was a notable development under the Biden administration. This legislation supports the domestic industry in producing semiconductors and introduces restrictions on Chinese access to advanced semiconductor technology. Moreover, the Biden administration focuses on the multilateral approach, which aims to strengthen the alliances and engage with the strategic partners to address the common issues with China (Μπάλιος and Ξανθάκης, 2003).

These developments show that the trade war is still a burning issue between two countries, that is USA and China.

1.2 Problem Identification

Financial markets are a barometer for any uncertainty and turbulence emerging in the global arena, whether political or economic. The world has already witnessed dependency on the stock markets due to the rapid increase in globalization (Baker et al., 2016). The increase in globalization tends to cause trade liberalization and is dependent upon the information flowing from international markets. In that context, any turbulence or event in the international market is promptly translated to the domestic markets.

Globalization and integration of the financial markets bring more prosperity to the domestic and international markets, whereas the flip side of the picture in terms of risk that globalization offers to the financial markets during periods of turmoil. One such turmoil has been the emergence of the Trade War between the USA and China and its repercussions on the other markets.

Trade war has been triggered intensively in the Trump era and escalated to a level where many economists predicted a new cold war as the country (USA) once experienced with the Union of Soviet Socialist Republics. In 2018, U.S Trade policy took stern action against China, by increasing tariffs, and China retaliated with the same intensity. The changes in the trade policies between these two countries has created friction in the world markets. However, the issue is not new. Both countries have faced numerous challenges that have caused threats to bilateral cooperation. For instance, in 1999 the bombing of the Chinese embassy in Belgrade, support of Taiwan by the US, Bilateral Trade Imbalance between the two, South China Sea and others. In the present times, the power transition between the two countries is a bone of contention between the two and is increasing existing tensions which is a concern for the whole world (Zhang et al., 2023).

The studies on Trade War have studied it as an announcement. For instance, Fajgelbaum et al. (2024) has studied the Trade War in terms of tariff announcements and their impact on the US, China and other countries. Joseph S. Nye (2015) investigated the impact of policy uncertainties between the US and China and studied the Trade War effect on both economies. Benguria and Saffie (2019)

studied the firm level impact of the Trade War on Chinese firms. He concluded that the firms that have export exposure to China have declined in their productivity.

On the other hand, firms that have export exposure to the USA have increased productivity. Bown (2021) studied the impact of bilateral tariffs due to the escalation of the US-China Trade War. The research study theoretically discusses the implications of these tariffs in detail. The study concludes and highlights that various policy instruments are not included in the conventional trade policy data series. More specifically, empirical testing of bilateral tariffs due to trade war is also lacking.

Ozdagli and Wang (2019) created a variable of trade war shocks through the Rivieccio and De Luca (2016) model. The researcher used the volatility index, treasury bonds, and other indexes such as S & P 500 to create the trade war shocks and financial markets with firm-level data. There have been numerous consequences in various domains as a result of trade policy. For instance, the economic relations between the countries i.e., US and China along with their close allies have been affected, creating a trade imbalance which has caused various industries in both countries. Secondly, the current war has also been initiated which has been termed in the literature as exchange rate disequilibrium/Misalignment. Therefore, the trade policies of these two countries, which are popularly labelled as trade wars (Benguria and Saffie, 2019) and proved to be more intense and persistent than initially expected, are crucial to understanding investors and policymakers worldwide.

This study creates a composite variable using the relevant proxies from the literature, and its impact on the financial markets is tested. This aspect is lacking in literature as of the contribution of this study. Liu (2020) studied the effect of trade war on the Chinese economy. The study used Google Trends data to measure the severity of the trade war. On this basis, trade war index was created with weekly data frequency for the time period from 7th Jan 2018 to 29th December 2019 with 104 observations. Further, Fan et al. (2022) created a trade war index to measure the impact of trade war on the Chinese economy as well. The focus of the study was to see the US Soft power in China via viewership of US movies.

The researchers construct a composite index by aggregating the Baidu index for US-China trade war keywords. The findings of the studies reveal a decline in the soft power of the US, it means significant reduction in the US movie revenue in regions more exposed to trump tariffs. These studies show evidence of construction of trade war index. Therefore, inspired by these studies, an alternate composite variable index was constructed based on the principal component analysis. In addition to this, a separate composite variable for the US and China provides a complete perspective of this war and the resulting consequences for the related economies.

It is important to mention that in the pursuit of understanding, analyzing and making informed decisions in the financial domain, the creation of a composite index is a valuable tool. As the financial data is unidimensional, individual variables, while important in their own right, often lack the capacity to fully encapsulate the complexity of financial scenarios like Trade War. It can be limiting and overlooks the interplay of factors that influence financial outcomes. A composite index provides a comprehensive view and ensures research outcomes that are more holistic in nature.

Besides creating a composite variable, this study adds to the body of literature by analyzing the impact of trade war on multiple financial markets. Existing research has predominantly focused on individual aspects of the financial sector, such as stock markets or currency markets. However, trade wars' interplay and simultaneous effects on currency markets, stock markets and cryptocurrency markets such as Bitcoin, remain underexplored. This is a significant shortcoming as it fails to provide a holistic view of the financial implications of trade war, which have a multifaceted impact.

Further, as the study explores the currency market, and the trade war between US and China, it understands the bias that may be caused by using the USD as a base currency and national currency of the USA. Also, using USD or EUR as base currencies in exchange rate studies is common. In order to avoid biases, as the USA is the major party of trade war and Germany is one of the financial markets under review in this study, it introduces a unique perspective by using the CHF (Swiss France) as the base currency. The selection is not arbitrary, rather it is

purposeful and relevant to the research objectives. The Swiss Franc has emerged as a notable currency for financial analysis due to its stability, neutrality and significance in global trade.

Lastly, the study also aims to add to the methodical gap by studying panel data analysis of multiple countries' financial markets in the context of trade war. For this purpose, it creates a panel of 11 countries and highlights how trade war affects the stock and currency markets across diverse economies. In addition, mean and spillover analysis is done to check the interdependencies among financial markets. It facilitates disentangling the channels through which trade war shocks propagate across the global financial landscape. It also tests for time-varying correlations and non-linear dependencies that substantially impact turbulent periods.

1.2.1 Conceptual Framework

The repercussions of ongoing trade war between US and China on various fronts can be witnessed, especially, the economic relations between the two countries are strained due to it, as well as with their close allies. The persistence of this situation leads to trade imbalance, which ultimately tend to cause disruptions among various industries in both countries. The disturbance in the economic relations does not end with the trade imbalance only, it also tends to cause exchange rate disequilibrium or misalignments (as labeled in the literature). It further complicates the matter and the economic situation between the two countries.

The retaliatory trade policies which are often termed in the literature as trade war can be seen becoming more intense and persistent than initially expected (Benguria and Saffie, 2019). This finding has stirred global investors and policymakers.

There is a need to undertake a holistic study addressing the limitations of this subject that have been left unaddressed in order to provide a holistic understanding of the impact of the trade war on the financial markets. However, this holistic perspective should be with respect to each country that is the main parties to trade war i.e., USA and China. It is pertinent to mention here that composite variable creation is also necessary to understand the overall impact. It is due to

the fact that the composition measurement of different proxies will draw varying results.

1.3 Research Gap

Despite significant advancements in understanding the impacts of trade wars, several critical gaps remain in the existing literature. This study contributes by addressing these gaps in the following ways:

Existing research, such as Liu (2020) and Fan et al. (2022), relies on single-dimensional proxies like Google Trends or Baidu Index to construct trade war indices. While useful, these approaches fail to capture the complexity and multidimensional nature of trade wars. This study advances the literature by developing a composite variable using Principal Component Analysis (PCA). This method integrates multiple proxies, including Economic Policy Uncertainty (EPU), Services Trade Restrictiveness Index (STRI), bilateral tariffs, and trade war shocks. By aggregating these diverse dimensions, the proposed index provides a more nuanced and holistic measure of trade war intensity, offering insights that single-dimensional proxies cannot achieve.

Much of the existing research focuses on isolated market impacts, such as the effect of trade wars on stock markets (e.g., Benguria and Saffie (2019)) or currency markets, thereby overlooking the interconnectedness of financial systems. This study provides a comprehensive analysis by simultaneously examining the effects of trade wars on stock markets, currency markets, and Bitcoin. This integrated approach allows for a deeper understanding of how trade wars influence various financial assets, offering a more complete picture of their economic implications.

Studies examining the impact of trade wars on currency markets often use USD or EUR as base currencies. However, these choices can introduce biases:

- The USD is central to trade war dynamics and often directly influenced by the conflict.
- The EUR is closely linked to Germany, which has specific economic ties with the US and China.

To address this limitation, this study employs the Swiss Franc (CHF) as a base currency. The CHF is recognized for its stability and neutrality, making it an ideal benchmark to analyze exchange rate dynamics during trade wars without introducing significant bias.

While prior research, such as Joseph S. Nye (2015) and Bown (2021), often adopts a bilateral perspective focused on the US and China, it neglects the spillover effects on other economies interconnected with these two countries. This study overcomes this limitation by constructing a panel of 11 countries to analyze the broader consequences of trade wars.

Using advanced methodologies like mean and spillover analysis and DCC-GARCH modeling, the study uncovers how trade wars affect stock and currency markets across diverse economies. This approach provides policymakers and market participants with a clearer understanding of the global ramifications of trade wars.

Trade wars involve two conflicting parties, yet many studies fail to analyze their effects from both perspectives. This study conducts a dual-sided analysis:

- **For the US:** It examines proxies like Economic Policy Uncertainty (EPU), bilateral tariffs imposed on China, STRI (US-to-China), and trade war shocks (US-to-China).
- **For China:** It evaluates similar proxies, including EPU, bilateral tariffs imposed on the US, STRI (China-to-US), and trade war shocks (China-to-US).

By separately assessing the impacts from both US and Chinese perspectives, this study ensures a balanced and comprehensive evaluation of trade war effects on financial markets in selected economies and offering valuable insights for academics, policymakers, and practitioners.

1.4 Research Questions

1. Does Trade War risk affect the financial markets?

2. What is the dependence structure between Trade war and Stock markets?

3. What is the dependence structure among Trade war and currency markets and bitcoin?

4. How do trade war shocks during US-China geopolitical tensions generate return spillovers to financial markets, including stock markets, currency markets, and Bitcoin

5. How do trade war shocks during US-China geopolitical tensions generate volatility spillovers to financial markets, including stock markets, currency markets, and Bitcoin?

6. Is any dynamic correlation between trade war and selected stock markets, financial currency market and Bitcoin?

1.5 Research Objectives

1. To create a composite variable of trade war

2. To find dependence structure between trade war and stock markets

3. To find dependence structure between currency markets including bitcoin and trade war

4. To find trade war shocks during US-China geopolitical tensions generate return spillovers to financial markets, including stock markets, currency markets, and Bitcoin

5. To find trade war shocks during US-China geopolitical tensions generate volatility spillovers to financial markets, including stock markets, currency markets, and Bitcoin

6. To find dynamic correlation from US and China to selected stock markets, financial currency markets and Bitcoin

1.6 Preview of Core findings and Implications

The research examines the influence of trade conflicts on financial markets, analyzing their impacts on stock returns and currency pairs. It examines essential research inquiries, concentrating on the possible mechanisms by which trade conflicts affect these marketplaces. Principal topics of investigation are Trade War and degree of effect on the financial Markets.

Based on the Efficient Market Hypothesis (EMH) proposed by Miller et al. (1970), the study assesses the efficacy with which financial markets integrate trade war information into asset valuation. The study utilizes comprehensive literature that emphasizes two principal perspectives on trade wars: those of the U.S. and China. This split emerges from country-specific data proxies, with U.S.-based proxies embodying one viewpoint and Chinese proxies representing the alternative. The study's results indicate a significant disparity in conclusions, especially regarding China, likely attributable to its regulated media environment in contrast to the more liberal media landscape of the United States.

This study has considerable ramifications for investors, politicians, and financial experts. By elucidating the connection between trade conflicts and market dynamics, it provides essential insights for alleviating risks linked to geopolitical tensions. The results further enhance the theoretical discussion on market efficiency, examining how economies with varying socio-political contexts react to trade wars. The research emphasizes the influence of media environments—regulated versus unrestricted—on market perceptions and decision-making processes. These insights may guide trade policy plans and risk management methodologies in international financial systems.

This research elucidates the impact of trade war on financial markets, enhancing the current literature and providing practical insights for stakeholders. The following sections of this thesis examine its distinctive contributions and its role within the wider academic and practical framework.

1.7 Contribution of the Study

The study is important because it contributes to the previous literature for instance Samaratunga (2009) who studied the dependence structure between the US Stock market and the BRICV stock markets during the period of trade war. Benguria and Saffie (2019) who studied the global impact of the US and China trade war on the global markets. Xu and Lien (2020a) studied the impact of trade war on major currencies. Aysan et al. (2019) studied the geo political risk such as trade war and their impact on bitcoin. The studies justify to undertake the underlying study and include the financial stock markets, currency markets and Bitcoin into focus.

In that connection, it adds to the literature by providing a holistic picture and taking into account the allies of the US as well as by looking into how they are being affected with it. It adds to the financial market literature including stock, currency and bitcoin with the help of existing literature as previously cited. As long as the case of the currency market is concerned, the underlying CHF has been used as a base currency to work and calculate real exchange rates.

Moreover, the underlying study takes into account the Trade war as a variable rather than investigating the impact of news announcements as done by Fajgelbaum et al. (2024). The underlying study identified the four key proxies suggested by the literature that include trade war shocks (Panait and Slavescu, 2012), Economic policy uncertainty (Thompson, 1980), Bilateral Tariffs (Benguria and Saffie, 2019) and Trade policy (Niu, 2015).

In order to explore how the developed economies behaved in this scenario, what shape the Trade war has taken, and how the stock returns and exchange rates reacted in this environment. For this purpose, a composite variable is created to test the impact, spillover and dependence on the financial markets. The creation of composite variables is an important aspect of the underlying study. It has been created separately for the USA and China with their respective data for the selected proxies in the underlying study.

Lastly, the study has considered multiple market segments such as equity markets, forex markets and Bitcoin as supported by the literature cited where the potential impact can be seen, to execute a comprehensive analysis of returns of these markets. Moreover, the dependence structure and the transmission of spillover is also detected. The underlying study intends to provide meaningful insights to the researchers, investors (Individuals as well as institutional) and policy makers.

Summary of the Chapter

This chapter provides the direction of the underlying study, what the study aims to answer, what the study intends to contribute, and the rationale behind the selection of this subject is provided in detail.

Study Plan

The structure of the subsequent chapters is as follows: Chapter 2 outlines the review of literature while chapter 3 details the methodology, i.e., the underlying study's road map. Chapter 4 presents a detailed description of the results and discussion. Chapter 5 presents the conclusion and policy implications.

Chapter 2

Literature Review

The following section entails empirical evidence and highlight the magnitude of the trade war's impact on the markets. On the one hand, China and the USA are the key parties battling a trade war on multiple fronts, be it import/exports, currency or technology. On the other hand, other countries closely connected to China and the USA have faced strong positive and negative repercussions.

2.1 Theoretical Background

The composition of the theoretical background for the underlying study is as follows:

2.1.1 Efficient Market Hypothesis

Efficient Market Hypothesis is attributed to Miller et al. (1970). Both the authors reacted to the empirical studies showing the random character of stock prices and interpreted the random character of the stock prices and attributed this as a consequence of rationality of behaviors.

Studies focusing on EMH such as Delcey et al. (2018) assert that all the available information is reflected in the prices of financial assets in an efficient market. This availability of information makes it impossible for investors to beat the markets and to earn excess returns consistently. Further, this theory also argues that no

arbitrage opportunities exist in efficient markets. It means that opportunities in which the investors may expect extraordinary gains don't persist.

Market efficiency can be divided into three forms: the markets are either weak form, semi form or may have strong form of market efficiency. At any of the three levels stated, the stock price is expected to entail the information at different levels. Strong form of efficiency indicates that the stock price reflects all the public and private information. So, when all the information is available it is impossible to beat the market. Semi strong market efficiency implies that all public information is incorporated in the stock prices, making it impossible to beat the market. Lastly, the weak form of efficiency implies that future stock prices may not be predicted on the basis of historic prices.

The theory assumes that future prices are independent of past prices because news travels instantly in the market, making it impossible to predict price movements. Furthermore, the 'Random Walk' concept in finance is also relevant in this regard. It shows the relationship between current and future prices. According to Propakistani (2019), whenever new information is available in the market, it is reflected in the asset prices without delay.

The underlying study is based on the EMH, as it aims to test how the trade war event has impacted the stock returns and the spillover among the stock markets of the selected countries. It may aid policymakers in formulating effective policies in order to avoid negative repercussions. The results of the study also help policymakers in several ways. For instance, by making more informed decisions, as different economies may experience varying effects from these events due to their unique economic structures and vulnerabilities, they may tailor their responses to address specific challenges and opportunities. It may also aid them in assessing the risks associated with these events by identifying the markets that are more vulnerable to them. It is pertinent to note that these two scenarios' impact may differ for different economies. Therefore, it is critical to undertake this study and to use the insights obtained through this study. The rejection or acceptance of this hypothesis in the context of the underlying study contains useful implications.

2.1.2 Mercantilist Theory

One of the very well-known economic theories, "Mercantilism" given by Adam smith in 1776, explains the rationale behind the Trade War and strong theoretical ground. It emphasizes the use of international trade by the government to strengthen the national power and to generate more wealth for the nation. The theory purports trade policies that are intended to reduce the trade deficit and create a trade surplus.

The theory's basic premise lies in a nation's power and wealth increase through international trade and following certain principles. One of these principles of mercantilist theory includes protectionism. It aims to protect the domestic market and increase a country's wealth and power by reducing reliance on imports, increasing tariffs, etc.

In the context of the Mercantilist economic system, a beggar-thy-neighbor policy is one of the economic policy tools used by one country to solve its economic problems at the expense of other countries. Adam Smith often criticized the term "Beggar thy neighbor" as a core flaw of mercantilist economic doctrine.

Moreover, mercantilist economic doctrine based its premise on making policies to cure domestic depression and unemployment by shifting the demand from imports towards domestically produced goods. This is achieved by imposing tariffs and quotas on imports or by competitive devaluation.

Although it is against the capitalist spirit, the period and the underlying issue show this phenomenon's exercise. The criticism of this theory leads to the conclusion that protectionist policies and actions like these may cause inefficiencies and create conflict between the nations. This debate increases the need to test the hypothesis of the underlying study.

2.1.3 Realist Theory of International Relations

The realist theory of international relations by Hans J. Morgenthau (1904–1980) developed realism into a comprehensive international relations theory that emphasized the centrality of power and "the national interest" (Ricardo, 1955). They

are primarily concerned with their security and chances of survival, leading to an anarchical structure of the international system. Economies may favor trade with political allies rather than adversaries out of concern that it may produce relative gains that excessively benefit partner countries at their expense. In a similar vein, it has been asserted that "trade follows the flag" because risk-averse business players should be driven to reduce the risk of upsetting business dealings to promote trade links with friendly nations (Zhang et al., 2023). Realist beliefs sharply contrast with liberal ones, highlighting economic interdependence's role in fostering peace.

2.1.4 Trade Protectionism and US-China Trade War

Song and Zheng (2023) investigated free trade, and his seminal work provides enough literature on the limits of trade protectionism. The researcher highlighted the benefits of free trade and product specialization. A similar notion was reinforced by David Ricardo (1817) in his work. His work focused on the theory of comparative advantage, demonstrating how countries could benefit from trade even if one country has an absolute advantage in producing all goods (Poole, 2004).

According to Carstens (2025), the subject of trade protectionism has not been upheld in the broader public and policy debates. However, the recent "Trade War" between the US and China has given rise to it. Various studies have considered the macroeconomic impact of the US-China Trade War (Berthou et al., 2018; Amiti et al., 2020). There has been research evidence that the global GDP has been reduced by 1% due to 10 percentage point increase in the global tariffs after two years. Further, these macroeconomic repercussions are not limited to the trade sector only but are extended to other domains. According to research studies, these negative impacts mainly originated by the prices of intermediate and final goods for consumers and producers (Casselman, 2019; Fajgelbaum et al., 2024). In addition to this, studies highlight the redirection of investment away from China towards alternative Asian Markets, such as Taiwan, Vietnam and Malaysia (for International Settlements, 2025). Moreover, the equity prices of the firms in equity markets, operating in sectors highly susceptible to trade war (such

as automobile, metals, technology and telecommunications, and transportation), had suffered more than other firms of Fund (2025); Jaeger (2022).

2.2 US-China Trade War and Selected Economies

The US-China trade war and its effects on the economy of the chosen countries for this analysis are as follows:

2.2.1 US-China Trade Conflict and Canada

The rising tensions between the United States and China have significantly impacted the global economy, resulting in both difficulties and possibilities for Canada. The escalations that intensified the trade war between the US and China during the Trump administration, including the imposition of tariffs on Chinese exports, resulted in a series of retaliatory actions, which have had various economic repercussions for third-party nations such as Canada.

The diversion of trade flows has been one of the immediate consequences of the US-China trade war that the country has experienced. Due to the administration's imposition of tariffs on Chinese items, US importers sought alternative sources for commodities, hence creating numerous chances for Canadian suppliers to occupy the void left by Chinese suppliers. The shift from Chinese to Canadian suppliers was significantly evident in the agriculture and manufacturing sectors, as Canadian products achieved more access to the US market. This possibility presented its own obstacles (Securities, 2025).

This opportunity presents its own obstacles. Flaherty (2021) asserts that heightened demand for Canadian goods may result in supply limitations and even domestic inflationary pressures. Furthermore, dependence on the U.S. market renders Canada susceptible to potential policy alterations or economic recessions in the United States. The interdependent structure of global supply chains indicates that disturbances between significant economies such as the U.S. and China produce widespread repercussions. Canadian enterprises involved in these supply chains may encounter heightened expenses and delays. If a Canadian firm depends on

Chinese components exposed to U.S. tariffs, production costs may increase, thereby impacting competitiveness.

The uncertainty arising from the trade war may induce reluctance in investment and expansion decisions among Canadian enterprises. The unpredictability of trade policies complicates and heightens the risks associated with long-term planning. The economy of Canada is significantly impacted by its natural resources sector. The trade war has caused volatility in global commodity prices, impacting Canadian exports including oil, timber, and minerals. For instance, diminished Chinese demand for specific commodities resulting from tariffs may cause oversupply and price declines, adversely affecting Canadian manufacturers (Securities, 2025).

If China pursues alternate sources for commodities formerly obtained from the U.S., Canadian exporters may experience heightened demand. This dynamic engenders a volatile environment for Canadian enterprises engaged in the commodities market. Trade tensions have impacted foreign direct investment patterns. Companies aiming to evade tariffs may contemplate transferring segments of their operations to nations uninvolved in the trade conflict. Canada, characterized by its stable economy and advantageous trade relations, may serve as an appealing destination for such investments.

Nevertheless, heightened foreign direct investment inflows may impose competitive constraints on domestic enterprises. Furthermore, Canada's commercial relations with both the U.S. and China necessitate meticulous management to sustain a balanced strategy that draws investment while avoiding the alienation of crucial partners. In reaction to the trade conflict, the Canadian government has enacted measures to safeguard its economy. In August 2024, Canada declared a 25% surtax on imports of steel and aluminum products from China, beginning October 15, 2024, to protect Canadian workers and vital economic sectors from inequitable Chinese trade practices (Uscanga Prieto, 2018).

Furthermore, Canada has actively pursued new economic alliances and reinforced current ones. The Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) and the Canada-European Union Comprehensive Economic

and Trade Agreement (CETA) exemplify initiatives aimed at diversifying trade contacts and diminishing reliance on a singular market (of Canada, b).

The U.S.-China trade war poses both urgent obstacles and opportunities, necessitating a reassessment of Canada's long-term economic strategy. The circumstance highlights the necessity of economic diversification regarding export markets and the domestic industrial foundation. Investments in innovation, technology, and education are essential for improving Canada's competitiveness in the global market. Moreover, establishing robust supply chains and cultivating strong trade partnerships with a varied array of nations can alleviate the risks linked to geopolitical conflicts among big economies (of Canada, a).

2.2.2 US-China Trade Conflict and the United Kingdom

The protracted trade conflict between the United States and China encompasses issues related to intellectual property theft, inequitable competition via subsidies and state-owned enterprises (SOEs), and limited market access for U.S. companies in China. The U.S. perceives China's economic policies as an exploitation of the global trade system, lacking compliance with its obligations, whilst China rationalizes its actions by citing its status as a developing country. The United States has implemented taxes on Chinese goods, imposed bans on companies such as Huawei, and restricted Chinese corporations' access to U.S. financial systems. These efforts seek to diminish China's influence in the Pacific Rim and align trading partners with U.S. economic ideals. China has enacted retaliatory tariffs, particularly on American agricultural goods. This reciprocal escalation has negatively impacted firms and consumers in both nations, undermining global economic progress.

The trade conflict is fundamentally based on geopolitical factors rather than solely economic issues. The United States encouraged China's inclusion into the global economy with the expectation that it would evolve into a liberal capitalist democracy. Nonetheless, China's trajectory has solidified its position as a geopolitical rival. Washington now aims to sever its vital sectors from China's influence to impede its rise as a global force. As a result, the trade war exhibits no indications of abatement. This new economic reality presents problems and opportunities for

the European Union (EU). The trade war hinders global economy, jeopardizing recessions in vulnerable EU economies and hindering reform initiatives within the bloc. It also jeopardizes the multilateralism that supports the World Trade Organization (WTO), perhaps compelling the EU to shift towards a geopolitical, rather than a rules-based, framework for global governance. Moreover, heightened U.S.-China tensions in the Middle East may have substantial implications for European security and migration strategies.

The EU may utilize its status as a significant trade partner of China to negotiate a comprehensive investment pact, so securing access to China's restricted industries, such as financial services and infrastructure. The EU might augment its global political power by mediating between Beijing and Washington, as suggested by the forthcoming von der Leyen Commission's objective to elevate the EU's international stature. The United Kingdom (UK) encounters issues akin to those of the EU, however with distinct complexities arising from Brexit. The ambiguity around Brexit, along with diminished global growth, exerts further pressure on the UK economy. Furthermore, being a tiny open economy, the UK is significantly dependent on multilateralism and free trade agreements, which may be jeopardized by the deterioration of the WTO. Following Brexit, the UK forfeits access to the EU's network of free trade agreements, potentially subjecting it to a more challenging global economic landscape.

The escalating U.S.-China relations may provide the UK with enhanced access to Chinese markets and facilitate the attraction of Chinese investments. Nevertheless, closely aligning with U.S. policies may compel London to restrict Chinese access to British markets, thereby undermining possible advantages. Achieving equilibrium between sustaining robust U.S. relations and engaging with China will be crucial for the UK to address these problems. Positioning itself as an intermediary between the two powers may confer a strategic benefit. In summary, the U.S.-China trade conflict epitomizes the rivalry for global economic and political supremacy and is improbable to conclude in the near future. The EU and the UK encounter considerable challenges yet possess opportunity to assume crucial roles in the changing global scene. Enhancing international organizations such

as the WTO may alleviate the adverse impacts of the trade war and combat the ascendance of protectionism and power politics (of Economics and , LSE)

The Centre for International Trade Policy (for International Trade Policy , CITP) indicates that the discourse around the UK's reaction to economic security, especially regarding the US-China trade war, underscores the escalating geopolitical tensions and their influence on trade policies. The US-China trade conflict, characterized by tariffs levied by the US on Chinese products, has raised significant apprehensions over economic security, especially in light of China's increasing supremacy in essential sectors. The UK confronts difficulties in reconciling its autonomous trade policy within these pressures.

The UK's position in this context entails addressing the changing dynamics of trade and economic security. The discourse highlighted the necessity of delineating economic security and promoting international collaboration with allied nations, such as the US and EU, on critical matters such trade, competition, and climate policy. In light of its post-Brexit autonomy, the UK is perceived as capable of significantly contributing to the reinforcement of a liberal economic order and addressing vulnerabilities in global supply chains, particularly with China's dominance over essential resources.

Participants observed that the UK might engage with countries including Canada, Australia, and Japan to address shared concerns and enhance global trade stability. Furthermore, there is a focus on aligning economic policies with national interests, such as competitiveness, sustainability, and security. The UK aims to safeguard its economic interests, especially regarding its reliance on Chinese trade, by diversifying supply chains and cultivating alliances with the Global South as vital strategy. Furthermore, the UK need to refrain from adopting an excessively rigid position towards China, in contrast to the US, and should instead implement a pragmatic strategy that reconciles protectionism with ongoing trade in non-sensitive sectors.

The influence of the trade conflict between the US and China on the UK economy has been minimal, especially including the indirect repercussions on investment and financial markets. It is acknowledged that trade tensions are likely to escalate

from this point forth. Nonetheless, the effect would likely be minimal in comparison to a no-deal Brexit. Any possible detriment should be counterbalanced by the increase in investment resulting from a Brexit agreement (Economics, 2019).

Research from King's College London underscores the vulnerabilities of the UK's semiconductor sector stemming from its reliance on both China and the U.S. during escalating trade tensions between the two giants. The industry's susceptibility is linked to U.S. ownership interests and dependence on American suppliers. Experts recommend that the UK should implement a prudent strategy to maintain the stability of this vital sector. The analysis indicates that the UK's semiconductor sector is jeopardized by its dependence on both China and the United States, in the context of an escalating global trade conflict between these two heavyweights. Research conducted by King's College London indicates that American investors possess a substantial portion of UK semiconductor companies, while the sector is mostly reliant on suppliers and clients situated in the United States. The exposure to geopolitical conflicts may endanger the UK's interests, leading experts to recommend a cautious, data-informed strategy to protect the industry's survival (London, 2024).

2.2.3 US-China Trade Conflict and Japan

van der Linden and Łasak (2023) indicates that the United States and Japan have experienced trade frictions over several products, including textiles, steel, autos, semiconductors, and agricultural goods, for the past 50 years. US–Japan trade tensions have mostly manifested in two ways: (i) the United States seeking to limit Japan's exports to its territory; and (ii) the United States striving to enhance its exports to Japan by "liberalizing" the Japanese market. The United States exerted pressure on Japan to implement essential reforms in order to accomplish two primary objectives: (i) to diminish its trade imbalance with Japan; and (ii) to safeguard and/or advance US businesses. The United States did not accomplish the primary objective, whereas some progress was made towards the secondary objective. The United States initiated a trade war against China with the aims of: (i) diminishing the bilateral trade deficit; and (ii) curbing unfair trade practices

by Chinese companies, including intellectual property rights abuses and coerced technology transfer. Drawing from the lessons of US–Japan trade tensions, the United States may attain some success with the second objective, but not the first. The likelihood of attaining the second objective would enhance if the United States collaborates with nations like Japan and the European Union, who encounter analogous challenges.

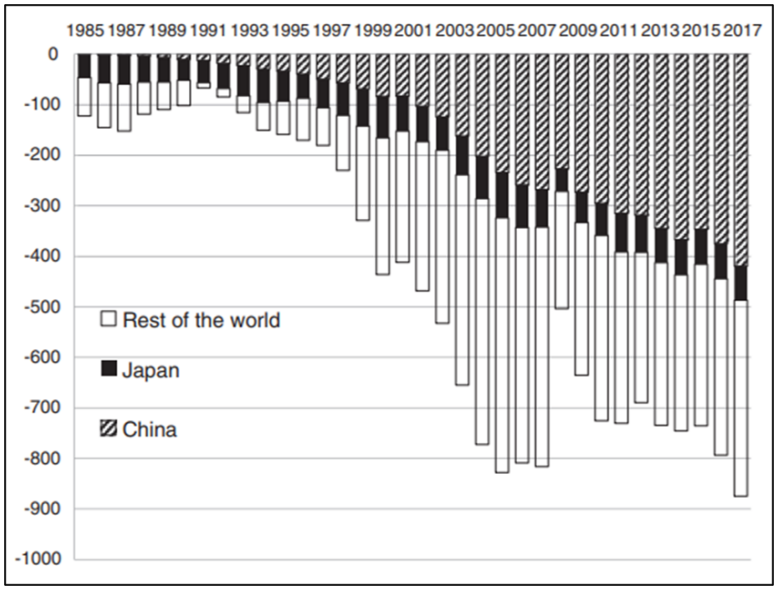

FIGURE 2.1: United States Trade Deficit (in billions of dollars)

The bilateral trade deficits of the United States with Japan, China, and the European Union (EU) were significant sections of the overall trade imbalance. From the mid-1980s until 2018, both Japan and China consistently reported trade surpluses with respect to the United States. Japan's portion of the US trade imbalance was substantial, ranging from 35% to 65% between the mid-1980s and the mid-1990s. Japan's market share commenced its decrease in the 1990s, ultimately reaching approximately 10% by the late 2000s. Since that time, it has remained between 7% and 10%. A divergent pattern is evident in China. China's share was minimal, comprising less than 10% until the conclusion of the 1980s. Beginning in the early 1990s, it experienced a consistent and rapid increase, culminating at 45% in 2009. China's proportion in recent years has remained between 45–50%. The dynamics of GDP among the United States, Japan, and China underwent significant alterations from the 1980s to the 2010s (Figure 2.2). The United States continues to be the largest economy globally based on GDP. From the mid-1980s to the early

1990s, Japan saw strong economic expansion and the rise of the bubble economy, but GDP growth ceased with the bubble's collapse in the early 1990s. The ratio of Japan's GDP to that of the United States surged from under 40% in the early 1980s to 70% in 1995, but subsequently plummeted to a historic low of 25% in 2017. A divergent pattern is noted for China. China's GDP constituted approximately 10% of the US GDP until 1995, after which it rapidly escalated to 63% by 2017.

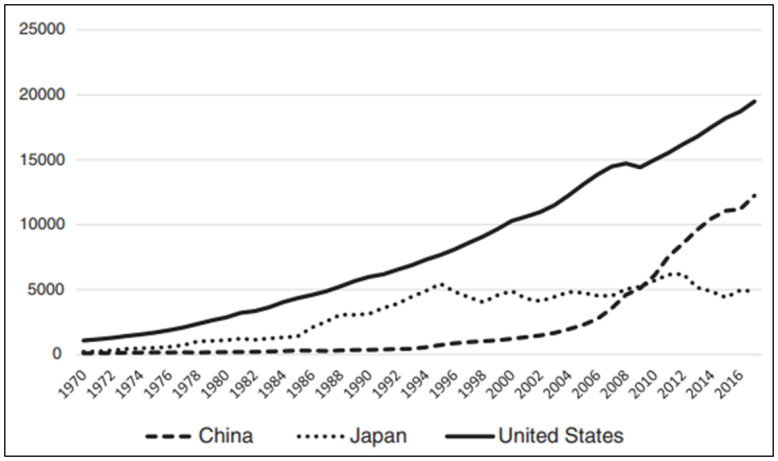

FIGURE 2.2: Gross Domestic Product (in billions): Japan, China, and the United States

The significance of the United States in Japan's exports is a crucial element in shaping Japan's trade strategy towards the United States. The greater the significance of the United States, the more constrained Japan's flexibility in its trade policy towards the United States becomes. The proportion of the United States in Japan's total exports rose from 33% in 1980 to 47% in 1985, subsequently decreased to 14% in 2011, and then exhibited a little recovery. These observations suggest that Japan's flexibility in its dealings with the United States has augmented since the mid-1980s, as the significance of the United States for Japan's exports has diminished. A comparable trend is observed in China; however, its reliance on the United States has never reached the levels seen in Japan. Two significant occurrences merit attention in the examination of US–Japan trade tensions.

The conclusion of the Cold War occurred in the late 1980s. From the conclusion of World War II until 1989, geopolitical friction existed between the Eastern

Communist Bloc, dominated by the Soviet Union, and the Western Liberal Democratic Bloc, led by the United States. Japan faced a Soviet threat and depended on the United States for its national security. The conclusion of the Cold War, which diminished the threat posed by the Soviet Union, enhanced Japan's flexibility in its dealings with the United States. The other change is the formation of the WTO, which features a more efficient dispute resolution procedure than that of the GATT. WTO members may utilize the WTO's dispute settlement system instead of engaging in bilateral trade discussions to resolve trade disputes. The introduction of an alternate dispute resolution procedure enhanced Japan's standing in trade negotiations with the United States.

Ajami (2020) asserts that the spillover effect of the US-China trade war is generating a ripple effect across Asian economies, including Japan, the Asian Tigers, and India. Moreover, this is initiating new realignments in trade relations between Japan and its Asian trading partners, including the Asian Tigers. The entire outcome is generating economic advantages for the Japanese economy, and China and Japan are expected to strengthen their trade and direct foreign investment connections. Japan, the world's third-largest economy, has substantial trade, economic, and investment relationships with both the United States and China. These commercial connections are less contentious than the current relationship between President Trump and China. Japanese corporations, including Toyota and Panasonic, have penetrated the Chinese markets at the official level. The economic connections between Japan and China have expanded, currently estimated at $180 billion in 2018. Japanese brands enjoy popularity among Chinese customers, and the business connections between Japanese and Chinese firms are expected to expand in the foreseeable future. Japanese advertising agencies and marketing businesses are diligently striving to comprehend the intricacies of the Chinese market and to acquire knowledge about local consumption preferences and behaviors. Despite the achievements of Chinese enterprises in Japan, problems persist due to longstanding historical animosities. The animosities between China and Japan are profound and persist, especially concerning the territorial claims over Senkaku Island by both nations. Japan must strategize its positioning to effectively navigate the American Eagle and the Chinese Dragon, considering

its substantial economic ties with China and geopolitical reliance on the United States.

Supachart (2019) investigate the impact of the US-China trade war on Japanese multinational corporations (MNCs), emphasizing a reduction in sales for Chinese affiliates, particularly those with significant exposure to North American commerce. It also determines that Japanese companies impacted by China-North America trade had a decline in stock values following the tariff announcement in 2018. The loss was more pronounced for companies with Chinese affiliates that relied substantially on Japanese inputs, highlighting the trade war's effect on global value chains.

2.2.4 US-China Trade Conflict and India

Ajami (2020) asserts that India, a prominent developing country in Asia and equally populous as China, with formidable economic challenges. Weak domestic consumption is expected to impede India's GDP growth rate, projected to decline from 5.8 percent to an anticipated 4.9 percent. Manufacturing output has experienced a significant fall, one of the greatest in the past two decades. Furthermore, there is diminished growth in the rural agriculture sector, characterized by stagnating salaries and feeble consumer expenditure. The government's endeavor to invigorate the domestic sector is, at best, precarious and will not, on its own, restore GDP growth. Alongside the frailty of the rural agriculture sector, other industries, including automobile manufacturing, are also experiencing decline. India continues to experience considerable bureaucratic obstacles, which will impede employment creation. India's economic alternatives pertain to its dual global economic connections. In the advanced global service industry dependent on information technology, India favors open international economic connections to sustain growth and provide employment for its highly educated engineers and technology-driven firms. In the manufacturing and agricultural sectors, which are susceptible to global competition, India favors a protected status to support the less efficient, less entrepreneurial, and less competitive agriculture sector. Faced with these two alternatives, India must also acquire the ability to navigate its

global trade connections. India presently has a trade deficit with China nearing $60 billion. Despite being members of the ASEAN accord, India and China lack a robust bilateral negotiation framework to address the Indian trade deficit. India and China have engaged in ongoing conversations regarding trade modifications aimed at preserving future economic links while enabling India to diminish its deficit. commercial challenges pertaining to state-owned businesses, labor legislation, and environmental difficulties are expected to remain key to Indian-Chinese commercial trade, investments, and other connections.

Misra and Choudhry (2020) undertook a study assessing the economic impacts of the US-China trade war on Brazil, Russia, India, China, and South Africa, with particular emphasis on India. It concludes that, in the short to medium term, India may benefit from trade deflection, as the advantages surpass the disadvantages of diminished trade. Nonetheless, over time, increasing tariffs may adversely affect the global economy. The research employs economic models and the Vector Error Correction Model to assess the pass-through impacts of tariff increases on Indian exports.

Chadha et al. (2021) analyzed India's potential responses to the US-China trade conflict. Although both the United States and China will incur losses, India may see short-term advantages. Nonetheless, should India encounter elevated taxes or augment its own duties, the nation may sustain losses. The essay posits that decreasing tariffs and enhancing production via improved port efficiency may yield advantages. India could get further advantages by participating in a regional trade grouping such as the RCEP. The trade war affects Asian nations variably, resulting in diverse effects around the area.

Bollen (2019) analyzed the economic ramifications of the current trade disputes involving the United States, China, Mexico, Canada, the EU, and other OECD nations. The analysis utilizes the WorldScan Computable General Equilibrium (CGE) model, which is a worldwide model including multiple countries and sectors. The research indicates that a comprehensive trade war, characterized by the United States and its trading partners imposing widespread tariffs, would result in losses for all involved nations. Devarajan et al. (2018) at the World Bank and other institutions employ a multi-country, multi-sector global CGE model named

GLOBE to assess the economic ramifications of a comprehensive trade war between the United States and its trading partners. They aim to counsel developing nations on appropriate responses. They assert that developing nations ought to abstain from punitive measures to benefit from a trade conflict. These benefits would arise from the redirection of trade away from the conflict-affected countries or areas. Developing nations would gain additional advantages by steadily and unilaterally lowering tariffs, engaging in regional trade agreements, and adhering to WTO regulations. Lee (2018) contends that the US–China trade war would negatively affect other nations, notably those in Asia. Several of these nations export intermediate items to China. These products encompass semiconductor chips and displays—produced mostly in various regions of Asia, thereafter transported to China. China manufactures final products from these intermediate goods and exports them to the United States. A comprehensive trade war may significantly impact Asian countries like Taiwan, South Korea, Singapore, and Malaysia, which export substantial quantities of these items.

The talks for the Regional Comprehensive Economic Partnership (RCEP), which includes ASEAN, India, and China, persisted for several years. After a decade of active pursuit, India opted not to join RCEP at the last moment. The official stance is that India maintains a substantial trade deficit with RCEP nations and anticipated particular safeguards for its industries and agricultural sector against an influx of imports, particularly from China. As that did not come to fruition, the Indian government anticipates no benefits from joining RCEP. Nevertheless, an examination of sector-specific trade statistics across several years may present a limited perspective, as investment decisions require time, and one must allow for the realization of long-term benefits. A thorough analysis is required to comprehend the advantages and disadvantages of participating in a trading bloc such as RCEP. The worldwide findings indicate that India must prioritize conducting analogous, yet more India-centric research on strategic trade strategy, particularly examining the effects of engagement in plurilateral trade agreements.

Shahzad et al. (2019) discovered that the US-China trade conflict substantially influenced India's trade dynamics, resulting in heightened trade diversion from

China to India. This was especially apparent in industries featuring easily substitutable products such as final goods, homogeneous goods, and those exhibiting significant price elasticity. US tariffs on Chinese imports facilitated a market opportunity for Indian exporters, as companies sought other suppliers. The effect on India's imports was more complex. While certain industries profited from heightened demand, others underwent differing levels of transformation. This indicates a multifaceted interaction of elements beyond mere trade diversion, including alterations in global supply chains and transformations in consumer preferences.

Literature examining the effects of the US-China trade war on the Indian economy indicates that, in addition to the direct consequences of elevated tariffs imposed by the US and other principal trading partners, the tariff conflict underscores the potential for trade diversion to alternative trading partners. Comparative advantage, coupled with tariff modifications stemming from the trade war, frequently results in increased substitution of goods from alternative trade partners accessing the targeted country's markets, potentially benefiting external entities in selling to markets directly affected by the tariff conflict (Bekkers and Schroeter, 2020; Bolt et al., 2019). India, as a significant common trading partner for both the US and China, serves as an exemplary case study for examining potential trade diversion arising from the US-China tariff conflict. This paper examines the short-term effects of the US-China tariff conflict on India's external trade, both overall and across various product categories. Utilizing product-level export and import data, it demonstrates that the tariff war initiated by the US and China's subsequent retaliation significantly affected India's export growth at the aggregate level. The effect is mostly influenced by US tariffs, rather than China's retaliatory levies. US tariffs prompted a shift in trade from China to India due to increased tariffs imposed on Chinese manufacturers by the US. The minimal effect of retaliatory tariffs highlights that China's punitive measures were focused on agricultural commodities. The study expands the trade diversion analysis to various product classifications beyond the overall effect. The study used three distinct classifications: intermediate vs final goods, homogenous versus differentiated goods, and high versus low elasticity goods. The trade diversion effect was observed to be more substantial for final items and negligible for intermediate goods.

Final items are readily substitutable, whereas intermediate goods are utilized in the production process, making their replacement more time-consuming. The focus on trade diversion concerning final goods highlights the immediate influence of the replacement effect on readily replaceable products. The study subsequently employs the differentiated and homogeneous product classification established by Rigobon (2003) to examine potential heterogeneity in trade diversion. The exports rose for homogeneous items but not markedly for diversified goods. The findings support the inflexibility of substituting non-homogeneous items in global value chains, at least in the short term. The impact on export intensity is determined to be greater for products with high elasticity, according to the estimates by Broda and Weinstein (2006).

The tariff war has a substantial impact on imported goods at the aggregate level. Nonetheless, the effect of tariffs on diverse product categories indicates that imports of finished goods from China surged considerably, while imports from the US remained unchanged. The import of homogeneous goods rose as a result of the tariffs, and a comparable effect is noted in goods with high elasticity. The US-China trade war raised Indian exports to the US, particularly in substitutable product categories, including final goods, homogenous (Rauch) commodities, and highly elastic goods. Finally, the research seeks to elucidate the underlying mechanism of trade diversion by employing the revealed comparative advantages (RCA) of Indian firms. According to the Ricardian model, nations engage in trade for goods in which they possess comparative advantages. Thus, RCA offers an elucidation of trade diversion. The study employs panel regression to demonstrate that Indian firms possess more revealed comparative advantages in final goods and highly elastic commodities, where the trade diversion effect is notably more pronounced (Shahzad et al., 2019).

2.2.5 US-China Trade Conflict and Germany

Hernández (2012), determined that the persistent US-China trade conflict has significantly impacted Germany, chiefly because of its interconnected economic ties with both the United States and China. With the escalation of tariffs by both

the US and China, Germany encounters heightened trade disruptions, especially in industries that are significantly dependent on exports to both nations, like automotive, equipment, and electronics. German enterprises operating in China or the United States have seen escalating costs and diminished demand, as tariffs inflate products prices and diminish consumer purchasing power.

As a member of the European Union, Germany must contend with the intricacies of EU-wide trade policies, which can conflict with the strategies of the United States or China. For example, the United States' requests for European allies to adopt a more stringent position against China over matters such as intellectual property rights or market access frequently conflict with Germany's economic interests, which encompass sustaining robust trading relations with China. Germany's trade surplus with the United States, although beneficial to its economy, also renders it susceptible to US tariffs. Conversely, Germany's dependence on China as a significant trading partner has rendered it susceptible to Chinese retaliatory tariffs.

The trade war has not only caused economic issues but has also raised wider geopolitical concerns. The US-China competition has compelled Germany to engage in a precarious balancing act, as it must manage the pressures from the US to adopt a more stringent position on China while simultaneously protecting its economic interests. This situation has incited demands in Germany for a more autonomous European foreign policy that may diminish reliance on both the US and China.

Furthermore, the US-China trade conflict has amplified the European Union's role in regulating and resolving trade ties. As the largest economy in the EU, Germany is pivotal in influencing the EU's reaction to the trade war, encompassing discussions for new trade agreements and regulatory frameworks that adapt to the evolving global commerce landscape. This situation has prompted discussions in Germany over the diversification of trade partners and the mitigation of susceptibility to economic volatility from the US and China.

Notwithstanding these limitations, there exist possible prospects for Germany. The restructuring of global supply networks resulting from the trade war has enabled Germany to exploit changes in trade dynamics. Certain enterprises are

considering shifting manufacturing from China to alternative countries, and Germany may gain from heightened investment in its industries or by acting as a substitute manufacturing hub for companies aiming to circumvent rising tariffs.

Nonetheless, the medium to long-term prognosis remains ambiguous. Germany's economic stability will rely on its ability to adjust to the evolving geopolitical and trade dynamics amid the ongoing trade war. Diversifying trade relations, improving competitiveness, and bolstering the EU's position in global trade governance will be crucial in alleviating the negative impacts of the US-China conflict on Germany's economy.

Germann et al. (2024) discovered that the United States is utilizing its influence in worldwide semiconductor supply chains to impede China's technical advancement. It examines Germany's "China chokepoint" companies, who, despite their reliance on US technology, have sought to evade US export restrictions. This is atypical, as companies in Japan and South Korea have adhered to US sanctions on China. The study indicates that these German enterprises are integrated into the nation's automotive sector, which is significantly dependent on the Chinese market. This secondary exposure prompts German companies to defy the US chip embargo, positioning them as active actors in the geopolitical conflict.

Stehlík et al. (2024) examined the differing responses of the United States and Germany to China's "Made in China 2025" project, which seeks to establish China as a leader in ten essential technology industries. This idea has elicited considerable apprehension in both countries, yet their reactions have been markedly dissimilar. Since the Trump administration, the United States has embraced a confrontational stance, primarily motivated by electoral discontent with manufacturing job losses and national security issues. These reasons have influenced the United States' robust opposition to China's technical advancement, emphasizing strategies such as tariffs, export restrictions, and sanctions on Chinese companies.

Conversely, Germany's reaction has been more restrained and prudent. German labor has generally performed better in globalization than American workers, and the German government has encountered difficulties in superseding the interests of German capital, especially within the substantial industrial sector. In contrast to

the United States, where economic issues are intricately linked to national security, Germany has predominantly avoided implementing comparable confrontational strategies. The connection between German capital, especially its automotive sector, and China is substantial; German enterprises gain from China's burgeoning consumer market, resulting in a more intricate dynamic than that with the United States.

The study contends that this diversity arises from variations in domestic political frameworks and class interests. The fall of the industrial sector in the US has coincided with populist attitudes, especially during the Trump administration. This has facilitated a direct correlation between national security concerns and economic issues, emphasizing the protection of American jobs and industries from Chinese competition. Conversely, Germany's labor force has had little effects from globalization, mostly attributable to the nation's strong social programs and the resilience of its industrial sector, which is deeply connected into global supply networks, especially with China.

The authors anticipate that the emergence of techno-nationalism, driven by China's technological aspirations, will escalate due to the COVID-19 epidemic. The pandemic has revealed weaknesses in global supply systems, intensifying national security apprehensions regarding China's technological supremacy. In this scenario, both the United States and Germany are expected to reevaluate their stances on China; yet, the paths of their replies will continue to diverge, influenced by their respective domestic circumstances and political economy.

The study underscores the intricate interplay among globalization, national security, and economic interests in influencing the responses of the US and Germany to China's ascent. The United States has adopted a more combative stance, aligning its economic and security policies against China, but Germany's approach is more circumspect, shaped by its economic interdependencies with China. The paper emphasizes the significance of comprehending these home elements to elucidate the variations in national reactions to the difficulties presented by China's technical aspirations.

2.2.6 US-China Trade Conflict and Mexico

Gachúz Maya (2022a) discovered that the economic link between Mexico and China has seen substantial evolution in the last decade. Despite the expansion of total commerce between the two nations, the relationship continues to exhibit significant asymmetry. China's exports to Mexico have increased significantly, encompassing a wide array of economic sectors. The exports consist of electronics, machinery, and textiles, indicating a wide and expanding presence of Chinese products in Mexico. Conversely, Mexico's exports to China have risen at a far slower pace, with export patterns predominantly concentrated in a limited number of critical industries, including oil, minerals, and agricultural products.

Notwithstanding this unequal economic relationship, the United States-China trade war has inadvertently benefited the Mexican economy. The escalation of tariffs levied by the U.S. on Chinese goods has rendered imports from China more costly for American enterprises, prompting many to pursue alternate suppliers for products traditionally sourced from China. Mexico, due to its geographical proximity and access to U.S. markets through agreements such as the United States-Mexico-Canada Agreement (USMCA), has established itself as a credible option to China. Consequently, Mexico's exports to the United States escalated, and in 2019, Mexico surpassed China as the principal trade partner of the United States for the first time.

The essay analyzes not just the immediate consequences of the trade war but also the impact of the USMCA on the economic relationships between Mexico, China, and the United States. The USMCA, which supplanted the North American Free trading Agreement (NAFTA), generated increased trading prospects for Mexico with the United States. The accord enhances Mexico's role as a significant participant in North America, while also impacting its relations with China. The trade war has complicated Mexico's situation, requiring it to maneuver between these two significant economies. Mexico gains from heightened shipments to the U.S. as a result of tariff escalations on Chinese goods. Conversely, Mexico must equilibrate its trade relations with both the U.S. and China, ensuring it does not estrange any party.

The study examines the wider ramifications of the U.S.-China trade war and its impact on global trade dynamics. The trade war has generated tensions between the U.S. and China, allowing Mexico to exploit the changes in trade dynamics. Nonetheless, this has not been without difficulties. Mexico navigates a precarious equilibrium in its diplomatic relations with both nations. The paper underscores the significance of comprehending the triangular trade dynamics among Mexico, China, and the U.S., as well as the impact of the ongoing trade war on global economic flows and Mexico's role therein.

The study offers a comprehensive examination of the developing economic connection among Mexico, China, and the United States, emphasizing the effects of the U.S.-China trade conflict and the USMCA. It underscores the unequal commercial relations between Mexico and China, the unforeseen advantages Mexico has derived from the trade conflict, and the obstacles it encounters in maneuvering its position within a swiftly evolving global trade landscape. The Mexican economy has adjusted to these changing dynamics, establishing itself as an alternative source for U.S. corporations aiming to diminish their dependence on Chinese imports. Mexico must meticulously navigate its connections with both the U.S. and China while these nations persist in their geopolitical and economic rivalry.

The dynamics of Mexico's trade with China and the primary issues stemming from the imbalance of this relationship have been examined in the current literature from many angles, highlighting impediments, trends, and difficulties for Mexico. Three primary analytical patterns can be identified: (1) the absence of complementarity in Mexico–China trade and Mexico's significant dependence on the US market, (2) the mismanagement of Mexico's trade policy concerning China, and (3) the perception of competitive threat posed by China from Mexico's perspective.

Garcia et al. (2011) emphasize that the absence of complementarity in the commercial relationship between the two nations is a significant issue, since China directly competes with Mexico in major trade areas. Luis Leon-Manriquez and Tzili Apango (2015) underscores the significant disadvantage posed by the substantial trade deficit for Mexico in its relationship with China, asserting that this factor is crucial in shaping the economic dynamics between the two nations and

obstructs the establishment of a more equitable relationship. In this perspective, Mexico's trading relationship with the United States is vital, as the trade deficit with China is partially mitigated by the trade surplus with the United States.

Gallagher and Dussel (2013) assert that Mexico's trade deficit with China constitutes a direct "threat" to both the domestic market and the US market. Sun et al. (2019) assert that the rise in exports from China to the United States, facilitated by trade liberalization, has intensified competitiveness in both the US and Mexican markets, potentially exerting increased pressure on Mexican exports. Weixian (1999) discusses that Mexico's hesitance and skepticism towards China are related to the displacement of industrial goods exports to the US market. Mexican exports are supplanted by Chinese manufactured goods, resulting in conflicts stemming from the relocation of firms to China and subsequent job losses in Mexico.

Gachúz Maya (2022b) identify key factors that hinder a more equitable relationship between Mexico and China, both financially and politically. The authors emphasize that a fundamental component in the context of Mexico is the geopolitical interest of the United States in Mexican territory, primarily due to the historical interconnection between the two nations and the 3,000 km border that enables commercial and socio-cultural contact. The writers assert that Mexico remains an area of influence for the United States.

Bernal-Meza (2016) posits that structural factors contribute to a growing reliance between Latin American countries and China. The author indicates that the center-periphery model illustrates China's substitution of Latin American manufactured exports in tertiary markets, resulting in increased reliance on dominant core economies. This dependency framework can be used to the relationship between Mexico and China due of their direct competition in the U.S. market.

The argument is substantiated by Gélvez Rubio and Gachúz Maya (2021), who assert that China's economic and political interests in Latin America suggest a transition in the cooperative relationship from a South–South to a North–South paradigm, primarily attributed to China's evolution from a developing nation to a global emerging power.

González García et al. (2015) assert that the Mexico–China relationship should be comprehended through a "triangular" framework. This approach examines the linked impacts of Mexico–United States ties, China–United States relations, and Mexico–China relations. This concept is pertinent to our analysis, as the effects of the trade war in Mexico stem from a triangular framework in which the three economies are interconnected.

The second analytical trend indicates that the mismanagement of Mexico's trade policy, coupled with insufficient institutional support for exports to China, hinders a deeper understanding between the two nations and exacerbates unbalanced trade conditions in their bilateral relationship.

From a domestic standpoint, and considering the policies enacted in Mexico during the last two administrations, Hearn (2015) posits that the issue of asymmetry in the Mexico–China relationship should not solely concentrate on competition with China, but rather on several domestic factors in Mexico. These factors encompass the mismanagement of economic policies in the export sector, which primarily foster the development of a select group of elite firms that receive support and promotion for exporting to China and other nations.

Chen and Goodman (2019) contend that further issues must be addressed to characterize the Mexico–China trade relationship more completely. The authors assert that public opinion in both nations serves as a pertinent indicator elucidating the mutual ignorance of the parties involved. The writers reference a study conducted by The Chinese Academy of Social Sciences, which indicates that a quarter of the Chinese populace is unaware that Mexico is a Latin American country. The authors contend that, generally, there is insufficient attention from the media and academia in each nation to bridge this gap of mutual ignorance.

Cornejo (2019) indicates that the fundamental issue in the Mexico–China bilateral relationship pertains to the prevailing imbalances between the two nations. Despite substantial investments in science, technology, and development in China, Mexico's progress in these domains is comparatively inferior.

Luis Leon-Manriquez and Tzili Apango (2015) contend that the issues within the China–Mexico bilateral relationship extend beyond mere commercial imbalance.

Internal factors within the organization and decision-making processes in Mexico reveal instances of insufficient understanding of China's economic, political, and cultural context, which affects the selection of officials and diplomats lacking adequate knowledge or experience in significant representations in China.

González García et al. (2015) delineate the many stages of the Mexico–China relationship. Variations and alterations have been documented, encompassing diverse viewpoints and discrepancies in the political arena. The authors contend that, at this juncture in the relationship, a revitalization is imperative, necessitating the abandonment of bilateral estrangement, divergences, and project terminations, alongside the formulation and execution of a new Mexican national strategy towards China.

Peters (2016) highlights that a further issue in the bilateral relationship is the absence of a medium- and long-term strategy with China, despite the significant growth in commerce between the two nations and Mexico's involvement in numerous key forums in Asia. The Mexican government delineated action lines with specific targets for China and India solely through the National Development Plan 2013–2018. The issue persists in Mexico's current six-year National Development Plan (2019–2024), as it addresses trade policy with the United States while neglecting trade diversification and the necessity to reassess the relationship with China (Plan Nacional de Desarrollo 2019–2024).

Uscanga Prieto (2018) contends that Mexico faces structural issues that must be addressed to enhance global competitiveness. These encompass advancing inside global value chains and augmenting public investment in education, science, and technology. The third analytical trend reveals a persistent misperception of the threat posed by Mexico in relation to China's exports and trade.Niu (2015) emphasizes the idea of a "Chinese threat" or "Chinese imperialism" in the China–Latin America relationship, which is linked to worries around environmental difficulties and employment losses. The author posits that it is reasonable to infer the existence of this type of perspective in the context of an expanding trade relationship with a nation as large as China.

Myers and Wise (2016) assert that additional factors contribute to the perception of mistrust between Mexico and China, particularly regarding Mexico's trade policy in international trade forums. Notably, in the World Trade Organization, Mexico has spearheaded initiatives against China's anti-dumping policies, which directly affects the perception of the Chinese government and enterprises towards Mexico.

Dell et al. (2019) underscore that the asymmetry in the China–Mexico relationship influences social dynamics in Mexico, while perceptions of social threat levels further affect bilateral ties and exacerbate mistrust. The authors indicate that job losses in the Mexican manufacturing sector, resulting from competition with China, exacerbate cocaine trafficking and violence, especially in areas with established international drug trafficking networks.

The aforementioned analytical patterns are crucial for analyzing and comprehending Mexico's contemporary commercial relationship with China within the framework of the United States–China trade conflict. Our contribution specifically examines the triangle economic exchange framework between Mexico, China, and the United States, as well as the influence of the USMCA on this relationship.

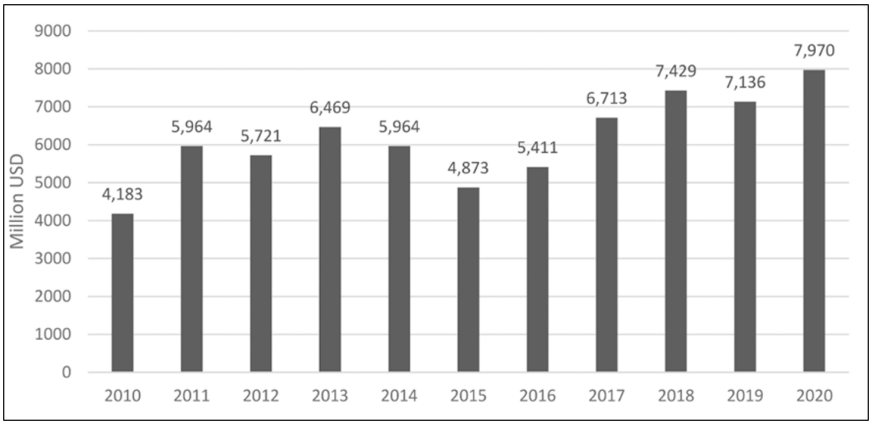

FIGURE 2.3: Mexico's exports to China (2008 - 2020) in millions

Source: data acquired from Secretaría de Economía (2020a, 2020b), OEC: The Observatory of Economic Complexity (2020), and United States Trade Representative (2020).

2.2.7 US-China Trade Conflict and Pakistan

Keeryo et al. (2020) found that in the escalating tensions between the US and China, Pakistan endeavors to preserve amicable relations with both nations. The government of Pakistan stated that the nation's economic progress is intrinsically linked to China. He emphasized that we are fortunate to have friends that consistently provide support not just for Pakistan's economy but also stand with us in every international problem faced by the country. Conversely, the United States continued to be the principal provider of foreign aid, contributing millions of dollars in military and civilian assistance in the ongoing fight on terror in the region. Two difficulties have concurrently arisen in recent times. The Taliban and the US peace agreement signifies the cessation of US involvement in the conflict, which has severely affected the commerce links between the involved nations. Concurrently, China has boosted its investment in Pakistan. From a defense and security standpoint, China has consistently sought to maintain a positive relationship with Pakistan, leading to various investments in military exercises to address worldwide security problems.

Historically, China's economic operations are commendable within the context of the global Belt and Road Initiative (BRI), which aims to establish new trade routes in Central and South Asia. Estimates reached over 30 billion dollars due to bilateral cooperation within the framework of the China-Pakistan Economic Corridor (CPEC), which enhanced Pakistan's infrastructure initiatives. Furthermore, China has endeavored to address the significant issue of the energy crisis by beginning several projects. The United States has condemned China's investments in the China-Pakistan Economic Corridor (CPEC), asserting that China prioritizes its own economic objectives while disregarding the interests of other nations, characterizing it as a mere debt trap. China and Pakistan dismissed the unfounded allegations over their economic, political, and social collaboration. The current government of Pakistan endeavors on all platforms to restore relations with the United States in order to mitigate the prevailing tensions between the two nations.

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The trade relations between Pakistan and the United States have a significant history of agreements focused on quick changes and sustainable practices. The Doha trade and WTO agreements serve as compelling proof of collaboration between the two nations. The trade policy advocates for more collaboration between both nations through trade liberalization and free trade agreements. Historically, political links between the two countries have overshadowed economic and social connections. The partnership episode is a legitimate response to the relationship between both countries in the framework of trade ties. The diplomacy following 9/11 reinforced the collaboration and relationship between both nations. The bilateral aid packages and help from international financial organizations enhance connections between the two countries. The aforementioned economies executed a trade and investment framework agreement in 2004, which has continued to serve as a successful model for both nations. Moreover, there exists a historical geopolitical alliance between the US and Pakistan, characterized by a robust history of free trade agreements and mutual investment.

The operations of these countries have also achieved success through the Ford Foundation and GE Foundation on several initiatives. The Trump administration maintained collaboration with Pakistan to address the COVID-19 crisis, which significantly altered the economic landscape and facilitated the deferral of loan repayments through the assistance of the International Monetary Fund. Additionally, the Pakistani government strengthened its relationship with the United States and

successfully enhanced its standing with the Financial Action Task Force, striving to exit the grey list. The US government commended Pakistan for its regional stability and emphasized that Pakistan should achieve self-sufficiency by implementing various measures against terrorism for the greater global benefit. Trade liberalization is crucial for the development of both China and Pakistan, as member nations of the WTO are permitted to enter into trade agreements for trade diversion.

Trade is essential due to varying economic and political frameworks. Various nations have distinct specializations in goods and services. Pakistan has been actively shaping its trade policies for the past two decades. The bilateral relationship between China and Pakistan is advantageous not only for the region but also for global economic development. Effective economic and political collaboration is essential for the progress and development of any nation, as the export competitiveness of countries is rapidly increasing due to advancements in technology and innovation. China occupies a favorable position among rising economies regarding innovative policies and patterns of comparative advantage at both local and international levels.

Pakistan urgently requires and possesses significant potential for rapid socio-economic transformation and the elimination of obstacles to economic success. Pakistan and China share borders and have a cordial relationship, strengthening their friendship through a free trade deal established in 2006 and 2007. The agreement consists of two phases: the first from 2006 to 2012, and the second, which commenced in 2013, is still ongoing. The growth of world trade varies between the two economies due to China's superior relative competitiveness. China has extended numerous chances to Pakistan, including tariff discounts, a flexible currency rate, advantageous pricing, a diverse array of products and services, and substantial customs relief. China has established numerous agreements with Pakistan to mitigate US influence in the region. A significant portion of investment returns will be allocated to transportation, infrastructure, and energy, which will positively influence sustainable growth, mitigate poverty, address inflation concerns, and promote technological innovation. China is offering a suitable timeframe to negotiate the terms and conditions of free trade agreements to benefit

both economies. Conversely, the United States imposes stringent requirements on Pakistan's economy. From the perspective of trade in Pakistan, it is imperative to renegotiate the deal with the United States, since a significant portion of imports remains reliant on our economy. Conversely, various products constituting Pakistan's primary exports are sourced by China globally, and Pakistan fails to establish a foothold in the Chinese market due to inadequate quality requirements. China has generated numerous risks to Pakistani businesses, ranging from semi-finished goods to full items across various sectors.

It is pertinent to note that Pakistan is the principal partner of both countries, having sustained its relations with them since its inception. Owing to healthy relations with both nations, China initiated a substantial financial endeavor (CPEC) amounting to 46 billion dollars in 2013, which has now escalated to around 70 billion dollars. The United States imports extensively from Pakistan. During the period from July to March in 2019-20, Pakistan's exports to the United States amounted to Rs. 471 billion, while exports to China totaled Rs. 219 billion. Concurrently, imports from the United States reached Rs. 692.6 billion, while imports from China were Rs. 1394.3 billion (Economic Survey of Pakistan, 2020). Osama Rizvi, an economic and geopolitical analyst, asserts that the economic conflict between the two major economies is highly crucial for Pakistan, as both countries are among Pakistan's largest trading partners (Propakistani, 2019). He further states that Pakistan is diplomatically engaged with China through the China-Pakistan Economic Corridor (CPEC), which offers substantial advantages for Pakistan. Leaders of the Pakistani business community assert that the trade conflict between the world's two largest economies, the USA and China, could be advantageous for Pakistan.

Currently, Pakistan has the option to renegotiate the terms of future investment and bilateral trade with China. The Chief Executive Officer of the Pakistan Business Council asserts that Pakistan has surpassed China in competitiveness in many sectors, including textiles. According to Miller (2012), trade relations between the US and Pakistan have expanded over the past decade, with Pakistan requiring the United States as a trading partner more than vice versa. In 2003, both nations signed a bilateral Trade and Investment Agreement, resulting in an increase in

bilateral trade from US$2.8 billion in 2001 to US$5 billion. Eight billion in 2011. In 2010, the United States was the primary destination for exports from Pakistan. Furthermore, he states that Pakistani workers in the United States contribute a significant share of the US$8.7 billion in remittances to Pakistan, while American enterprises represent US$517 million of foreign direct investment in Pakistan, nearly one-quarter of the total. If Pakistan fails to sustain such connections with the US, bilateral trade between the two nations may stagnate.

2.2.8 US-China Trade Conflict and Bangladesh

The U.S.-China trade war, a significant aspect of contemporary global commerce, has generated an economic environment where nations formerly seen as minor participants have encountered unexpected opportunities. Among these nations, Bangladesh distinguishes itself as one that has substantially profited from the evolving dynamics. With the escalation of trade tariffs between China and the U.S., nations such as Bangladesh, Vietnam, and Chile surfaced as prospective beneficiaries, as the trade conflict reconfigured global supply chains and investment trends.

Bangladesh has traditionally preserved robust trading links with both the United States and China. Bangladesh's commerce with China has predominantly involved imports, with China serving as Bangladesh's principal import partner, providing commodities valued at over $15 billion as of 2017. These items encompass a diverse array of things, including machinery, electronics, and raw materials. In 2017, Bangladesh's exports to the United States exceeded $5.8 billion, predominantly comprising clothing. The United States has historically been the second-largest export destination for Bangladesh, with the garment sector, comprising roughly 80 percent of the nation's overall exports, being integral to this commerce.

The U.S.-China trade war has unexpectedly benefited Bangladesh, especially in its garment industry. American retailers, confronted with heightened tariffs on products produced in China, have pursued alternatives to Chinese suppliers, with Bangladesh emerging as a logical option. Consequently, the nation has experienced substantial expansion in exports to the United States. In the initial three

quarters of 2018, Bangladesh's market share in the U.S. increased by 6.46 percent, with expectations for this trend to persist. A 2012 McKinsey analysis anticipated that Bangladesh would gain from China's gradual withdrawal from labor-intensive sectors, a transition now expedited by the trade conflict. In response to Chinese tariffs, U.S. corporations are relocating factories, making Bangladesh, known for its low labor costs, an appealing option (Choudhury, 2021a).

Bangladesh's primary advantage in the global apparel business is its competitive labor expenses. The nation's minimum salary is significantly lower than those of its Southeast Asian competitors. Bangladesh provides labor at a mere $95 per month, which is over 50% less expensive than Cambodia's minimum salary of $182 per month. Moreover, Bangladesh's population over 160 million offers a significant work supply, unlike Cambodia's comparatively smaller population of around 16 million. Bangladesh possesses a unique advantage in labor-intensive sectors, particularly in garment production.

Bangladesh is poised to benefit not only from heightened demand for its clothes but also from the reconfiguration of global supply chains in several sectors. The United States has enacted tariffs on steel imports to rejuvenate its own steel sector. This has resulted in a rise in steel prices, impacting countries such as Bangladesh that depend on imported steel. Bangladesh imports substantial amounts of scrap steel from the United States for its local steel manufacturing, which has been affected by tariffs. Bangladesh may alleviate these price escalations by enhancing domestic steel output via its expanding shipbreaking sector, which now supplies over fifty percent of the nation's steel. In light of escalating steel prices, Bangladesh may implement strategies to enhance its shipbreaking facilities and advance its steel sector.

Bangladesh could gain from the U.S.-China trade conflict in its agricultural imports. In 2018, China put tariffs on U.S. soybeans, resulting in a significant decline in U.S. soybean exports to China. Bangladesh, which imports substantial amounts of crude vegetable oil, with 30 percent sourced from soybeans, could gain advantages by shifting its supply chain to the United States. This would not only provide Bangladesh access to more affordable soybeans but also enhance its economic ties with the U.S., as Bangladesh aims to diminish its trade imbalance with

the U.S. by augmenting imports. Moreover, Bangladesh's current trade surplus of $4 billion with the U.S. might be leveraged to enhance bilateral relations.

Nonetheless, despite these prospects, Bangladesh encounters numerous obstacles in properly leveraging the scenario. The nation has persistently contended with infrastructural inadequacies, a fragile legal framework, and an adverse business climate. These limitations may constrain Bangladesh's ability to capitalize on the opportunities arising from the trade war. Moreover, there are apprehensions over the long-term viability of Bangladesh's association with China, especially considering the nation's escalating indebtedness to China. Critics have expressed concerns regarding Bangladesh's risk of entering a debt trap, a phenomenon noted in other nations involved in China's Belt and Road Initiative (BRI).

Notwithstanding these apprehensions, Bangladesh has experienced a notable surge in foreign direct investment (FDI) from China, especially following Chinese President Xi Jinping's visit to Bangladesh in 2016. During this visit, China and Bangladesh executed 27 investment and finance deals totaling $24 billion, and the influx of Chinese investment into Bangladesh has intensified in the subsequent years. During the 2017-2018 fiscal year, foreign direct investment from China to Bangladesh surged to $506 million, a significant rise from $68.5 million in the preceding year. A significant portion of this investment is directed towards Bangladesh's export processing zones (EPZs), where companies are established to capitalize on the country's low labor costs and its strategic role as a supplier to global markets.

The U.S.-China trade war has disrupted global trade and generated anxiety for numerous nations, yet it has afforded Bangladesh considerable opportunity. The nation's advantageous labor prices, strategic location within the global supply chain, and expanding trade relations with the U.S. and China have allowed it to leverage the evolving dynamics of international trade. Nonetheless, Bangladesh's capacity to fully capitalize on these prospects will hinge on its ability to confront internal concerns, such as infrastructural deficiencies, governance problems, and potential financial risks linked to its expanding connection with China. Bangladesh's performance amid the ongoing trade war will hinge on its capacity to maneuver

through these complications and capitalize on its position within the changing global economic framework (Anwar, 2019).

2.2.9 US-China Trade Conflict and Sri Lanka

Wijayasiri and Wijesinha (2021) discovered that the losses China experiences in US exports have resulted in a trade diversion towards other nations, which has benefitted Sri Lanka in certain respects. As corporations relocate manufacturing from China to alternative regional sites, Sri Lanka has the potential to leverage this transition. The chapter contends that Sri Lanka must improve its competitiveness through the implementation of trade and investment reforms to fully reap benefits. These reforms will facilitate the attraction of increased foreign investment and enhance the economic environment, allowing Sri Lanka to fully capitalize on the repercussions of the trade war. Enhancements in infrastructure, labor markets, and regulatory frameworks will be essential for positioning the country as an appealing locale for relocated enterprises.

Dissanayaka (2022) discovered that the study "How the Trade War between China and the United States Affected Sri Lanka via the Thucydides Trap, the Yugadanavi Power Plant, and Port City – An Investigative Study of the Opinions of Experts in Political Science" by D.M.I.P. Dissanayaka analyzes the intricate effects of the US-China trade conflict on Sri Lanka's strategic initiatives and geopolitical stance. The paper examines the impact of increasing trade tensions between the two global powers on Sri Lanka's foreign policy and its strategy on significant national initiatives. The Thucydides Trap posits that the emergence of a new power frequently results in conflict with the dominant one. The study examines the manifestation of this concept in Sri Lanka's ties with China and the United States, especially regarding its strategic position in the Indian Ocean.

The research primarily concentrates on the Yugadanavi Power Plant, a significant energy development initiative in Sri Lanka. The research examines the impact of the US-China trade conflict on this initiative, particularly concerning the participation of Chinese and American organizations in finance, technological transfers, and collaborations. The study underscores the difficulties encountered by

Sri Lanka in obtaining international partnerships for extensive energy initiatives amidst escalating geopolitical tensions. The study also analyzes the Port City development project in Colombo, focusing specifically on the impact of Chinese investment. This study assesses the impact of the US-China trade conflict on Sri Lanka's capacity to advance the Port City project, focusing on financing and the ramifications for Sri Lanka's foreign relations.

The study employs qualitative research methodologies, such as interviews with political science specialists and secondary data analysis, to elucidate the wider economic and geopolitical ramifications of the US-China trade war for Sri Lanka. The results indicate that the trade war has generated both possibilities and difficulties for the nation. Although it has complicated Sri Lanka's foreign policy and economic objectives, it has simultaneously created opportunities to diversify international partnerships, potentially drawing investments from nations seeking to diminish their reliance on China. The analysis underscores the necessity for Sri Lanka to adeptly maneuver through the evolving global landscape to seize emerging possibilities while alleviating the dangers associated with the persistent trade tensions between the US and China.

Choudhury (2021b) analyzed the essay "The China-US Trade War and South Asian Economies" by Badar Alam Iqbal, published in the Journal of East Asia & International Law in 2022, which investigates the effects of the intensifying trade conflict between China and the United States on South Asian economies. The research indicates that although the trade war has resulted in elevated tariffs and disrupted conventional trade patterns, it has concurrently offered new prospects for South Asian nations to augment their economic interactions with both China and the United States.

Iqbal's analysis highlights that the trade war has caused trade diversion effects, favoring nations such as Bangladesh, India, and Sri Lanka. For example, Bangladesh's garment industry has expanded as American merchants pursue alternate sourcing strategies to alleviate the effects of tariffs on Chinese products. India has experienced a rise in exports to the United States, leveraging the diminished competitiveness of Chinese goods in the U.S. market. Sri Lanka has also sought to

attract investments and trade partnerships by utilizing its strategic location and advantageous trade agreements.

The research examines the difficulties encountered by South Asian economies, including the necessity to adjust to changing global supply networks and the possible hazards of over reliance on either China or the United States. Iqbal underscores the necessity for these nations to enact trade and investment reforms to enhance competitiveness and cultivate a conducive business climate. This strategic strategy is crucial for South Asian countries to manage the intricacies of the trade war and to achieve sustainable economic growth in the changing global environment.

The report offers a thorough analysis of the complex effects of the China-US trade war on South Asian economies as well as selected developed economies, emphasizing the resultant opportunities and challenges. The underlying study provides a significant resource for policymakers and stakeholders in the region, delivering insights on how South Asian countries might adeptly address the evolving dynamics of international trade and economic connections.

2.3 Trade War and Its Repercussions

Qiu et al. (2019) reveal that the other countries shall reap the benefits of this trade war between China and the USA, specifically regarding welfare and trade. It is for this reason that the trade war shall lessen the trade between these two countries and shall divert these trade activities to other countries and the trade of other countries shall boost. However, it may be noted that the GDP and manufacturing shall also affect all other countries. In that aspect, the majority of the countries shall bear the negative effects. It is because of the reason when the trade flow shall be diverted to the other countries only those countries where the GDP and Manufacturing is positive shall be able to handle the improved consumption variety and welfare. In other situations, the production of other countries will become less efficient. This means their productivity will be reduced due to less specialization (Qiu et al., 2019).

The findings of the study reveal that the world shall bear the negative effects of this war except the non-manufacturing production. The non-manufacturing production shall not be affected due to the full-employment assumption and release in manufacturing production because of the trade war (Li and Whalley, 2021).

The literature suggests that trade war may create huge problems for the economies as well as the financial markets. For instance, a study conducted by Burggraf et al. (2020) studied the impact of political news on the movements in stock prices. The study found that such news has a negative impact on S&P stock returns. Further, the study also reveals that the results vary depending upon the trade relations between US industries and China. If the intensity of the relations of an industry is strong, it has been impacted adversely due to the trade war. An important thing to mention here is that the study collected the news from social media, especially from Twitter, to check the impact of news related to the trade war on stock prices. The researcher has analyzed the political risk of the news and its negative influence on the stock markets. One of the study's interesting findings also attempts to answer the question, i.e. "how many words do you need to shake up markets? And the answer as per the study is one tweet or 280 characters are enough". However, it must be noted that the results may vary for the stocks of different industries depending upon their trade openness with China.

Huynh et al. (2023) investigated the global co-movements in the stock markets in the context of Trade war. The researcher used Copula methodology to obtain results. The findings of the study revealed that in the pre-war period, co-movement between the selected stock markets exists but the situation is reversed during the trade war. The study reveals the downside movements during the trade war. This means that systematic risk prevails in global markets. It is important to note that the stocks markets selected for these countries were the European equity markets. The study justifies the rippling effect on the stock market decline in the year 2018 when number of stock exchanges witnessed a downward trend, where the S and P fell more than 6%, Hang Seng Index and Shanghai Index fell 13% and 25%. It is pertinent to highlight at this point that US and China are the witnessing the most severe trade wars of the last decades. Being the two biggest economies of the world, this war shall damage international trade relationships and severely

impact international financial market performance. Further, the research study also examines the G7 equity markets and analyzes the market return distributions, particularly focusing on the USA and China's two major players. It highlights that the increase in the level of globalization and the intricate interdependence of the two major economies has the potential to create strong channels of spillover in the global landscape, specifically in the context of the trade war tensions.

It is pertinent to highlight that some researchers such as Brune et al. (2015), have explored the impact of military conflicts on the financial market. While the focus on the war was more physical and traditional, the underlying study focuses on the new type of war associated with the fourth industrial revolution and its impact on the financial markets.

Arouri et al. (2019) found that internationally diversified assets are typically famous among risk-averse investors to avoid market downturns. In addition to the political risks, macroeconomic news announcements also play a pivotal role in the stock market co-movement (Lahaye et al., 2011). Research studies show that besides news, even when the actual trade war takes place in terms of increase in the tariffs and other steps, it influences the global economic output. It results in the "crowding out" phenomenon, where the industries within these countries in the absence of certainty reduce their output. Therefore, the whole system and financial markets have deteriorated (Huynh et al., 2023).

In the previous section, the important implications of trade war are elaborated in detail. It can be inferred that this event contains a strong probability of affecting the dynamics of markets in the world. Since there is a dearth of studies on the Trade war, previous research studies have been provided in the section below which state how similar kind of events have caused turbulence within and cross markets due to the contagion factor.

2.3.1 Economic Policy Uncertainty

The studies that investigated the impact of EPU on the stock markets are numerous and they have found different results (Antonakakis et al., 2013; Brogaard and Detzel, 2015; Kang and Ratti, 2015; Liu and Zhang, 2015). Further, a study

examined USEPU's impact on the six stock markets (Australia, Canada, China, Japan, Korea and the USA). The findings of the study reveal that the impact of EPU was negative on all the other stock markets except the Australian stock market returns. Another study took into account 19 economies and tested the impact of USEPU on global financial markets. The finding of the study revealed the negative impact of US EPU on all the countries except the Stock Market of China Kido (2018).

In addition,, a study considered European EPU and the USEPU and tested the impact on UK, Germany and French stock markets. The study's findings revealed that the impact of own country EPU was insignificant. However, the impact of USEPU was significant on these stock markets Sun et al. (2019). Following this, a study conducted by of New York at Buffalo. Center for Asian Studies (1976) checked the impact of US-EPU and China-EPU on the global stock markets. Interestingly, the findings of the study reveal that EPUs have a significant influence on global markets. A study by Chen and Yu (2020) has used economic policy uncertainty to measure the impact of trade war on the financial markets.

Moreover, another study attempts to investigate the impact of economic policy uncertainty on the stock market returns during financial crisis period. The study took into account the EPU of US and China and tested its impact on the stock market of these countries. The study used dynamic panel data for nine years and examined the impact of EPU on the stock market of 60 countries in the context of epidemic, war and financial crisis period (Guenichi et al., 2021). The study also highlights that during the war period, the main loser was the USA. The study highlights two reasons to declare USA a loser in the war period. One is the empirical results showing that the interaction between the US-EPU and the dummy variable created for war is significant and positive in contrast to the two main competitor economies, Europe and Asia Pacific. Second, it states that the USA plays a major role in all wars in the world. This US stance led the other competitors in the international stock markets to take advantage of these war periods.

Antonakakis et al. (2018) studied the uncertainty transmission among international markets. The study uses TVP-VAR methodology to analyze the results.

The findings of the study reveal that significant spillover exists from the EU to the US. It highlights that foreign economic uncertainties influence domestic uncertainties. Countries selected for the study include UK, USA, Japan, European Union and Canada.

Kido (2018) found that US economic policy uncertainty shocks contain spillover effects on the global financial markets. The study incorporates FAVAR (Factor augmented vector auto-regression) to check the spillover impact on the stock, currency and commodity prices. The findings reveal that EPU negatively affects stock prices. However, the impact on the Chinese market is very small.

According to a study by Balcilar et al. (2015), economic policy uncertainty also influences the most liquid and largest financial market, foreign exchange.

2.4 Bilateral Tariffs

Bown (2021) explains that the US's trade strategy with China has undergone substantial adjustments under the Trump administration. The Chinese leadership responded in favor. Both sides implemented modifications using a variety of policy instruments, many of which are difficult to measure and are not included in conventional trade policy data series. The researcher, therefore, took the bilateral tariff data in detail and attempted to explain it.

Kapustina et al. (2020) study the causes and outcomes of trade war in detail. The researcher found that one of the main actions during the trade war to reduce the deficit in bilateral trade in the US economy is to impose tariffs. It is also a way to limit the access of Chinese companies into the American market. This study also highlights the importance of imposing tariffs by both countries.

Zeng et al. (2022) studied the impact of Bilateral tensions on US imports. The study considers Bilateral Tariff as a proxy for bilateral tensions. The study's conclusions show that tensions between the two countries hurt US imports. The findings reveal that the companies which were highly integrated to China with varying degrees of supply chain show disproportionate impact. Throughout the trade war period, this pattern has persisted. The increase in tariffs imposed on

different industries that had substantial global value chain ties to China has not only added to the bilateral tensions but also left a lasting impact on these sectors.

2.5 Trade Policy

Nicita (2013) also used trade policy and its impact on exchange rates and examined whether the countries attempting to address the persistent exchange rate overvaluation and trade balance disequilibria are employing trade policy measures as an alternative strategy. The findings reveal that the countries that might be facing currency appreciation are less inclined to pursue trade liberalization. It is due to the fact that overvalued currency already exposes the domestic industries to heightened foreign competition. The study utilizes the Trade Tariff Restrictiveness Index, calculated by Fugazza and Nicita to quantify the trade policy.

The findings of this study substantiate the results of the other studies that also support the significance of exchange rate misalignment. However, it is important to note that, according to this study, short term exchange rate volatility is not a major concern. Trade policy was used in this study as a dependent variable and exchange rates were used as independent variables. In the underlying study, the key variable that is trade war is independent variable and exchange rates (for currency market), as well as stock market returns (for equity markets) and bitcoin return (for digital currency market), are dependent.

2.6 Trade War Shocks

Ozdagli and Wang (2019) studied the impact of policy uncertainty shocks due to trade war have a significant impact on the stock prices. The study further highlights that this impact is less negative for firms that heavily rely on bank debt, whereas non-bank debt does not have a mitigating effect. He et al. (2022) studied the US-China trade shock and how China developed regional resources to mitigate the impact of adverse shocks due to the US-China Trade war. Their study is theoretical and employs economics models to understand the impact of

the cost of switching to alternative locations on regional resilience to handle trade shocks.

The above literature shows the proxies used in the literature to measure the trade war and used in the underlying study to measure the impact of trade war and in the composition of a composite variable.

2.7 Literature for Hypothesis Development

Benguria and Saffie (2019) investigated the global impact of the US and China trade war. The research study evaluated listed firms of 40 countries and found that due to the trade war between the two countries, firms in China that have export exposure towards the USA have declined in productivity (revenue, profits and capital stocks). The research study further reveals that those businesses sensitive to the business cycles are more likely to be drastically impacted due to the trade war and policy uncertainty during this period. The researchers created a dummy variable of trade war to study its impact on the firm level basis. It is important to note that this study highlights two perspectives under which the trade war may cause a global impact. Firstly, the trade policy uncertainty and secondly the substitute of Chinese imports which are targeted by the US tariffs. This shift in the supply chain also greatly impacts connected economics worldwide.

Nong (2021) studied policy uncertainties in the context of trade war between the two countries to measure the effects of the trade war. The researcher then attempted to find out how these uncertainties labeled as trade war affect the two countries. The research considered fiscal, monetary, and trade policy data to obtain meaningful insights. The study's findings reveal that monetary policy is the main cause of uncertainty in China whereas fiscal policy is the main cause of uncertainty in the US. Overall, the focus of the study is to investigate the connection of economic policy uncertainty between the USA and China, in the context of trade war.

Amstad et al. (2021), created a trade sentiment index in order to measure the impact of trade tensions between the two countries (US and China) on the global

stock markets. This Trade Sentiment index is not empirically tested however, it has been created through the textual analysis of the news related to the trade war. Machine learning tools had been applied to obtain the results on a big data pool. The findings of the study reveal that the results of the trade war are not hopeful for any equity markets; rather, the Asian equity markets are severely affected by it.

Wang et al. (2021) studied how firms listed in the stock market of China responded during the trade war period. The study's findings reveal that firms with a high proportion of exports towards the US reacted negatively in the market. The study also highlighted two important findings. First, out of all the firms the reaction of non-state firms was stronger. Secondly, the main cause of this negative reaction was the increase in the tariffs; these firms were directly exposed.

Dhar et al. (2023) studied the impact of trade war on Chinese markets and their competitive advantage being replaced due to trade war by Vietnam. The study highlights the possibility that Vietnam might replace China due to its labor-intensive industry. The study uses data from Comtrade for 20 years. It uses scenario analysis to ascertain and compare Vietnam's competitive advantage. The study's findings show that China's competitive advantage is negatively affected due to trade war whereas Vietnam's competitive advantage has increased during this period.

According to Rahman and Rahman (2019), China's influence on the Asian region has been a huge challenge for the USA. This influence can potentially be a game changer for the US economy in a geopolitical context. Moreover, the USA continues implementing various strategies to address this challenge. A study conducted by Bandyopadhyay and Rajib (2023) found the impact of trade war between US and China on the US soybean futures market.

Further, the US China Trade War has repercussions on specific economies. This perspective has been highlighted by Itakura (2020) by employing the CGE (Computable General Equilibrium) model on global trade. The researcher used simulation analysis to assess the situation. The study aimed at comprehending the effects of trade war on critical factors such as tariffs, investment and productivity.

The findings of the study reveal the decline in the GDP of both the parties to war i.e., China and USA. In addition, the study also analyzes the influence of global value chains to understand the trade responses and the role played by these chains in shaping the robust trade reaction during the conflict period.

According to a research study by Lu and Zhou (2023), physical proximity is an important factor when describing the crisis response. It argues that an increase in physical proximity is linked to the elevated sensitivity to crisis exposure. The researchers applied this argument to examine the impact of US-China trade war shocks and their effects on the firms listed in China's stock market. This study aimed to examine the companies with spatial proximity that experienced a decline in market value due to this event. Thus, the findings reveal a decline in these firms' market value, leading to observable spillover effects extending to peer organizations.

It shows that the US-China trade war can potentially impact the financial markets and the overall economy of each country that is party to it. According to van der Linden and Łasak (2023) the main reason for the trade war is the allegations by the USA towards China for unfair trade practices, technology theft etc. their study highlights the causes and consequences of trade restrictions between the two countries that has led to the trade war. The study concludes that these allegations have turned into war and are now becoming the battle for leadership for the countries.

In continuation, the researchers Jian and Afshan (2023) studied how exporters have reacted to trade protection measures resulting from trade war. The findings of the study reveal a decrease in exports by the USA to China. The study also highlights that the trade shocks stemming from trade war have caused the countries to redirect their exports to alternative destinations, highlighting the need for further investigation of trade war's impact on other economies as well. This has been affirmed by Rahman et al. (2023) as these researchers studied the impact of trade war on the Asian economies. The researchers used the modern technique i.e., neural network approach to determine this impact. This study provides strong rationale for the Asian economies, and it argues that these Asian economies are affected by trade war.

The academic literature stated above clearly shows that the subject of the Trade War has been studied widely, its impact is also measured on the financial markets as well. However, the gap can also be seen in terms of taking this study beyond the existing level. The underlying study, in addition to considering the impact of trade war on the financial stock markets, aims to address the dependence between the stock returns of the selected markets and the trade war and the spillover of the same. It further adds to test the dynamic correlation that may exist between trade war and the financial stock markets.

Channels through which Trade War Impacts Financial Markets

Firstly, trade war creates uncertainty, which can deteriorate investor confidence. It may cause a huge-sell off in the market and cause huge volatility as well. Gu and Xie (2019) studied the impact of trade war on the stock markets from a behavioral perspective. The findings of the study show that the impact of Investor sentiment of the Chinese Investor is asymmetric on the stock market. On the other hand, investor sentiment of the US investor is weaker on the stock market performance. The study also concludes that trade conflicts negatively impact US and China's stock markets. It is due to the strong correlation between the supply chains of the two countries. In that context, raising tariffs tends to cause adverse effects on the stock markets.

Secondly, Li et al. (2020) studied that firms affected by the US initiated trade dispute investigations have altered their earning management strategy. This shift is more visible in the firm with a more negative market reaction with respect to this dispute. The research study states that Chinese firms altered their earning management strategy amid trade war and engaged in more upward earnings management. This tends to cause the investors to react positively to the earnings management by the firms.

According to Cheng et al. (2019), the trade war trigger is like other exogenous shocks to the firms. The firms may take the opportunity to take a "big bath" that means deliberately reporting larger losses in the current period to achieve

higher earnings in future periods. He further states that natural disasters, such as the negative shocks which have economic impact are difficult to quantify by the investors. On the other hand, Lahaye et al. (2011) state that trade investigations (trade disputes) may not be a good opportunity to manage cookie jar reserves; it is because the investors may easily quantify the consequences of final duties imposed. In the context of previous discussion regarding trade dispute investigations. Whether it causes the firm to change its earnings management or not, Healy and Wahlen (1999) conclude that investors use accounting information to value stocks. The earning manipulation may incentivize the managers to influence short-term stock price performance.

Thirdly, of New York at Buffalo. Center for Asian Studies (1976) examines the US-China trade war and states that the only way to fix the trade imbalances and to solve the problem of trade war between the two countries, China must set up economic reforms. The study suggests prevention of further devaluation of Chinese currency and the increase in interest rates. This increase in interest rates may slow down the economic growth and may negatively impact the financial markets. Not only this, but there are also various channels through which increase in the interest rates may have a strong impact on the financial markets via influencing borrowing costs, profitability of the company, investment flows, and asset valuation.

Regarding the case of Trade war, the following are a few studies that directly confront the subject from different perspectives.

Several concerns between US and China give rise to the currency war amid Trade war. A study conducted by Shaikh et al. (2021) clearly states that due to the trump tariff policies in 2018, the Chinese currency weakened; however, the silent war has already been ongoing between US and China since 1970.

It shows that the currency pairs have been examined in the past to test the impact of trade war. The above study provides rationale to study the impact of trade war on the currency pairs.

Numerous studies provide evidence that in past economic crises, investors used cryptocurrency to hedge their assets. For instance, a study conducted by Bouri et al. in 2017 found that the investors preferred cryptocurrencies for the sake

of investment when the national currency of China devalued in 2016. Moreover, there are studies that identify Bitcoin as an investment opportunity that is decoupled with the existing financial system thus offering diversification benefit to the investors (Shahzad et al., 2019).

Plakandaras et al. (2022) extended the literature by incorporating Machine learning techniques to forecast the impact of trade war on the bitcoin returns. The study's findings reveal that trade-related uncertainty and Bitcoin returns have no impact on each other and can be used as a safe haven by investors. The above study provides the rationale for studying trade war's impact on Bitcoin.

Egger and Zhu (2020) conducted an event study on the stock markets during the US-China Trade war. The study aimed to find out the impact of trade war on the stocks of the listed companies and studied the impact of tariff announcements by the US and China in the relevant time span. The study's findings show that the claims of trade war and protectionist measure have affected the third countries more in contrast to the trade war parties. Shi et al. (2021) studied the co-movements between US and Chinese stock market amid trade war. The researchers examined the time varying copula technique at the market and sector levels from 2017 to 2020. The researchers applied event study analysis to investigate the impact of the Trade War on the co-movement dynamics. They further studied the before and after announcements of the effects of the US-China trade war. The study's findings reveal that co-movements exist between China, Hong Kong and US stock markets and are affected positively to the stock markets in specific sectors (specifically, industrial and IT). The study highlights reduced portfolio diversification benefits due to US-China trade war.

The above strand of literature shows that empirical evidence of dependence has already been tested in the literature in the stock markets due to trade war. It further propels the underlying study the underlying study to apply the dependence structure advance methods. So that, to check the distribution structure of the stock market returns and conclude with the right type of distribution, thereby suggesting the type of co-movement that exists in the markets due to trade war.

H1: Trade War risk affects financial markets

Trade war between China and USA has caused its repercussions on many fronts. One of them is the currency markets. Literature on exchange rate volatility shows that various events in the past had also caused it. For instance, a study conducted by Dimitriou et al. (2013) found that extreme economic events, such as the 2008 financial crisis and the Eurozone Sovereign Debt Crisis, reduce the correlations between EUR, JPY, GBP, CHF and the Australian Dollar (AUD) each expressed against the USD (Dimitriou et al., 2013). However, the dependences of the Canadian Dollar (CAD)-EUR and CAD-GBP pairs are increased, likely due to their strong financial and economic ties with the U.S.'s 5/33 economy (Dimitriou et al., 2017).

Gozgor et al. (2019) and Bouri et al. (2020) found that Bitcoin acts as a hedge against trade-related uncertainty. Based on a wavelet analysis, the former academic researchers assert that, with a few caveats, bitcoin returns, and the indicator of trade policy uncertainty (based on news) show a positive link. Bouri et al. (2020) found negative impact of trade uncertainty on the correlations between US equity and Bitcoin returns. Further, a number of studies such as Bouri et al. (2017); Bouri and Gupta (2021); Fang et al. (2019); Aysan et al. (2019); Wu et al. (2019) conclude that Bitcoin returns linked to US-China Trade war likely to increase the volatility. These studies are however contradicted by Baur and Dimpfl (2018). The researchers examined 20 cryptocurrencies and found statistical evidence for Bitcoin and Ethereum to be weak, which might be taken to mean that well-informed investors may predominate these two cryptocurrencies.

H2:H3: Dependence exists between Trade War and Stock Markets, Currency Markets and Bitcoin

Saijai et al. (2021) examined the spillover effect of US stock market volatility amidst trade war on the BRICV stock markets, which include (Brazil, Russia, India, China and Vietnam). The bivariate Garch (1, 1) model measured the spillover effect. The findings of the study show that spillover exists between US and each stock in BRICV. It further shows that the US stock market positively correlated with BRICV stocks between 2012 and 2019. However, after Trump's escalation of trade war period in 2018, the US-China, US-Vietnam and US-Brazil series seem to be affected and have declined in correlation.

The above empirical literature shows the presence of spillover from US to the other stock markets. It further provides rationale to test the spillover from the US to the relevant economies and from the China perspective to the other relevant economies.

According to Ba and Shen (2010), most of the developed and emerging economies around the globe are connected through currencies. For instance, US dollar, Chinese Yuan, etc.; therefore, it is pivotal to study the exchange rate volatility (Qiu et al., 2019).

Exchange rates around the world became flexible in the 1970s (Law et al., 2018; Mahidud et al., 2021) and since then the volatility of exchange rates has been a primary concern (Shaikh and Hongbing, 2015) in the macroeconomics of developed (Weixian, 1999) and developing economies alike (Ketenci, 2016).

The above study provides the rationale of studying the volatility spillover on exchange rates due to trade war.

Bouri et al. (2021) forecasted the volatility of bitcoin returns and the role of the US-China Trade war. The researcher used machine-learning techniques such as random forests and HAR-RV model for this purpose. The study's findings reveal that US-China trade uncertainty enhances forecast accuracy for different random forest designs and forecast timeframes. The claims of Bitcoin's hedging and "fight to safety" properties noted in the preceding sentence are based on anecdotal data, and there is little academic research on the subject.

H4:H5: Spillover exists between trade war ad Stock Markets, currency markets and Bitcoin

A study conducted by Saijai et al. (2021) investigated the dependence structure between US stock markets and the BRICV stock Markets. The study considered the period of the Trade War to evaluate if there was stock market volatility in the returns of these stock markets during this period. The findings of the study reveal that US stock market and the BRICV markets have strong positive correlations during the period of trade war, when DCC GARCH is applied. The study further shows that the Trade war has effected the bivariate copulas of US-China, US-Vietnam and US-Brazil.

The study provides a strong reference for analyzing financial markets. Firstly, it is pertinent to note that when a country with a big economy like the USA initiates Trade restrictions other countries may respond to such trade policy to protect their economies. This situation may lead to the economic slowdown of the whole world. Secondly, in an investment perspective, if the Trade war effect on US economy is positive and cause to increase the investment funds, it may also cause an increase the expected return on the assets. The rise in expected return on assets may also be due to inflation. Thus, this rise may attract more investments internationally. This scenario may change the outcomes of the Trade War.

The right terminology for justifying the argument of investigating dependence and spillover between the markets is financial contagion. This is the situation that causes the markets to co-move. A number of research studies in the literature justify the presence of financial contagion. For instance, a study conducted by Dornbusch (2001) found a contagion effect between advanced and emerging markets. Further, it found high correlations among the markets that had high volatility during that period. The period of the study was 1960-1990.

According to Bank (2025), one of the most important aspects that impact any country's internal and external affairs is the exchange rate, specifically in the trade war. Hur (2018) states that the exchange rate highly affects the firm's costs. This is because firms trade internationally due to increased globalization and financial integration, and changes in the exchange rates impact on the transactions resulting from any trade arrangements.

According to a study conducted by Xu and Lien (2020b), the impact of trade war has been seen on a number of currencies including the Chinese Yuan and major trading partners such as Australian dollar, Euro, Japanese Yen, USD and KRW. The findings of the study reveal that currency contagion between two pairs (KRW-CNY, SGD-CNY) had increased; however, the dependence between JPY-CNY reduced as the trade war began. The recent element of trade war has also been considered for further exploration. According to Xu and Lien (2020b), the trade between China and the US began in March 2018. The announcement by the President of USA to impose tariffs on the goods being imported from China. This was one of the very important events in the foreign exchange markets. It not only

changed the dynamics where major trading currencies shifted their dependencies in the global market, but also, they altered their portfolio positions as well. The onset of trade war had cause strong impact on imports, exports and ultimately outputs and prices in the US-China and among their major trading partners. This created a ripple effect that also translated to other currencies' purchasing power.

According to Xu and Lien (2020b), trade war affects the currency market's dependence structure. The researcher documented intra-regional currency contagions. The study's rationale lies in the fact that the appreciation in the USD against the target currency (CNY) due to the trade war has caused the changes. Further, the study highlights that the downside risk of the global economy caused by the trade war It is due to these two driving factors that the exchange rate variations and the dependence were found between the CNY and currencies of major trading partners.

The study focused on the dependence between CNY and the currencies of major trading partners of the country. The trade war produces heterogeneous effects on exchange rate dependences among the US, China and their major trading partners, further influencing the decisions of portfolio diversification, risk management, central bank interventions and international trade (Xu and Lien, 2020b).

There are a number of studies that highlight the dependences among exchange rates. However, it is pertinent to understand that a notable gap exists in the literature regarding the influence of the US-China trade war on the currency correlations between China and its primary trade partners (Xu and Lien, 2020b). Also, the trade war has a far-reaching impact on the imports and exports for both countries and their key trading partners. These effects translate into changes in the relative purchasing powers of currencies that ultimately lead to the anticipation of significant impacts on the dependencies the currencies may depict. The study further evaluates the dependencies of daily exchange rates of CNY/USD, with its six major trading partners along with USA.

Hou et al. (2024) investigated the linkages between the bitcoin and crude oil markets, in the context of Trade war time period. For this purpose, the researcher took bitcoin and crude oil data from four indices. The findings of the study reveal

that in the initial escalation of trade war between US and China during the trump period, bitcoin got affected. However, this effect can be seen more vividly in the post-trade war period. Finally, bitcoin also works as a diversifier for oil risk.

H6: Dynamic correlation exists between trade war and Stock Markets, Currency Markets and bitcoin

2.8 Integrated Perspective on Trade War Dynamics: Multifaceted Literature

Research conducted by Huang et al. (2023) examined the impact of trade conflicts on the financial lines of networks that facilitate global manufacturing. In order to assess the effects of this component, our investigation has focused on only one year, 2018–2019. The study found that when tariffs were higher, the market value of US organizations whose main business is handling Chinese imports and delivering goods significantly.

Yuan et al. (2023) observed the diversion of supply chains to determine the global effect of the US-China trade war on greenhouse gas emissions. This investigation's primary objective is to ascertain how the US-China trade war has altered the concept of commerce and, more specifically, how these changes may have affected the dispersion of ozone-depleting chemical emissions across different supply chains. Discharges throughout the planet can undergo massive alterations as a consequence. The results of this analysis lend credence to our current understanding of the possible effects of a trade war on the global distribution of goods and labor. Using a trade war as a framework, Steinberg and Tan (2023) examined how the public reacted to foreign protectionism. The essay highlighted the potential repercussions of increased protectionism in the case of a trade war and voiced worries about the free trade system's long-term viability. The study's authors assert that when governments implement protectionist measures, the general population's view of global commerce changes. According to the study's authors, Chinese support for international commerce has regularly decreased while American protectionist measures are in place. People are expressing a desire for revenge,

particularly against the United States, in a tendency known as "direct reciprocity," the results show. The research also finds a "generalized reciprocity" rationale that removes systemic support for trade.

By examining the 2018 US-China trade war, Jian and Afshan (2023) investigated the effect of trade protection on exports. Monthly customs data from January 2017 through May 2019 was used in the study. The study's findings indicate that the initiation of the trade war by the US against Chinese exports results in an average reduction of 16.47% in Chinese overall exports to the US. Further analysis reveals that the decline in exports may be mostly attributed to a fall in volume, while pricing remain largely stable. In contrast, adverse trade shocks result in a shift of exports towards nations that are geographically closer and possess bigger economies. Moreover, there has been an even greater diversion of exports in businesses that are research and development intensive, need skilled labor, have a higher proportion of capital income, and are located upstream in the production chain. Additionally, the study shows that enterprises with a competitive advantage, high export value, large export growth, and high substitution elasticity are more likely to be affected by trade protectionism.

The impact of the trade battle between the US and China on IT advancement in China was concentrated by Chen et al. (2023). The discoveries demonstrate that the trade battle between the US and China fundamentally influences the data and correspondence innovation industry. The operational expenses of ICT businesses have increased, and their capacity to develop technically has decreased due to this war. In addition, while spending on research and development has been about the same, the number of patents filed for very complex ideas has decreased, suggesting that innovation is becoming less effective.

In their 2023 study, Zhang et al. (2023) looked at how trade tariff shock affected CSR. Findings suggest that in the face of trade disputes, firms step up their corporate social responsibility (CSR) efforts. According to the study, corporate social responsibility (CSR) initiatives during a trade war increase sales and decrease the probability of a stock price collapse.

In their study, Dang et al. (2023) studied the redistribution of trade between nations that occurred due to the US-China Trade War. The analysis uses quarterly data on US imports and identifies trade diversion across several sectors and goods, including those that are not specifically subjected to US tariffs on China.

Lee et al. (2023) studied the impact of the US China Trade War and its impact on the Post Conservation research program Land allocation. The study has highlighted the affect caused due to trade war on the commodity markets and prices. Land is one of them. Song and Zheng (2023) conducted an empirical investigation on how Chinese multi-product enterprises modify their export activities in reaction to the increase of US tariffs during the US-China Trade War. The study's results provide compelling evidence that the implementation of an extra tariff on some items sold by the company in the target market is linked to a decrease in sales of its other non-targeted products in the same market. The concept is more similar to cannibalization where the researcher has labelled it as the "within firm cross product chilling effect"

Çepni et al. (2023) studied the time varying spillover effect of US-China Trade War on the growth of emerging economies. The researchers use the US uncertainty index in predicting the growth rate of emerging market economies the period of analysis covers 1984 to 2019. It also takes into account Trade policy uncertainty and GDP data of US and other economies.

Guo and Chen (2023) studied the trade war between the US and China and its impact on the RMB trade rate fluctuations. The researcher studied the news related to China's and US trade policies. According to the report, the most important factors that cause the RMB's value to rise and fall are the China-US dialogue and the introduction of tariffs. In addition, there may be large swings in currency value, leading to quick appreciation or depreciation, as a consequence of tariff reductions and harsher controls on businesses. U.S. policy, events, and trade news are the primary drivers of RMB fluctuations. The influence of positive events on the appreciation of the RMB is small, but the impact of negative events on its devaluation is large.

By 2031, U.S.-China bilateral trade is predicted to have dropped by $63 billion, according to Gilbert et al. (2023). The quantities of trade between the European Union and China are expected to increase, but at a slower pace compared to the worldwide average. This is because enterprises are prioritizing the enhancement of their resilience. The acceleration of near-shoring and friend-shoring will fuel global trade growth with ASEAN nations, India, and Mexico.

Merino (2023) explores the notion of a hybrid global war, specifically focusing on the confrontation between the United States and China. Hybrid warfare refers to a kind of conflict that is distinct from traditional combat, including a battle between two entities. The researcher associates this notion with a novel and intricate global reality that the United States must confront as a result of the expansion of ”globalization”, the widespread use of modern technology, the rise of violent transnational extremist groups, and the resurgence of powerful nations.

The researcher further asserts that it is a “synchronized application of political, economic, informational, CEMA (cyber and Electromagnetic activity) and military effort, for strategic objectives, that minimizes the risks that accompany conventional war”. In addition to this, Joseph S. Nye (2015) highlighted that today’s wars are hybrid and unlimited.

Gao et al. (2024) studied the price dynamics in the soybean markets, considering the US China Trade War and how it varies in the presence of unpredictability in the trade relations of these two countries. The study uses a wavelet approach to investigate this hypothesis. The study takes into account the future soybean markets of China and US and checks the direction and spillover between these markets. The findings of the study reveal that China has been in the more powerful position while responding to the US tax and the retaliation to these taxes has caused the soybean a more powerful position. In addition to this, after the first stage trade deal and the emergence of Covid-19, neither could cause the pricing power of the US soybean market to show any sign of price recovery.

Guo et al. (2023) highlighted the role of economic sanctions imposed by US against China. The study states that these caused structural imbalance in the relation

of two countries. The researchers study the economic impacts of US sanctions against China on US and target countries. It took the data of 20 years.

The findings of the study reveal that the impacts tend to change over time. The study highlights two perspectives as a result of US economic sanctions against China. Firstly, the study shows that increase in these sanctions tend to cause slowdown in the trade growth of China. Secondly, it has a negative impact on the US Consumers and the businesses as well as they face higher prices due to increase in the import duties. It also highlights that although both US and China faced adverse outcomes due to economic sanctions of China, the impact on China has been largely weakened.

Cheng et al. (2023) highlighted that China US Trade War imbalance is a complex macroeconomic issue. The researchers took data from 1992 to 2020 and studied this imbalance. The study's results indicate that the disparity in comparative advantages of service trade significantly contributes to the trade deficit between China and the US. Additionally, the discrepancy in consumption rates plays a crucial role as a mechanism.

Hoque et al. (2023) studied the transmission of technology, knowledge, and expertise in the field of TPU (Technology Production Units) across a limited number of economies. The study's results indicate that the USA and China are major exporters of TPU shocks, while Japan is a significant importer. China's TPU (Third Party User) has the most significant sway among the three nations, with the United States and Japan trailing behind. The research also indicates that the transmission of shocks from the TPU (Trade Policy Uncertainty) of the United States, China, and Japan has an impact on the stock market returns of vulnerable nations.

Stehlík et al. (2024) analyze the stock market results before to and after the significant events in the US Sino transactions from 2016 to 2019. The researcher examines the Chilean stock market index and analyses 26 significant events that occurred throughout this timeframe. The study's results indicate that there were 16 adverse responses and 10 favorable responses, resulting in an approximate market capitalization loss of 13 billion USD.

Zhou et al. (2023) conducted a comprehensive analysis of China's trade policy framework, focusing on the legal reactions to security-related measures and disputes within the international trade system. The researcher analyses China's strategies for ensuring national security, both at the national and domestic levels. The researcher argues that China's security policy is transitioning from defensive to proactive.

In their study, Zheng et al. (2023) studied the economic consequences of the tariff escalations implemented by the United States and China during the trade dispute under the Trump administration and the possible benefits that may arise from their elimination. The tariff hikes were significant, as the United States multiplied its taxes on industrial items by a factor of six, specifically targeting intermediate and capital goods.

Meanwhile, China raised its levies on American agricultural exports by more than five times their previous levels. These modifications affect trade and manufacturing choices in both nations and undermine the global trading system. These events caused significant economic damage to both countries, resulting in a 4.9% decrease in import volumes in China and a 4.5% decrease in the USA.

Additionally, the trading patterns between the two countries were greatly disrupted. Their expenses for the United States increased towards the end of 2021, after the expiration of the import growth provisions included in the Phase One Agreement during the Trump presidency. Reaching an agreement to eliminate these expensive and disruptive tariffs would result in significant increases in revenue for both nations and contribute to the reduction of consumer costs in the United States.

Chen and Nie (2023) used the event research methodology to analyze the US China Trade Conflict. The study revealed that the Chinese Listed firms experienced a detrimental impact on their stock market performance due to the conflict. However, firms with institutional investor holdings (IIH) incurred lesser losses than their counterparts when a trade conflict was announced through a US presidential

memo. The research also analyzed the diverse impacts of this conflict on companies. The impact of IIH was more pronounced for companies with international exposure and those situated in provinces with a greater level of marketization.

The presence of institutional investors reduced the cost of refinancing for the business and enhanced their long-term performance, although experiencing short-term losses after the US presidential statement in the midst of the trade battle. The paper elucidates the function of institutional investors in mitigating the repercussions of the US-China trade war and attaining financial stability from a micro-level standpoint. The findings have significant implications for managing companies and stabilizing financial markets in reaction to uncertainties surrounding trade policies.

van der Linden and Łasak (2023) the Sino-US technological decoupling and the ways to address it. The researchers state the Sino-US trade war has gradually turned into a tech race that mainly stems from China's technological ambitions reflected in the "Made in China 2025" strategy promoting China as a high-tech country in the world markets and reducing its dependence on foreign technology.

Further, the researchers assert that there has been an increasing "tit-for-tat" game for global economic and technological dominance, while at the same time both countries are still strongly linked through the "dollar trap" of international monetary (dollar) system, indicating currency war.

The researchers highlight that the rationale behind this war is the increasing technological competition is to reduce the US reliance on Chinese technology in areas that raise national security risks and to protect critical technologies from being transferred from the US to China, with technological competition mainly encompassing sectors such as 5G, artificial intelligence and advanced semi-conductors.

The study further states China uses its economic power over global technology supply chains to achieve its political goals and many companies are leaders in advanced technologies relative to the US and the rest of the world in fields such as smart phones, drones and electric vehicles.

In response, the US government has placed unprecedented restrictions on technology exports to cut off Chinese companies from advanced semiconductors made

anywhere in the world using US equipment or know-how. The goal is to contain China's rise by thwarting technological development that could enhance its capabilities, especially in the military and cyber fields.

In the search for a suitable US technological decoupling strategy regarding China, four approaches are distinguished to address it including the full technological decoupling by the separationists, the restrictive approach that assumes that the technology relationship between the US and China is a zero-sum game, a cooperative approach that views that US-China technical ties as non-zero and largely beneficial to the US and the centrist approach conducted by the Biden administration that tends to focus on the advanced technology decoupling while enabling fair economic engagement with China in other fields.

Bhargava et al. (2022) studied quantifying narratives and their impact on the financial markets. For this purpose, the researchers attempted to quantify narrative and to explain that which narratives drive the financial markets. For this purpose, the researchers take into account media derived narratives and show that they may contain predictive information for market returns beyond traditional market indicators.

This study may be linked to the trade war as this is also a narrative that the investors may use to enhance the asset allocation strategies, thus it is indirectly linked to the subject of the underlying study. The study's findings help understand how narrative influences financial markets and ultimately impacts asset prices.

Parakh and Aditya (2023) studied the determinants of trade agreements. The researchers aim to investigate the determinants with a novel approach that is different from the standard economic variables. They used socio-cultural, political factors and bilateral relationships and performed a qualitative comparative analysis. The study's findings affirm that countries participate in trade agreements not only for economic reasons but for political and socio-cultural reasons as well. This study indirectly supports the arguments that the trade war between US and China is also escalated by political reasons, which is then translated into retaliatory measures.

Gebre Borojo et al. (2023) found the impact of trade policy uncertainty on the trade flow of 113 emerging economies and low-income developing countries to 143 destination countries. It further studies the impact of trade policy uncertainty on the trade flow between developing countries pair.

The findings of the study reveal that the extensive and intensive margin of trade flow of emerging economies and low-income developing countries are adversely affected by the TPU of destination countries.

Gur and Dilek (2023) discussed about the neo-protectionism policies adopted by America. The researchers study the shift in recent times. They highlighted that the USA has changed its economic priorities and policy preferences in a concerted effort to bolster its weight in the global economy, reduce over-reliance on global supply chains, and create more employment within its borders. This change has become more apparent in the wake of the Trump presidency and the Covid-19 pandemic.

The study highlights that increased neo-protectionist measures and proliferation of smart automation technologies alone will not empower the USA sufficiently to consolidate its technological superiority over China, add impetus to its manufacturing investments and create well-paying jobs for the broader segments of American society through reshoring manufacturing activities.

To achieve these goals, the USA should instead implement an integrated policy framework that spans industrial and technology policies and tax and labor market policies.

Otherwise, even though reshoring may gain a certain momentum, new industrial facilities will not expand productivity enough to raise the competitiveness of the US economy to satisfactory levels, as such investments might not provide enough new job opportunities to remediate socioeconomic problems.

2.9 Summary Table of Key Studies

Following table contains the key studies that highlight the trade war between US and China and it's impact on the financial markets studied by the researchers.

Table 2.1: Summary Table of Key Studies

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
1	BTC	Giray Gozgor, Aviral Kumar Tiwari, Ender Demir, Saqi Akron	2019	relationship between the returns of bitcoin and index of trade policy uncertainty Index in the USA		2010 to 2018	Wavelet Coherency (WTC)	Overall, the paper finds that trade policy uncertainty significantly and negatively affects the Bitcoin returns during the periods of regime changes.
2	BTC	Demir et al.	2018	impact of EPU on Bitcoin				Uncertainties in economic decisions are likely to affect bitcoin returns, which will decrease the trust to fiat currencies. At the extreme quantiles, the EPU has a positive influence on BTC.
3	BTC	panagiotidis et al.	2018	impact of EPU index in China, EU and USA on Bitcoin returns			BSGVAR	EPU impacts negatively on Bitcoin returns.
4	BTC	Aysan et al.	2019	impact of Geopolitical risk on BTC returns			Q-Q (Quantile on Quantile estiamtions	GPR has positive effect on BTC returns on upper quantiles.
5	EPU	Hassen Guenichi hamdi Khalfaoui and Nejib Chouaibi	2021	impact of EPU on the stock markets during the trade war period				one of the core findings relevant to this study is that wars increase the level of own-country EPU and especially USEPU which leads to the third dominant economy (Europe) to take advantage to develop its stock markets as a favorable area for investors.

Table 2.1 continued from previous page

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
6	EPU	Guo et al.	2023	What is the impact of Categorical EPU on carbon futures?			uni variate/regression	the findings of the study reveal that although categorical EPU indices can predict the fluctuation of carbon futures but the prediction ability of a single categorical EPU index is not robust.
7		Itakura	2020	Impact of US China trade war on global trade.		2018-2019	CGE/Computable general equilibrium/simulation analysis	The findings of the study show that there are negative impacts on bilateral trade that are more widespread across countries and world GDP is also reduced. Global value chains play a substantial role in determining trade responses at the disaggregated level.
8	BT	Benguria	2019	The impact of trade war on US exports via change in tariffs		January 2015 to April 2019. 40 countries China, Canada, Mexico, the European Union, Turkey, Russia and India. tariff data	Regression	The findings of the study reveal that there is large negative impact of foreign tariffs on US exports. Second, US import tariffs tend to cause lower exports by US. The study also shows that the impact of tariffs on US export volumes and prices are different than that of exchange rates. This study also sheds light on the role played by uncertainty in trade war. Studying is also important for two things. One concludes that limited ability of US exports facing retaliatory tariffs to be redirected to other destinations. Secondly, tariffs pass through to exchange rate pass through the response is different from what it was on the prices and export volumes.

Table 2.1 continued from previous page

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
9	BT	Bown et al.	2021	What is the impact of global value chains on trade protection?	no theory is mentioned in the paper	1995 to 2013 (10 countries 41 trading partners, 18 Industries.	Instrumental Variable Strategy (IV= bilateral industry level growth in DVA, DV is anti-dumping removals Regression	Researchers find that bilateral industry-specific domestic value-added growth in foreign production significantly raises the probability of removing a duty. The results are not limited to imports from China but are only found for the protection decisions of high-income countries. Back-of-the-envelope calculations indicate that rapid GVC growth in the 2000s freed 15% of the trade flows subject to the most common temporary restrictions (i.e. antidumping) applied by high-income countries in 2007.
10	BT	Kapustina, Lipkova, Silin, and Drevalev	2020	The impact of imposing tariffs to reduce the deficit in bilateral trade in the US economy.	systems theory	2017 to 2020	4 scenarios	The analysis shows that a US-China Tariff escalation could reduce global exports by up to 3% and global income by 1.7% with losses across regions.
11	TP	Caliendo and Parro	2021					
12	TP	Tien and Anh	2019					
13	RnB	Carvalho, Azevedo, Massuquetti,	2019					
14	TW and BTC	Bouri et al.	2021	What is the impact of trade uncertainty on the correlation between US and BTC			2018-2019	BTC returns linked to US and China Trade war Likely to increase the volatility.

Table 2.1 continued from previous page

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
15	BT	Zeng et al.	2022	What is the impact of bilateral tensions on US imports? and have taken bilateral tariffs as a proxy for bilateral tensions.	no theory is mentioned in the paper	GTAP data base from 2018 to 2020	Simulations Method via GTAP	The study's conclusions show that tensions between the two countries hurt US imports. The findings reveal that the companies, which were highly integrated to China with varying degrees of supply chain, show disproportionate impact. Throughout the trade war period, this pattern has persisted. The increase in tariffs imposed on different industries that had substantial global value chain ties to China has not only added to the bilateral tensions but also left lasting impact on these sectors.
16	TP	Nicita (2013)	2013	What is the impact of market access conditions on the international trade?	no theory is mentioned in the paper	Sample includes all major countries and covers more than 90% of world trade.	Regression	Findings show that lower tariffs due to preferential access help increase the bilateral trade. It often results in higher preferential margin vis a vis foreign competitors. This system of preferences is disadvantageous for those countries that did not actively engage in forming new trade agreements.
17	RnB	Ozdagli and Wang	2019	What is the impact of policy uncertainty shocks due to trade war on stock prices?			Rigobon and Sack (2003)	The findings of the study show that this impact is less for firms that heavily rely on bank debt, whereas non-bank debt does not have a mitigating effect.
18	RnB	Zhang	2022					
19	TW and SM	Amiti, Kong, and Weinstein	2020	Estimate the effects of the trade war on investment.			Event Study	The authors find that the trade war lowered the investment growth rate of listed U.S. companies by around 1.9 percentage points.

Table 2.1 continued from previous page

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
20	TW and SM	Stehlik et al.	2024	what is the impact of US Sino transactions on the stock markets		2016-2019 (chilean stock market)	26 events (event study)	the results show 16 adverse responses and 10 favorable responses, resulting in an approximate market capitalization loss of 13 billion USD
21	TW and SM	J. Chen and Nie	2023	US China trade conflict impact on Chinese listed firms			event study	the findings show that Chinese listed firms experience a detrimental impact on their stock market performance due to conflict. However, firms with institutional investor holdings (IIH) incurred less losses when a trade conflict was announced through a US presidential memo.
22	TW and CM	Guo and Chen	2023	trade war between US and China and its impact on the RMB trade rate fluctuations			news announcements	
23	TW/CM	Xu and Lien	2020	Impact of trade war on currencies Chinese yuan and major trading partners.				The findings of the study reveal that currency contagion between two pairs (KRW-CNY, SGD-CNY) has increased; however, the dependence between JPY-CNY reduced as the trade war began. The research also tested the effects of trade war affect the currency market's dependence structure. and documented intra-regional currency contagions.
24	TW/BTC	Plakandaras, bouri and Gupta	2021	What is the impact of trade war on the bitcoin returns?			Machine learning	the study findings reveal that bitcoin returns, and trade related uncertainty have no impact on each other's and can be used as safe haven by the investors.

Table 2.1 continued from previous page

Sr No	Variable Focused	Authors	Year	Research Question	Theories	Sample	Models	Core findings
25	TW/BTC	bouri, gkillas, gupta and pierdzioch	2021	forecasting volatility of bitcoin returns and the role of US-china Trade War			HAR-RV model (Machine learning)	the study findings reveal that US-China trade uncertainty enhances forecast accuracy for different random forest designs and forecast timeframes.
26	TW is old	Cheng, Hong, li and Zhang	2023	one of the complex macroeconomic issues is China US Trade War imbalances		1992 to 2020		The findings show that the disparity in the comparative advantages of service trade is a significant factor contributing to the trade deficit between China and the US.
27	China stance	Zhou, Jiang and Chen	2023	China's trade policy framework focusing on the legal reactions to security related measures and disputes within the international trade system.				the researcher argues that China's security policy is transitioning from a defensive to a proactive character.
28	Trading partners	Zheng, Zhou, Li, Padula and Martin	2023	economic consequences of tariff escalations implemented by US and Chian				these modifications affect trade and manufacturing choices in both nations and undermine the global trading system. Further, the trading partners between the two countries were greatly disrupted.

2.10 Hypotheses

H1: Dependence exists between trade war and stock markets

H2: Dependence exists between trade war and currency of the selected markets

H3: Dependence exists between trade war and Bitcoin.

H4a: trade war shocks during US-China geopolitical tensions generate return spillovers to financial markets, including stock markets, currency markets, and Bitcoin

H5b: trade war shocks during US-China geopolitical tensions generate volatility spillovers to financial markets, including stock markets, currency markets, and Bitcoin

H6: Dynamic correlation exists between trade war and stock markets, currency markets of selected countries and bitcoin

Chapter 3

Research Methodology

The current study aims to examine the stock returns and exchange rates in the context of trade war and the spillover between foreign exchange markets and the stock returns of the selected Asian and Latin American countries in the context of the Trade War . In this chapter, the following sections discuss the choice and construction of the sample, measurement of variables and methodology in detail.

3.1 Data Description

This study has collected data from several sources to conduct an empirical investigation.

3.1.1 Stock Markets

The study focuses on trade war and its impact on the financial market. The focus of trade war revolves around the trade tensions/conflicts between the two major economies i.e., USA and China. Mattoo and Staiger (2020) state the US actions have initiated the trade war, they provide rationale for this reason, by stating that it is a shift from a rule-based system to a based system by the country in order to reduce the trade deficits it has with the trading partners.

In this connection, the focus on the selection of countries is from the perspective of the USA. The major trading partners of the USA and the South Asian Economies

are receptive to trade war. However, the impact is tested from the US and China on these economies in two ways. The trade war variable is also created from the perspective of China and from the Perspective of the US.

The underlying study has taken into account the daily data of 5 South Asian countries, China, India, Bangladesh, Sri Lanka and Pakistan and developed economies including USA, Japan, UK and Germany are taken for the purpose of this study.

Furthermore, the US, China, Germany, Japan and the UK are the major contributors to the WTO as well according to the WTO budget report 2020.

TABLE 3.1: WTO Budget Report, 2020

Member	2020 Contribution in CHF	% Contribution
United States of America	22,855,905	11.691%
China	20,142,365	10.303%
Germany	13,976,295	7.149%
Japan	7,673,375	3.925%
UK	7,399,675	3.785%

Out of the four selected South Asian economies that are highly receptive to the trade war effects, Bangladesh, Sri Lanka, and India were suggested by Rahul Nath Choudhury in his book "The China-US Trade War and South Asian Economies".

According to World Indicator Trade Solution Database by World Bank (2019), Major Trading Partners of USA are:

Partner Name	Trade B	Expc	Import (US$ Thousand)	Import Partner Share (%)
Canada	-34,290...	292,...	326,628,559.10	12.72
Mexico	-104,94...	256,...	361,320,937.42	14.07
United Kingdom	4,967,7...	69,1...	64,133,144.83	2.50
China	-365,83...	106,...	472,464,913.74	18.40
Japan	-72,323...	74,6...	146,974,311.37	5.72
Germany	-70,060...	59,7...	129,857,182.08	5.06

FIGURE 3.1

The underlying study has also been taken into account in the South Asian Countries as well to investigate the impact of Trade war. These include India, Bangladesh,

Sri Lanka and Pakistan. These countries have a long trading history with the USA. For instance, in 2019, the trade volume of the USA with India was $146.1 billion, exports were $58.6 billion, and imports were $87.4 billion. The US goods and service trade deficit with India was $28.8 billion. India is the 9th largest goods trading partner with the USA as per the records.

Pakistan is also a trading partner of the USA with $6.6 billion in total trade, of which the Goods exported total $2.6 billion and imported totaled %3.9 billion. The Trade Deficit in total amounts to $1.3 billion as of 2019 records. Sri Lanka is the 71st trading partner with the USA, where the country's exports to the US total $390 million and imports $2.7 billion. And the US trade deficit with Sri Lanka in 2019 was $2.4 billion. Lastly, Bangladesh is the 46th largest trading partner as of 2019 with a total volume of trade amounting $9 billion, with exports totaled $2.3 billion and imports totaling $6.7 billion. The trade deficit of US goods with Bangladesh is $4.3 billion as of the 2019 record. (Office of the US state Trade Representative, 2019)

3.1.2 Exchange Rates

The daily exchange rate of currencies is taken for the purpose of this study. These currencies include USD, Yuan, CAD, GBP, Euro, and Pak rupee, Taka, Sri Lanka Rupee, Mexican Peso and Indian Rupee. The selection criteria of the currencies are based on the stock markets selected for the study. Real Exchange rates are used for the purpose of the study.

3.1.2.1 Real Exchange Rates

Real Exchange rate is a bilateral measure to compared the currency value of one country in comparison to the other adjusted for inflation difference (MacDonald, 2007).

Following formula has been used to measure the real exchange rates for the underlying study:

Formula:

$$Nominal\ Exchange\ Rate = \frac{Nominal\ Exchange\ Rate\ \times\ Domestic\ Price\ Level}{Foreign\ Price\ Level}$$

3.1.2.2 Selection of CHF as Base Currency

CHF has been used as a base currency instead of USD for all the currency pairs such as USD/CHF, CAD/CHF etc., for working in both cases i.e., for USA and for China. As the study explores the currency market, and the trade war between US and China, it understands the bias that may be caused by using the USD as a base currency and national currency of USA. Also, using USD or EUR as base currencies in exchange rate studies is common. In order to avoid biases, as the USA is the major party of trade war and Germany is one of the financial markets under review in this study, it introduces a unique perspective by using the CHF (Swiss France) as the base currency. The selection is not arbitrary, rather it is purposeful and relevant to the research objectives. The Swiss Franc has emerged as a notable currency for financial analysis due to its stability, neutrality and significance in global trade. Further, Lu et al. (2024) in their study also used Swiss franc as their base currency studying the safe-haven currencies under global uncertainties. The sample of their study included both China currency pair and US for which the base currency Swiss franc is used. The researchers highlight "*The Swiss franc is widely regarded as a safe-haven currency, mainly due to the nation's political stability, strong economy, and sound monetary policy*".

TABLE 3.2: Selected Equity and currency markets for the study

Country's Name	**Index**	**Currency**
USA	S&P 500/DJIA/Nasdaq Composite	USD
UK	London Stock Index (FTSE 100 Index)	GBP
Germany	DAX	Euro
Japan	Nikkei 225 index	Japanese Yen
Canada	S&P/TSX Composite Index	CAD
Mexico	IPC	Mexican Peso
China	Shanghai Composite Index	Renminbi
India	S & P BSE Sensex	India Rupee
Sri Lanka	COOMBO IND ALL SHS	Sri Lankan Rupee

Table 3.2 continued from previous page

Country's Name	Index	Currency
Bangladesh	Dhaka Stock Exchange	Bangladeshi Taka
Pakistan	KSE Index	Pakistani Rupee

3.2 Bitcoin

Although at the stage of conceptualization, there are few empirical studies such as of Gozgor et al. (2019) and Bouri and Gupta (2021), however, huge anecdotal evidence is available to link the trade war to bitcoin. For instance, financial practitioners claim that the US-China trade war and soaring bitcoin prices are not independent (Bouri et al., 2021). Aysan et al. (2019) studied the geo political risk such as trade war and their impact on bitcoin.

According to Barry Silbert, (Interview in fortune, Balancing the ledger, founder of digital currency group), "Bitcoin behaves as an asset that is independent of various uncertainties that exist in the traditional financial system".

The behavior of bitcoin as a flight to safety is not new; it has been seen during the time of "Brexit" negotiations. In that context, research studies such as of Bouri et al. (2017); Fang et al. (2019); Aysan et al. (2019); Bouri and Gupta (2021) and Wu et al. (2019) show that an increase in bitcoin returns are linked with the US-China trade war and uncertainty in general are likely to result in heightened volatility.

Bouri et al. (2021) studied the link between the trade war and bitcoin. For this purpose, the researcher used intraday data in 5-minute intervals from 2017 to 2019. This empirical study confirms the ability of trade uncertainty to predict the realized volatility of bitcoin returns. These results also endorse the work of Gozgor et al. (2019) and Bouri and Gupta (2021) which are the basis of the underlying research.

The data of Bitcoin is obtained from "coinmarketcap".

3.3 Sample Selection

US relations with China share a long history of peace and turbulence. The initial signs of warning between the two countries were seen on the issue of Taiwan in 1971. Later, President Richard Nixon visited China and signed a Shanghai Communique with the premier of China in an attempt to discuss difficult issues. After getting recognition from the USA in 1972 formal ties began between the two countries. China was granted permanent normal trade relations with US, and it joined WTO in 2001. This paved the way for China to become the USA's second-biggest Trading partner and surpass Mexico. The relations between the two countries have had numerous ups and downs. In 2008, China became the largest US foreign creditor. It also became the second largest economy in the world (CFR, 2022).

In 2012, trade tensions began to rise again. The literature shows different measures on various fronts such as diplomatic, political and economic to normalize the relations. However, with the Trump administrations, a spike in the trade tensions was observed again.

In that connection, the suitable period to underline study, which intends to study the Trade War as the key variable, is from 2012 to 2019. The same sample period is used for the purpose of Exchange rate daily data and Bitcoin closing prices.

3.4 Composition of Trade War

3.4.1 Trade War

Trade War is a composite variable that is created through principal component analysis.

3.4.1.1 Literal Definition

It is an economic conflict that results when two countries tend to engage in extreme protectionism or other trade barriers, such as tariffs, in response to the trade measures taken by the other country.

3.4.1.2 Operational Definition

1. According to Jackson (1989), Most favored nation principle and reciprocity constrain the exercise of power and this constraint is the very meaning of a rules based system. Any violation to this triggers a trade war.

   The GATT/WTO rules based multilateral trading system is built on the pillars of the most favored nation principle (MFN) and reciprocity. MFN embodies the non-discrimination principle whereby imports of the same product from different countries have the right to face the same (MFN) treatment in a given market. Reciprocity refers to the notion that bargains should be balanced, so that as a result of the agreed tariff liberalization each country can anticipate an increase in the volume of its exports that is roughly equivalent in value to the increase in the volume of its imports.

2. Mor (2018) states, "A trade war is a back-and-forth dispute in which one country imposes tariffs on certain imports from other countries or countries to restrict trade."

3. According to Bouët and Laborde (2017) "A trade war is an intense international conflict where states interact, bargain, and retaliate primarily over economic objectives directly related to the traded goods or service sectors of their economies, and where the means used are restrictions on the free flow of goods and services".

3.4.2 Trade War Shocks

Trade war shocks are the shocks generated from the equity markets due to the trade tensions between US and China. The method used by Ozdagli (2021) in his research study was employed. This variable was computed two times i.e., separately for US and China. Each time the stock returns of the respective country were used.

The news related to trade disputes between US and China and their respective retaliatory measures including tariff wars is obtained from the WTO website. The

details of the news is provided in Appendix A. The details of construction of variables are provided in the section below.

3.4.3 Economic Policy Uncertainty

EPU has been used as a proxy in the study of Guenichi et al. (2021) to measure the impact of trade war in the financial markets. Another study by Ongan and Gocer (2020) also aims to examine the impact of US trade policy uncertainty on US bilateral trade balance with China.

Besides, economic policy uncertainty (EPU) is a form of economic risk, where the future of government policy is uncertain and unpredictable, which raises risk premiums and leads businesses and individuals to delay spending and investment until the uncertainty is clear. According to Supachart (2019) The concerns regarding China's competition with the US in shaping the global world order are more likely to be driven by political factors rather than economic motives. Consequently, changes in economic policy in China implied by the economic uncertainty has urged various sectors to prepare in order to have the readiness for further actuation.

The global economic policy uncertainty index reveals an increase in the world's aggregate economic policy uncertainty since mid-2007 as well as EPU indices of US and China. The Chinese EPU Index reached the peak at the end of 2018, the same time as the economic growth in China was at the lowest rate and occurred with the emergence of the serious trade war.

Another study by Wang et al. (2014) cited by Supachart (2019), states that as investors in the financial market expect their returns according to the risk taken by the uncertainty that plays important role in order of decision making under information they received as well as a corporate investment which degree of marketization is sensitive to the economic policy uncertainty. Thys we may consider that EPU affects not only the real economy but also creates significant reactions from the financial market.

Another general argument for uncertainty in the controlled market is that the setback faced by the manufacturers and the exporters in China as a result of trade

war cannot be controlled even if the media is under control in China. In addition to this, many other factors may lead to uncertainty for instance, the control of government often leads to the view that the information is not transparent.

The control further leads to unpredictable policy changes that may create a volatile environment. Loss of credibility among public and international observers is also evident in government-controlled environments.

The data for Economic policy uncertainty has been taken from the website named (www.policyuncertainty.com). The makers of this index have created this policy-related economic uncertainty index for many countries, out of which we have obtained the data for USA and China. The index is based on the newspaper-based approach.

The methodology of creating EPU is provided in appendix B.

3.4.4 Bilateral Tariffs

The calculated values of Bilateral Tariffs are adopted from the world trade profile reports available on the WTO (World Trade Organization) website. The report contains country wise bilateral tariff details i.e., for US and China Separate details are available. The data labeled as trade weighted average means HS six-digit MFN tariff average weighted with HS six-digit import flows is used for the study.

The technical notes provided by the report that show the calculation of these bilateral tariffs show that "*only duties and imports recorded under HS chapters 01-97 are taken into account. Each applied tariff schedule is validated against the standard nomenclature at the HS six-digit subheading level of the HS version adopted by the country for the reference year. National tariff lines that do not follow this standard (i.e., the first six digits should be based on the standard subheading nomenclature of the HS version used by the country) are discarded and not taken into account" (World Trade Profile Report, 2022 by WTO)*".

3.4.5 Trade Policy

Nicita (2013) in their article use the measure capturing direct market access conditions, although methodologically identical to the OTRI (Overall Trade Restrictiveness Index), is labeled tariff trade restrictiveness index (TTRI) to account for its more limited trade policy coverage (i.e., only tariffs). In the construction of these indices, the aggregation across products takes into account the fact that the imports of some goods may be more responsive than others to a change in tariffs, intuitively, products where imports are less sensitive to prices (inelastic) should be given less weight because of preferential access (a lower tariff) would have a lesser effect on the overall volumes of trade.

For this study, STRI (Services trade restrictiveness Index) was used as a proxy. The data has been obtained from OECD (Organization of economic cooperation and development).

Composition

As per the database, the following lines elaborate on the method of calculating the indicator.

"The OECD STRI is a unique, evidence-based tool collecting information on trade restrictions across 19 major services sectors. The project has two distinct but complementary instruments: a services trade regulatory database and a services trade restrictiveness index. These instruments provide a rich source of information for trade policy makers, trade negotiators, and researchers and are instruments for impact assessment of trade liberalization. The STRI further allows individual countries to benchmark their services market regulations against the global best practices and identify outlier restrictions and current bottlenecks.

The regulatory database contains laws and regulations collected from 50 countries: the 38 OECD Member economies, Russia and key partners (Brazil, China, India, Indonesia, Kazakhstan, Malaysia, Peru, Russia, South Africa, Thailand, Singapore and Vietnam), as well as countries having accession discussions with the OECD. Based on the qualitative information in the database, composite indices quantify the identified restrictions across five standard policy categories, with values between zero and one. Complete openness to trade and investment gives a score

of zero while being completely close to foreign services providers yields a score of one".

TABLE 3.3: Description of variables and data sources.

Variable	Definition	Reference	Data Source
Economic Policy Uncertainty	News based Economic Policy Uncertainty Index	Baker et al. (2016)	Policy Insight.com
Bilateral Tariffs	These are the trade war Tariffs i.e., tariffs that each country applies to the other	Benguria (2023)	World Trade Organization/-World Bank
Trade Policy	It is measured through the Services tariff restrictiveness Index.	Fugazza and Nicita (2013)	OECD
Exchange Rates	Real exchange rates	Saadaoui (2024)	Investing.com
Equity	Real Equity prices	Shi et al. (2021)	Investing.com
Bitcoin	Real Bitcoin Price	Plakandaras et al. (2022)	Coin Market Cap
Trade War Shock(TWS)	It is computed with the help of Ozdagli (2021)	Li et al. (2023)	New source: WTO | 2020 News items. (2022). Retrieved 23 September 2022, from www.wto.org/english/newse
Trade War Composite (TWC)	Trade War is a composite variable that is created through principal component analysis.	PCA (Principal Component Analysis)	

3.5 Model Specification for Composite Variable

A composite variable war created for the underlying study separately for USA and China with their respective proxies for trade war.

The equation for composite variable is as follows:

$$Trade\ War\ Composite = b_1\ STRI\ +\ b_2 EPU\ +\ b_3 BT\ +\ b_4 TWS$$

Where STRI is services trade restrictiveness index, EPU is economic policy uncertainty, BT is bilateral tariffs and TWS is trade war shocks.

The composite variable is created with the help of principal component analysis. The weights b_i are derived from PCA and ensure the components maximize explained variance. it is pertinent to mention here that the composite variable was created for US where all the data for the above variable was obtained for USA, for instance Services trade restrictiveness index from US to China, EPU of USA, Bilateral Tariffs from USA to China and Trade war shocks were estimated on the stock returns from the US equity market. Similarly, for the composite variable that was created for China, the data was obtained for China, for instance, Services trade restrictiveness index from China to USA, EPU of China, Bilateral tariffs from China to US and Trade war shocks were estimated from the returns of the Shanghai stock exchange.

3.6 Research Methodology

As one of the objectives of the studies is to find the dependence structure between the markets and Trade War, therefore, in order to measure the correlation between the markets and risk copula technique is the most effective. The Copula model allows the market correlation and risk to be handled with greater flexibility (Hsu et al., 2012).

It is important to note that in order to measure the dependencies of the financial asset returns may be computed through product-moment coefficient. However, it is evident that returns rarely follow a normal distribution and are generally non-linear and time varying. It is very challenging to model the co-movement given the price jumps due to any economic shock.

According to a few research studies, there is evidence that asymmetry exists as the downside and upside market movements are considered. Further, the tail

distributions are not similar to those found in the normal distribution and tend to be fatter (Ang and Chen (2002); Boyer et al. (1999); Kolari et al. (2008); Longin and Solnik (2001); Tastan (2006)). These studies further suggest that dynamic conditional correlation model (DCC) is a probable solution to capture and address this however, this methodology developed by Engle (2002) only considers the time-variation issue and not the extreme values or departure from normality, therefore, in order to get a complete understanding, there is a need to go one step further from DCC Family Models to Copula as suggested by (Nakatani and Teräsvirta, 2009).

Construction of Trade War Shock for the underlying study

The trade shocks variable was constructed using the method followed by Li et al. (2023) to quantify the impact of trade war news on financial market returns. Daily return data for both the United States and China were collected over the study period. A dummy variable was created to denote days with trade war-related news; it was set to 1 on days when significant policy announcements, such as tariff impositions or changes in trade agreements, were reported, and 0 on days without such news.

To determine the baseline variance (i.e., market behavior absent trade policy shocks), average daily returns were computed for periods when the dummy variable was 0. On days when trade war news was present (i.e., the dummy variable was 1), the difference between observed returns and this baseline was calculated. This difference was interpreted as the "variance due to trade war" and was used to capture the market's reaction to these specific events.

This methodology was applied to both the US and China, with trade shocks variables constructed for each. This approach allowed for isolating the impact of trade war news from other potential confounding factors, enabling a clear quantification of trade-induced volatility in the respective financial markets.

3.6.1 Principal Component Analysis

The underlying study has used principal component analysis (PCA) methodology to create a trade war index and investigate the impact of trade war on financial

markets. PCA technique in EViews allows the weights to be automatically created for each Trade War component.

$$TWC_{usa} = \sum_{i=1}^{4} \alpha_i \times X_i$$

where

TWC_{usa} is the trade war composite variable created with US data derived from PCA

α_i is the loading assigned to the i-th variable by PCA

$\sum_{i=1}^{4}$ is the summation of four variables

X_i is the i-th original variable (X_1=EPU,X_2 = BT,X_3= STRI and X_4=TWS

Principal component analysis is a statistical technique that is used to reduce the dimensionality of a dataset while retaining most of the variation in the data. It ensures the contribution of each variable by ensuring the standardization of data. Further, the correlation matrix is calculated to understand the relationships between the variables. Further, eigenvalues and eigenvectors of the covariance matrix are computed. Where eigenvectors determine the direction of the principal components and eigenvalues determine their magnitude. The sorting of eigenvectors is done in decreasing order of their corresponding eigenvalues. The principal components are then formed by selecting the top k eigenvectors, where k is the number of components that explain a significant portion of the variance. The original data is projected onto the new principal component axes resulting in a transformed dataset with reduced dimensionality.

3.6.2 The Copula Methodology

Copulas are joint distributions with uniform marginal, representing the dependence structure in the joint distribution. Copulas were first introduced by Geenens (2024). To account for asymptotically large losses, Nguyen and Huynh (2019), Boako and Alagidede (2018) and Rivieccio and De Luca (2016) demonstrated how

to define dependence structure through the family of heavy tail and stochastic copula.

A few overviews of copula hypothesis and claims have shown up in the writing to date (Nelsen, 2006) and (Joe, 1997) are the main course books on copula hypothesis, giving thorough introductions with copulas and reliance demonstrating, with an accentuation on measurable establishments (Joe and Kurowicka, 2011). Speak to a forward-thinking study on copula and vine copula applications. Cherubini (2004) present an overview of copulas utilizing techniques from numerical account (Patton, 2012). Presents an outline of the utilization of copulas in monetary time arrangements. Jondeau and Rockinger (2006) proposed a GARCH-Copula way to deal with measures of the reliance construction of financial exchanges. Notably, the examination of reliance investigation, particularly on outrageous occasions, assumes a vital part in monetary applications, such as portfolio choice, value-at-risk, and worldwide resource assignment.

3.6.3 Copula Models for the Dependence Structure

3.6.3.1 Motivation for Using Copula Model

Copula functions tend to describe the correlations between variables. It uses low dimensional marginal probability density function to describe high-dimensional join distribution. Different copula functions can be employed under varying market circumstances in order to accommodate different distribution characteristics.

According to a study conducted by Zhao et al. (2017), the researchers stated that a non-linear model is crucial for accurately describing the dynamic correlation structure between variables. The copula function excels in this domain as it is a non-linear correlation research tool that can precisely depict the dependent structure among multiple random variables. Its flexible form and excellent statistical properties make it particularly adept at capturing the non-linear characteristics and sharp peaks and heavy tails often observed in financial assets.

By utilizing a copula model, this research can effectively analyze the complex interdependencies in financial markets impacted by trade wars, providing a robust framework for understanding and managing risk.

Copula Method

First and foremost, copula capacities proposed by Geenens (2024) have now become a compelling apparatus for demonstrating the dependency of irregular factors. The use of the copula capacities expanded hugely throughout the most recent twenty years. A few investigations have applied copula capacity to decide the reliance structure in monetary information for better outcomes. Copula capacity can be characterized along these lines, the copula is a capacity that ties a dimensional total conveyance capacity to its single-dimensional edges and is separated from everyone else a steady dissemination work portraying the reliance of the model. So as indicated by Sklar, joint dissemination between factors can be investigated in copula structure by changing the minor conveyance into a uniform distribution. so, any aggregate circulation can be transformed into minimal dispersion.

3.7 Copula

Following equation describes the general form of a copula:

$$C(u, v) = P(U \leq v, V \leq v)$$

where $= \mathrm{F}_{Twc}$ (Twc) : is the marginal CDF of the trade war composite variable. and $= \mathrm{F}_s$ (S) are the marginal cumulative distribution functions (CDFs) of the dependent variable that is each series of stock when testing dependence between the two series. Trade war composite variable will remain the same when testing for each series and the stock return series is changed each time the bivariate dependence has been tested.

The same method is revised for the currency market as well where the trade war composite variable is tested for bivariate dependence with each currency pair that is tested separately. As a result each currency pair is tested with a trade

war composite variable that was created with the US data and the process was repeated for the trade war composite variable that was created for China. each series whether stock returns, currency pairs or bitcoin series, all were tested with trade war composite variable China after testing with Trade war composite variable for US.

Gaussian Copula

The Gaussian copula models linear dependence and is based on the bivariate normal distribution.

$$C_{Gaussian}(u, v; \rho) = \phi_{\rho}(\phi^{-1}(v), \phi^{-1}(v))$$

where

$u = F_{Twc}(Twc)$: Marginal CDF of the trade war composite variable.

$v = F_s(S)$: Marginal CDF of the stock return series.

ϕ = Standard normal CDF

ϕ^{-1} ; inverse of the standard normal CDF

ϕ_p : Bivariate normal CDF with correlation parameter , representing the strength of linear dependence.

Clayton Copula

The clayton copula is well suited for modeling lower tail dependence. It captures the strong co-movement during the joint downturns.

$$C_{clayton}(u, v; \theta) = [max(v^{-\theta} + v^{-\theta} - 1, 0)]^{-1/\theta}$$

where:

$\theta > 0$: parameter controlling the strength of dependence. Larger implies stronger lower tails dependence.

$v = F_{Twc}(Twc), v = F_s(S)$: marginal CDFs of the trade war composite variable and stock return series of the selected economies.

Gumbel Copula

The Gumber copula captures the upper tail dependence. it captures the co-movements during the extreme positive events.

$$C_{Gumbel}(u, v; \theta) = exp(-[(-ln(v))^{\theta} + (-ln(v))^{\theta}]^{1/\theta})$$

$\theta \geq 1$: this parameter controls the upper tail dependence. Larger value of implies stronger dependence.

$v = F_{Twc}(Twc), v = F_s(S)$: marginal CDFs of the trade war composite variable and stock return series of the selected economies.

Frank Copula

This copula is symmetric and models moderate dependence.

$$C_{Frank}(u, v; \theta) = -1/\theta ln(1 + \frac{(e^{-\theta u} - 1)(e^{-\theta v} - 1)}{e^{-\theta} - 1})$$

$\theta \neq 0$: it is the dependence parameter where positive implies positive dependence and negative implies negative dependence.

$v = F_{Twc}(Twc), v = F_s(S)$: marginal CDFs of the trade war composite variable and stock return series of the selected economies.

Student's t Copula

This copula models the dependence with tail dependence in both extremes i.e upper and lower tails.

$$C_t(v, u; \rho, \tau) = t_{\rho,\tau}(t_{\tau}^{-1}(v), t_{\tau}^{-1}(u))$$

where:

t_v : it is the CDF of the univariate t-distribution with degrees of freedom.

t_τ^{-1} : it is an inverse univariate t-distribution CDF.

$t_{\rho,\tau}$: it is bivariate t-distribution CDF with correlation parameter and degrees of freedom τ.

$v = F_{Twc}(Twc), v = F_s(S)$: marginal CDFs of the trade war composite variable and stock return series of the selected economies.

The above series has similarly applied for the currency market and bitcoin series as well. It is pertinent to mention here that the trade war composite variable created with the US data was once tested with all these series respectively (stock returns, currency pairs and Bitcoin). The working is done again to test the dependence with the trade war composite variable created with the data obtained from the China side (as described above) and was tested again with each series. The results are discussed in the next chapter.

3.8 GARCH in Mean

In order to explore the return and volatility transmission from Trade War composite variable to the selected series in the stock markets, currency market and Bitcoin, two stage GARCH in mean approach (GARCH-M) is used, proposed by Liu and Pan (1997). In the 1st stage, the relevant series (from the stock market, currency market and bitcoin) are modeled through an ARMA(1,1)-GARCH (1,1)-M model.

$$\gamma_{j,t} = \beta_0 + \beta_1\gamma_{j,t-1} + \beta_2 V_{j,t} + \beta_3\varepsilon_{j,t-1} + \Omega_j\varepsilon_{k,t} + \varepsilon_{j,t}\varepsilon_{j,t} \sim N(0, V_{j,t})$$

$$V_{j,t} = \alpha_{j,0} + \alpha_{j,1}V_{j,t-1} + \alpha_{j,2}\epsilon_{j,t-1}^2 + \phi_j\epsilon_{k,t}^2$$

where $\varepsilon_{(k,t)}$ is the standardized residual series for the trade war composite variable, and captures the mean return spillover effects from it. The exogenous variable $\epsilon_{k,t}^2$

that is the square of the standardized residual series is included in the conditional volatility equation to observe the volatility spillover. It is well defined as $\epsilon_{k,t} = \epsilon_{k,t}\sqrt{V_{k,t}}$. The subscript j in each of the equations refers to the return series from stock markets, currency market and Bitcoin respectively.

3.9 DCC-GARCH

In order to predict future volatility based on the past returns, Multivariate GARCH model i.e., Dynamic Conditional Correlation is preferred. DCC (Dynamic Conditional Correlation) considers time varying effects while calculating the correlation matrix. It must be noted that DCC is an extended form of CCC, Constant Correlation Estimator.

The underlying study shall base the foundation on the model by Antonakakis et al. (2018):

$$O_t = \omega_t + P_t whereas \frac{p_t}{v_{t-1}} \sim N(O, C_t)$$

$$p_t = C_t^{1/2}\omega_t, where \omega_t \sim N(0,1)$$

$$C_t = D_t O_t D_t$$

where $t = O_{it}, \cdots, O_{Nt}$ is a N * 1 1 vector of volatilities (specifically, 8 stock markets, 8 foreign exchange markets and Bitcoin), thus N = 14; (ω_t, ω_{Nt}) denotes 14 * 1 mean vector ω_t, conditional covariance matrix is denoted by C_t, diagonal matrix square root of the conditional variances is represented by D_t = diag $(C_t^{1/2}, \cdots C_{NN,t}^{\frac{1}{2}})$ whereas the univariate GARCH-type model is defined by the C(ii,t) and in the last t is the t * (N(N-1)/2* A) matrix consisting of the time varying correlation.

$$O_t = diag(q_{ii,t}^{-1/2}, \cdots\cdots\cdots q_{NN,t}^{-\frac{1}{2}})$$

However, symmetric positive definite matrix is represented as $Q_t = (q_{i,j,t})$ is an N * N and is defined as follows.

$$Q_t = (1 - \alpha = \beta)Q + \alpha\omega_{t-1}\omega_{t-1} + \beta Q_{t-1}$$

In the above equation $\omega = (\omega_t, \cdots \omega_{Nt})$ N * 1 vector of the standardized residuals and Q represent the unconditional variance matrix of ω_t. Non-negative scalar parameters meet the condition $\alpha + \beta < 1$.

Linking Methodology to Research Questions and Hypothesis

The underlying study's first two research questions aim to determine the impact of trade war on financial stock markets, financial currency markets and Bitcoin. The research hypothesizes that trade war has a significant impact on the financial stock market, financial currency market and Bitcoin. To test this hypothesis, regression analysis is employed. This method allows for quantifying the relationship between IV and DV as in the case of this study, the IV is trade war and the DV is labeled as financial markets (including financial stock markets, financial currency markets and bitcoin). The regression model helps to assess the extent to which the trade war influences the financial markets performance.

The third and fourth research questions are related to testing the dependence structure between trade war and the financial stock markets, financial currency markets and Bitcoin. The research hypothesizes that dependence exists between trade war and financial stock markets, financial currency markets and Bitcoin. To explore the dependence structure, Basic 5 copula models are used. Copula models allow for capturing and modelling the dependence between multiple variables without assuming a specific distribution. The copula functions have facilitated this research to describe the dependence structure between trade war and the financial markets. It adds insights as to how these variables co-move under different market conditions.

The research questions five and six test the volatility transmission from US and China to selected financial stock, currency markets and Bitcoin and dynamic correlation between trade war and selected financial stock, currency markets and Bitcoin. The underlying study hypothesizes that the spillover and dynamic correlation exists in these markets. In order to test these hypotheses, GARCH modeling is used. Where Garch-M is used for volatility spillover and DCC Garch is executed to test the hypothesis related to dynamic correlation.

Chapter 4

Descriptive Statistics

TABLE 4.1: Descriptive Statistics for Trade War Proxies from US data

US	Bt	Stri	Epu	Tws
Mean	0.036136	0.225283	0.032632	0.045595
Std	0.002716	0.013951	0.026814	0.0403978
min	0.027917	0.157567	4.07E-05	5.14E-05
25%	0.034778	0.224804	0.0125861	0.013867
50%	0.03499	0.224909	0.0247981	0.0330402
75%	0.037941	0.225271	0.0467325	0.0654554
max	0.046771	0.26149	0.129591	0.174273

The descriptive statistics for trade war proxies from the US data provide a detailed overview of the distribution and variability of the variables Bt, Stri, Epu, and Tws. The mean values suggest that Bt (0.2253) has the highest average, followed by Tws (0.0456), Epu (0.0326), and Bt (0.0361). The standard deviations indicate that Tws (0.0404) and Epu (0.0268) exhibit greater variability, while Bt (0.0139) and Bt (0.0027) are relatively stable. Minimum values show close proximity to zero for Epu (0.00004) and Tws (0.00005), reflecting occasional minimal levels. The quartiles reveal a central clustering of values, with medians (50th percentile) for Bt, Stri, Epu, and Tws at 0.03499, 0.22491, 0.02480, and 0.03304, respectively, indicating typical central tendencies. However, the maximum values, such as 0.1296 for Epu and 0.1743 for Tws, highlight the potential for significant spikes in these variables. Overall, the data suggests that Bt and Stri are relatively consistent,

while Epu and Tws demonstrate higher fluctuations, reflecting their sensitivity to external influences in the context of trade wars.

TABLE 4.2: Descriptive Statistics from Trade War Proxies from China Data

China	**Bt**	**Stri**	**Epu**	**Tws**
Mean	0.0919892	0.437777	0.0678617	0.0734103
Std	0.0141685	0.0181067	0.050015	0.0616113
min	0.0685155	0.360632	1.31071e-05 |	3.40E-04
25%	0.0760744	0.428066	0.02721	0.0238933
50%	0.100871	0.443656	0.0572468	0.0561557
75%	0.103783	0.44734	0.100637	0.106864
max	0.106499	0.505839	0.223146	0.256583

The descriptive statistics for China's trade war proxies—Bt, **Stri**, **Epu**, and Tws—illustrate varying levels of central tendency and dispersion. Among the variables, **Stri** has the highest mean (0.4378), reflecting its dominant average influence, followed by **Bt** (0.0920), **Tws** (0.0734), and **Epu** (0.0679). The standard deviations indicate moderate variability for **Bt** (0.0142) and **Stri** (0.0181), whereas **Epu** (0.0500) and **Tws** (0.0616) display greater fluctuations. The minimum values show near-zero occurrences for **Epu** (0.00001) and **Tws** (0.00034), emphasizing their potential for minimal impact at times. Quartiles reveal the central clustering of data, with medians (50th percentiles) for **Bt**, **Stri**, **Epu**, and **Tws** at 0.1009, 0.4437, 0.0572, and 0.0562, respectively, signifying typical midpoints. Maximum values such as **Epu** (0.2231) and **Tws** (0.2566) highlight occasional spikes in these variables. Overall, the data suggests that **Stri** is the most consistent and influential variable, while **Epu** and **Tws** exhibit more variability, indicating sensitivity to external factors in China's trade war context.

4.1 Principal Component Analysis

TABLE 4.3: PCA variance for Trade War Composite created for USA

USA	**Explained Variance**
Bt	0.32166407

Table 4.3 continued from previous page

USA	Explained Variance
Stri	0.27719884
Epu	0.20267636
Tws	0.19846072

The data represents the explained variance contributions of four factors—Bt, Stri, Epu, and Tws—to a model or phenomenon in the USA. Bt, with 32.17%, is the most influential factor, indicating its dominant role in explaining the variation in the data. Stri follows with 27.72%, showing a substantial yet smaller impact compared to Bt. Epu and Tws contribute 20.27% and 19.85%, respectively, with relatively moderate effects, though their importance remains significant.

Together, these factors account for 100% of the total variance, suggesting a comprehensive decomposition where all variables are impactful, with no single factor overwhelmingly dominant. This highlights a balanced contribution of all four factors in the model's variance explanation.

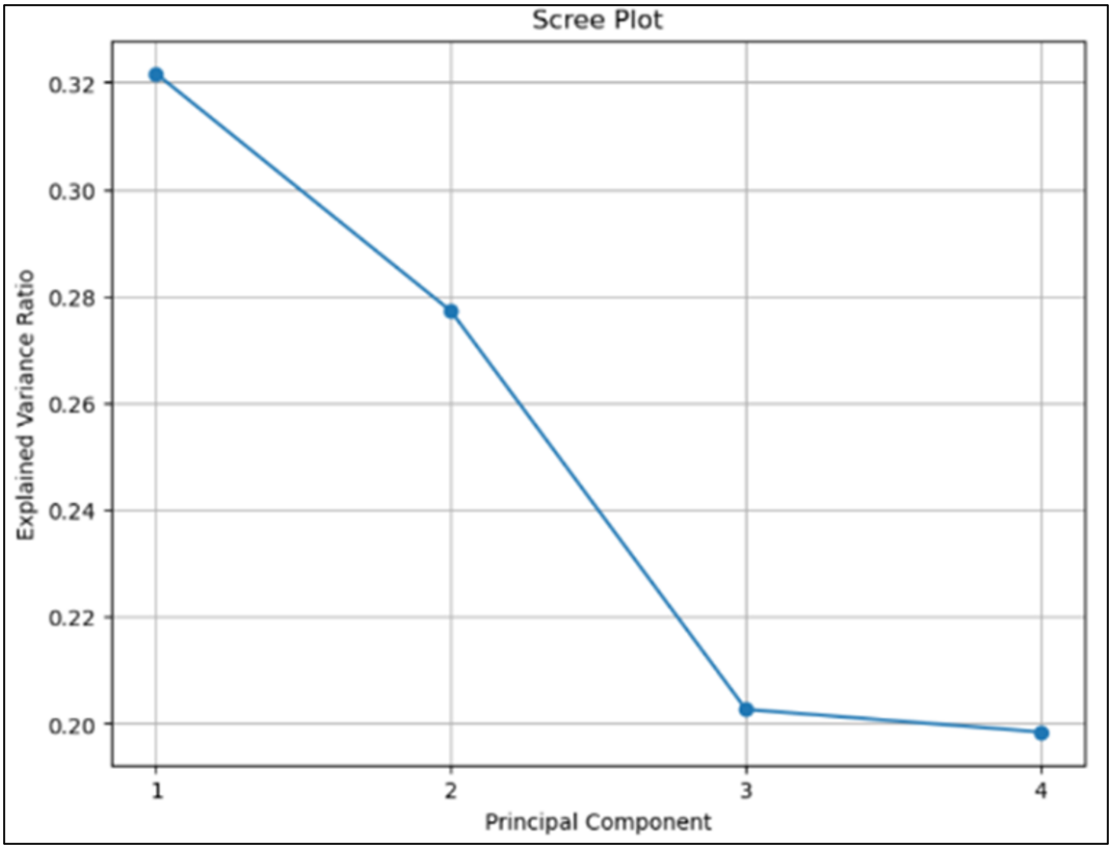

FIGURE 4.1: Scree Plot for Trade War Composite Variable created with Trade War proxies for USA side

TABLE 4.4: Principal Component Analysis explained variance table trade war proxies obtained for China

Chine	**Explained Variance**
Bt	0.42748266
Stri	0.25900888
Epu	0.24089193
Tws	0.07261653

The explained variance data for China highlights the contributions of four factors—Bt, Stri, Epu, and Tws—to a model or phenomenon. Bt, with a significant contribution of 42.75%, emerges as the most influential factor, accounting for nearly half of the total variance. Stri follows with 25.90%, showing a substantial but smaller impact relative to Bt. Epu contributes 24.09%, indicating its comparable significance to Stri. Tws, however, has a much smaller contribution of 7.26%, suggesting it plays a minor role in explaining the variance. Overall, the distribution of explained variance underscores Bt's dominance in the model for China, with Stri and Epu also playing important roles, while Tws has relatively limited influence.

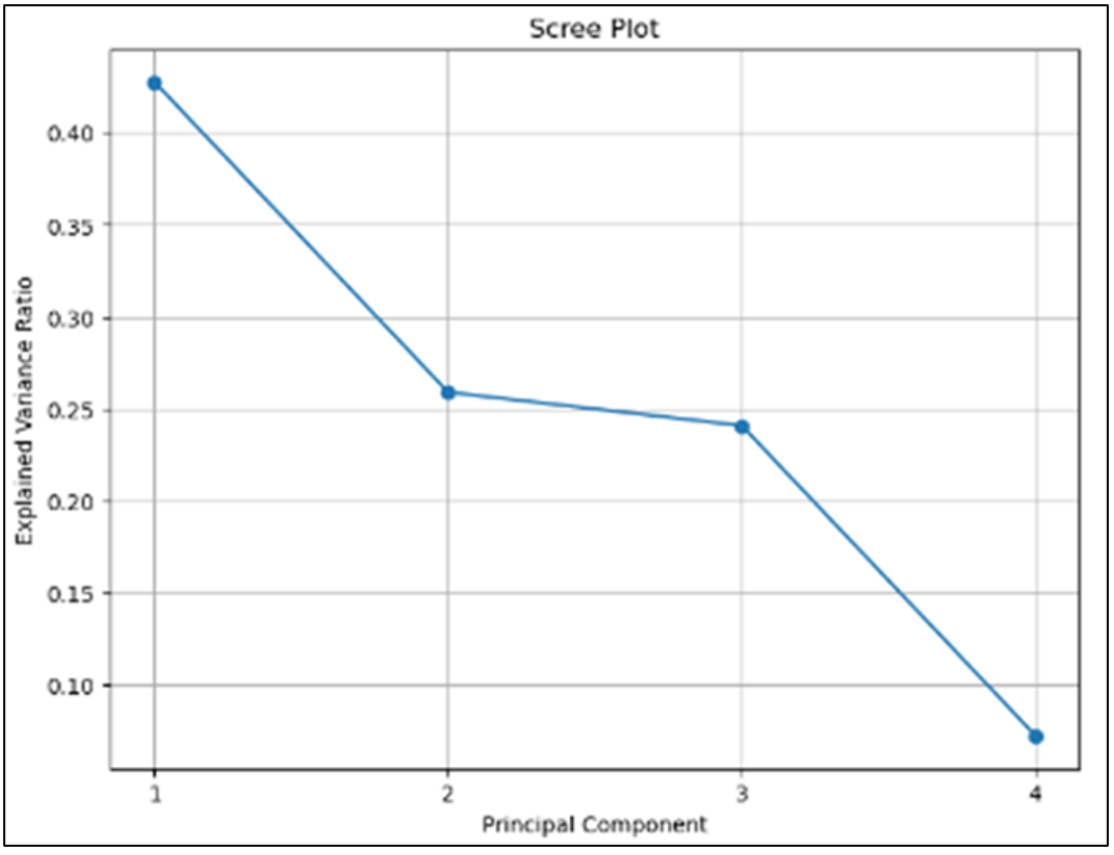

FIGURE 4.2: Scree Plot for PCA of trade war proxies obtained for China Side

TABLE 4.5: Descriptive Statistics for Stocks and Trade War Composite Variable for US and China

	BANGLA	**CANADA**	**CHINA**	**GERMANY**	**INDIA**	**JAPAN**
Mean	-0.00296	0.00019	0.00024	0.00024	0.00076	0.00035
Median	0.00036	0.00074	0.00096	0.00083	0.00093	0.00082
Maximum	0.09798	0.11295	0.05604	0.10414	0.08595	0.07231
Minimum	-0.30854	-0.13176	-0.08873	-0.13055	-0.14102	-0.07049
Std. Dev.	0.02780	0.00943	0.01372	0.01239	0.01091	0.01222
Skewness	-7.30171	-0.94168	-1.15894	-0.67559	-0.91488	-0.41520
Kurtosis	65.61321	46.97163	9.97251	11.77532	19.97811	7.51079

TABLE 4.6: Descriptive Statistics for Stocks and Trade War Composite Variable for US and China

	MEXICO	**PAK**	**SRI LANKA**	**TW CHINA**	**TW USA**	**UK**	**US**
Mean	0.00023	0.00061	0.45310	0.35244	0.21011	0.00011	0.00051
Median	0.00043	0.00071	0.44523	0.81921	0.15546	0.00067	0.00085
Maximum	0.05943	0.04684	1.02472	1.40734	5.00353	0.08667	0.08968
Minimum	-0.07853	-0.07102	-0.02914	-3.08880	-3.10077	-0.11512	-0.12765
Std.Dev.	0.00998	0.01035	0.32292	1.08230	0.98868	0.01002	0.01065
Skewness	-0.72119	-0.47906	0.09563	-2.12471	0.14943	-0.83506	-0.58472
Kurtosis	10.32888	7.14439	1.72128	6.34628	3.64341	14.63052	23.41440

The statistical summary offers essential insights into the attributes of data distributions across different countries or areas. The averages for most countries are often near zero, with the exceptions of Sri Lanka, Taiwan (China), and Taiwan (USA), which exhibit much higher average values of 0.4531, 0.3524, and 0.2101, respectively. Medians are typically positive and frequently exceed means, signifying skewed distributions. Maximum and minimum values indicate considerable variety, exemplified by Taiwan (China) with a maximum of 1.4073 and a minimum of -3.0888, and Taiwan (USA) with a broader range from -3.1008 to 5.0035. Standard deviations indicate more volatility in regions such as Taiwan (China) and Taiwan (USA), in contrast to the more stable distributions observed in countries like Canada and Sri Lanka. Skewness indicates that the majority of distributions are negatively skewed, with the exceptions of Sri Lanka and Taiwan (USA), signifying

a predominance of severe negative values. Kurtosis values exhibit significant variation, with exceptionally high kurtosis in Bangladesh (65.61) and Canada (46.97), indicating heavy-tailed distributions, whilst Sri Lanka presents the lowest kurtosis (1.72), signifying a distribution more akin to normality. These measurements highlight the varied statistical behaviour among regions, with some demonstrating stability while others display significant volatility and severe values.

4.2 Descriptive Statistics for Currency Market and Bitcoin

TABLE 4.7: Descriptive Statistics for currency market and Bitcoin

RER	**BANGLA**	**BTC**	**CANADA**	**CHINA**	**GERMANY**	**INDIA**	**JAPAN**
Mean	0.138382	0.001772	0.004406	0.01241	-0.006941	-0.000696	0.025385
Median	0.08588	0.003344	0.004344	0.003332	-0.002905	0.001701	-0.001761
Max	0.495803	0.203359	1.552815	1.393607	1.109803	0.532377	3.370976
Min	-0.081781	-0.175181	-1.722214	-1.922867	-0.986397	-0.888291	-4.403866
Std. Dev.	0.145399	0.036936	0.280871	0.275324	0.232778	0.136238	0.751876
	BANGLA	**BTC**	**CANADA**	**CHINA**	**GERMANY**	**INDIA**	**JAPAN**
Mean	0.138382	0.001772	0.004406	0.01241	-0.006941	-0.000696	0.025385
Median	0.08588	0.003344	0.004344	0.003332	-0.002905	0.001701	-0.001761
Max	0.495803	0.203359	1.552815	1.393607	1.109803	0.532377	3.370976
Min	-0.081781	-0.175181	-1.722214	-1.922867	-0.986397	-0.888291	-4.403866
Std. Dev.	0.145399	0.036936	0.280871	0.275324	0.232778	0.136238	0.751876

The descriptive statistics for currency markets and Bitcoin (BTC) underscore disparities in performance and volatility among various geographies and assets. The average values reveal that the majority of currencies maintain low positive or near-zero averages, with the Real Exchange Rate (RER) exhibiting the highest mean (0.1384) and China presenting a negative mean (-0.0069), indicating a general depreciation or downward trend over the studied time. Conversely, Bitcoin's mean (0.0044) is modest yet positive, indicating its overall rising trend over time. The medians for the most of variables approximate their means, signifying a somewhat symmetric distribution, with the exception of Japan, which exhibits a median (-0.0018) markedly lower than its mean (0.0254), showing skewness.

The standard deviations indicate considerable volatility in Bitcoin (0.2809) and Japan (0.7519), reflecting their pronounced fluctuations relative to other currencies. The greatest and minimum numbers underscore Bitcoin's significant volatility, with a peak of 1.5528 and a trough of -1.7222, indicating strong price fluctuations. Japan demonstrates the broadest spectrum among the currencies, with a peak of 3.3710 and a trough of -4.4039. Conversely, Bangladesh and Germany demonstrate less volatility, as seen by their lower standard deviations (0.0369 and 0.1362, respectively). The figures demonstrate Bitcoin's increased volatility relative to conventional currency markets, whilst regional currencies exhibit varying trends and stability levels influenced by local and global economic factors.

TABLE 4.8: ARCH Effect (TWCUS to other Stock Markets)

Sr. No	**countries**	**coefficient**	**Significance**	**Model**
1	USA	0.157054	0.0000	ARMA-GARCH
2	JAPAN	0.307638	0.0000	ARMA-GARCH
3	Germany	0.296895	0.0000	ARMA-GARCH
4	UK	0.262566	0.0000	ARMA-GARCH
5	Canada	0.18494	0.0000	ARMA-GARCH
6	Pak	0.377096	0.0000	ARMA-GARCH
7	India	0.294393	0.0000	ARMA-GARCH
8	China	0.336196	0.0000	ARMA-GARCH
9	Mexico	0.373529	0.0000	ARMA-GARCH
10	Bangladesh	0.405174	0.0000	ARMA-GARCH
11	Sri Lanka	0.782872	0.0000	ARMA-GARCH

Note: The above table 4.8 shows the results of ARCH Effect that is a pre-requisite for conducting the GARCH in Mean. The ARCH effect is tested for the stock markets

First of all, the ARCH effects are examined in all the series. The results are presented in the above tables. The level of significance shows that the ARCH effect exists in all the series. So, for all the series, we apply ARMA-GARCH model. The table presents the results of the ARCH (Autoregressive Conditional Heteroskedasticity) effect testing across stock markets, using the ARMA-GARCH model. The coefficients represent the degree of volatility clustering, a pre-requisite for applying the GARCH-in-Mean model, and all coefficients are statistically significant

with p-values of 0.0000. Among the markets, Sri Lanka exhibits the highest coefficient (0.7829), indicating the strongest presence of volatility clustering, followed by Bangladesh (0.4052), Pakistan (0.3771), and Mexico (0.3735). China, Japan, Germany, India, and the UK have moderately high coefficients ranging from 0.2626 to 0.3362, reflecting significant but less pronounced volatility effects. The USA and Canada show lower coefficients (0.1571 and 0.1849, respectively), suggesting relatively milder volatility clustering compared to other markets. These results highlight substantial heterogeneity in volatility dynamics across global stock markets, with emerging markets like Sri Lanka and Bangladesh exhibiting stronger ARCH effects, likely due to higher market inefficiencies or external shocks.

TABLE 4.9: ARCH Effect (TWC-US to other Currencies)

Sr. No	currencies	Coefficient	Significance	Model
1	USD/CHF	0.992571	0.0000	ARMA-GARCH
2	JPY/CHF	0.268983	0.0000	ARMA-GARCH
3	ERU/CHF	0.103796	0.7840	ARMA-GARCH
4	GBP/CHF	0.260394	0.0000	ARMA-GARCH
5	CAD/CHF	0.207581	0.0000	ARMA-GARCH
6	PKR/CHF	0.057111	0.0000	ARMA-GARCH
7	INR/CHF	0.070155	0.0000	ARMA-GARCH
8	YEN/CHF	0.207581	0.0000	ARMA-GARCH
9	MXR/CHF	0.222472	0.0000	ARMA-GARCH
10	BDR/CHF	0.992571	0.0000	ARMA-GARCH
11	SLR/CHF	0.887463	0.0000	ARMA-GARCH
12	BTC	-0.193699	0.0000	ARMA-GARCH

Note: The above table 4.9 shows the results of ARCH Effect that is a pre-requisite for conducting the GARCH in Mean. The ARCH effect is tested for the Currency market.

First of all, the ARCH effect is examined in all the series. The results are presented in the above tables. The level of significance shows that the ARCH effect exists in all the series except currency (Euro/CHF) Germany. Therefore, for all those series in which ARCH effect exists we apply ARMA –GARCH model and for EURO/CHF and USA itself. Further, The table summarizes the results of ARCH (Autoregressive Conditional Heteroskedasticity) effect testing for various

currency pairs and Bitcoin (BTC) using the ARMA-GARCH model. The coefficients indicate the degree of volatility clustering, with all coefficients statistically significant (p-values of 0.0000) except for the EUR/CHF pair (coefficient: 0.1038, p-value: 0.7840), suggesting that most currencies exhibit significant ARCH effects, a precondition for applying the GARCH-in-Mean model. Among the currencies, USD/CHF and BDR/CHF show the highest coefficients (0.9926), indicating pronounced volatility clustering, followed closely by SLR/CHF (0.8875).

Other currencies, such as MXR/CHF (0.2225), CAD/CHF (0.2076), and GBP/CHF (0.2604), exhibit moderate ARCH effects. Interestingly, BTC has a negative coefficient (-0.1937), signifying a contrasting volatility pattern compared to traditional currencies. These results reveal that most currency pairs, especially those involving emerging markets like BDR/CHF and SLR/CHF, exhibit strong volatility clustering, while BTC displays unique volatility behavior, potentially driven by its speculative nature and differing market dynamics.

Table 4.11 presents the results of the GARCH-in-Mean model analyzing the mean and volatility spillover effects of the Trade War composite variable (Twus) on various stock markets. The mean spillover coefficients for Twus are mostly insignificant across the markets, as indicated by high p-values, except for Canada (0.000229, p = 0.03572).

This suggests that the trade war composite has a limited direct impact on the mean returns of most stock markets, with Canada being a notable exception where the variable positively affects returns.

Additionally, the Twus_cond-var coefficient, which captures volatility spillover, is significant only in Canada (p = 0.001455) and India (p = 0.09962), indicating moderate evidence of volatility transmission to these markets. For other countries like Japan, Pakistan, and the UK, the coefficients are insignificant, implying no meaningful volatility spillover from the trade war composite.

The variance model highlights persistent volatility in all analyzed stock markets, as evidenced by significant and high beta coefficients, such as 0.78 for the US, Canada, and the UK, and 0.88 for China and India. These results indicate that volatility shocks from trade war conditions have a lasting impact across markets.

TABLE 4.10: Mean and volatility spillover from TW composite variable to currency markets including Bitcoin

	US		**bangla**		**canada**		**China**		**Germany**		**India**	
Twus	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	-0.0453	0.469	0.004406	0.502	-0.00217	0.87	0.002829	0.795	0.0113	0.332	0.000665	0.773
Us(1)	0.0829	0.586	0.8891	2.10E-254	-0.008	0.876	-0.0108	0.833	0.0508	0.275	0.0421	0.55
twus	-4.91E-03	0.791	0.003002	0.242	0.019	0.03046	0.0131	0.08409	0.003288	0.646	0.000665	0.793
twus_cond-var	0.0238	0.541	0.004519	0.357	0.0111	0.229	0.009064	0.299	-0.0122	0.114	-0.00126	0.606
Variance Model												
omega	5.22E-03	0.175	0.000132	0.06786	0.00021	0.415	0.000134	0.434	0.00064	0.659	0.000377	0.00609
alpha	0.1081	2.52E-03	0.0999	0.01158	0.0349	0.001282	0.0397	1.27E-05	0.0285	0.611	0.2002	3.99E-10
beta	0.8919	0	0.8801	1.57E-88	0.9651	0	0.9603	0	0.9601	7.50E-29	0.7798	1.50E-110
	Japan		**Mexico**		**Pak**		**Slr**		**Uk**		**Btc**	
Twus	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	-0.0242	0.301	0.005107	0.516	0.002021	0.564	0.0738	0.577	-0.00289	0.833	0.002328	0.294
Us(1)	0.0167	0.774	-0.0048	0.927	0.0462	0.443	-0.8995	0.77	0.0725	0.113	-0.00525	0.899
twus	-0.00933	0.591	0.004681	0.367	0.004854	0.07101	0.0355	0.602	0.005308	0.543	0.001526	0.23
twus_cond-var	0.006401	0.731	0.001029	0.884	0.001136	0.686	0.007794	0.779	-0.00767	0.349	-9.59E-05	0.925
Variance Model												
omega	0.001028	0.282	0.000606	0.06517	0.000143	0.192	0.000583	0.894	0.001464	0.177	2.73E-05	3.42E-06
alpha	0.0265	0.105	0.051	0.002171	0.1941	0.03845	0.215	0.142	0.0529	0.03623	0.01	0.632
beta	0.9735	0	0.929	1.40E-307	0.8059	1.54E-18	0.785	0.196	0.9255	4.8E-223	0.97	0

Table 4.11: Mean and Volatility Spillover from Trade War Composite Variable to Stock Markets

	US		**bangla**		**canada**		**China**		**Germany**		**India**	
Twus	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	0.001016	3.86E-12	9.41E-05	0.524	0.00037	0.000548	0.000235	0.231	0.000481	0.02531	0.000675	9.21E-05
Country(1)	0.1468	7.39E-10	0.9179	0.00E+00	0.1688	1.66E-24	0.3393	2.21E-47	0.2891	9.89E-37	0.296	1.40E-40
twus	5.38E-05	0.687	-3.20E-05	0.904	0.000229	0.03572	9.65E-05	0.144	2.41E-05	0.69	8.90E-05	0.314
twus_cond-var	0.000424	0	0.000113	0.477	0.00024	0.001455	-1.25E-05	0.92	1.83E-05	0.855	-0.00015	0.09962
Variance Model												
omega	2.22E-06	0	2.40E-06	0	1.73E-06	0	3.33E-06	0	2.81E-06	0	2.17E-06	0
alpha	0.2	1.05E-15	0.2	3.63E-09	0.2	2.19E-16	0.1	2.44E-13	0.1	3.30E-10	0.1	2.58E-08
beta	0.78	0	0.78	8.30E-232	0.78	0	0.88	0	0.88	0.00E+00	0.88	0.00E+00
	Japan		**Mexico**		**Pak**		**Slr**		**Uk**			
Twus	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**		
constant	0.000645	0.001655	0.000321	0.03431	0.001007	1.04E-09	0.000338	0	-61.3694	0.00014		
Country(1)	0.3166	5.94E-41	0.3756	1.04E-70	0.3862	1.20E-185	1.0001	0	0.232	1		
twus	-5.00E-05	0.882	-5.03E-05	0.771	-0.0006	0.000718	6.69E-05	4.50E-250	-78.6419	0.536		
twus_cond-var	-3.47E-05	0.858	-5.79E-05	4.06E-05	1.34E-05	0.906	-4.52E-05	0	42.314	0.654		
Variance Model												
omega	1.34E-05	0	1.71E-06	0	1.82E-06	0	9.88E-08	0	1.86E-06	0.999		
alpha	0.2	1.46E-16	0.1	4.21E-10	0.1	5.66E-12	0.2	4.85E-31	0.1	4.32E-01		
beta	0.7	1.70E-183	0.88	0	0.88	0	0.78	0	0.88	0.967		

TABLE 4.12: Mean and Volatility spillover from Trade war composite variable (china) to stock markets

	Bangladesh		**canada**		**China**		**Germany**		**India**	
Twchn	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	-0.4757	8.71E-01	9.09E-04	3.59E-07	-0.00028	0.492	0.000729	0.0374	0.001088	0.003372
Country(1)	0.8986	9.49E-01	0.1684	1.74E-14	0.3386	2.18E-48	0.2887	1.91E-40	0.2956	1.97E-64
twchn	-1.20E-01	0.946	-4.23E-04	0.07038	0.000612	0.14	-3.05E-04	0.458	-4.08E-04	0.274
twchn_cond-var	0.1494	0.971	-0.00018	0.04898	0.000244	0.199	-1.04E-04	0.594	-3.05E-04	0.0487
Variance Model										
omega	2.52E-06	1	1.73E-06	0	3.33E-06	0	2.81E-06	0	2.17E-06	0
alpha	0.2001	2.86E-01	0.2	3.44E-25	0.1	4.00E-255	0.1	2.82E-10	0.1	3.24E-21
beta	0.7799	0.000772	0.78	0.00E+00	0.88	0	0.88	0	0.88	0.00E+00

TABLE 4.13: Mean and Volatility spillover from Trade war composite variable (china) to stock markets

Twchn	**Mexico coef**	**pvalue**	**Pak coef**	**pvalue**	**Slr coef**	**pvalue**	**Uk coef**	**pvalue**
constant	0.000685	9.05E-02	6.80E-04	5.25E-02	0.000338	6.89E-13	-7.21E-05	0.833
Country(1)	0.3758	4.02E-72	0.386	3.78E-69	1	0.00E+00	0.2701	9.23E-33
twchn	-5.07E-04	0.181	2.57E-04	0.403	6.94E-05	0.752	4.18E-04	0.175
twchn_cond-var	-0.000227	0.192	0.000599	2.57E-06	-1.73E-05	0.954	-4.81E-04	0.03379
Variance Model								
omega		0	1.82E-06	0	9.88E-08	0	1.86E-06	0
alpha	0.1	9.68E-41	0.1	2.51E-12	0.2	1.84E-30	0.1	5.59E-12

Table 4.13 continued from previous page

Twchn	Mexico coef	pvalue	Pak coef	pvalue	Slr coef	pvalue	Uk coef	pvalue
beta	0.88	0	0.88	0.00E+00	0.78	0	0.88	0

Meanwhile, the alpha coefficients, representing short-term volatility effects, are significant and uniformly high (0.1–0.2), indicating that markets experience immediate but transient responses to trade war-related volatility. Notably, the high significance of omega across markets (p = 0.00) suggests the baseline level of market variance remains significantly influenced by trade war uncertainty. In summary, while mean spillover effects from Twus are generally minimal, volatility spillovers are more pronounced, particularly in the Canadian and Indian stock markets, reflecting these economies' sensitivity to trade war conditions.

Table 4.12 and 4.13, show that the mean and volatility spillover effects of the trade war composite variable (Twchn) originating from China on the stock markets of many nations. The results indicate that the influence is more significant in the volatility dynamics (variance model) than in the mean effects. In Bangladesh, the Twchn coefficient in the mean model is statistically negligible (-0.1201, p-value = 0.946), signifying the absence of a significant mean spillover effect from the trade war. The volatility model indicates substantial persistence, evidenced by a beta value of 0.7799 (p-value = 0.000772), implying that volatility shocks are enduring.

In Canada, Twchn has a slightly significant negative mean effect (-0.000423, p-value = 0.07038). The conditional variance effect of Twchn is marginally significant (-0.00018, p-value = 0.04898), suggesting that trade war anxiety has a minor influence on the volatility of Canada's stock market. The persistence of volatility is significant, indicated by a beta of 0.78 (p-value $<$ 0.0001).

India exhibits no substantial mean spillover (Twchn coefficient = -0.000408, p-value = 0.274) however demonstrates strong volatility persistence (beta = 0.88, p-value $<$ 0.0001).

Table 4.14: Mean and volatility spillover from trade war composite variable (China) to Currency Markets and Bitcon

	US		**Bangla**		**Canada**		**China**		**Germany**		**India**	
Twchn	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	-0.0116	6.59E-01	0.0246	4.73E-11	0.0106	4.22E-01	0.013	2.86E-01	-0.00742	5.36E-01	-0.001	8.53E-01
country(1)	1.09E-01	0.556	7.91E-01	2.70E-114	-3.16E-03	0.951	-1.11E-02	0.827	5.74E-02	0.214	4.36E-02	0.535
twchn	0.0464	0.423	0.0274	1.47E-12	2.22E-02	0.268	1.82E-02	0.359	-6.26E-03	0.608	-0.00125	0.885
twchn_cond-var	0.006348	0.55	0.004397	5.09E-10	0.003496	0.392	0.00293	0.4	-0.00089	0.653	-0.00034	0.832
Variance Model												
omega	0.005243	2.07E-01	0.000152	8.84E-05	0.000212	4.07E-01	0.000135	4.37E-01	0.000677	5.37E-01	0.000371	8.80E-03
alpha	0.1068	0.00314	0.0999	8.81E-05	0.0344	0.0011	0.0393	1.22E-05	0.029	5.20E-01	0.2	3.94E-10
beta	0.8932	0	0.8801	2.20E-241	0.9656	0	0.9607	0	0.9593	7.53E-48	0.78	1.90E-104

Table 4.15: Mean and volatility spillover from trade war composite variable (China) to Currency Markets and bitco

	Japan		**Mexico**		**Pak**		**Slr**		**Uk**		**Btc**	
Twchn	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
constant	0.0308	3.95E-01	0.016	1.29E-01	0.001604	7.14E-01	-0.2351	2.62E-01	-0.0129	2.66E-01	0.001819	3.47E-01
Country(1)	1.45E-02	0.802	-6.54E-03	9.11E-01	6.18E-02	0.426	1.23E-01	0.801	7.46E-02	0.102	-7.55E-03	0.857
twchn	0.0698	0.07967	0.009931	4.97E-01	9.82E-03	0.193	-3.31E-01	0.23	1.17E-02	0.44	0.001387	0.615
twchn_cond-var	0.009495	0.149	0.000118	9.64E-01	0.0021	0.121	-0.0406	0.255	0.001806	0.613	0.000192	0.782
Variance Model												
omega	0.001021	2.78E-01	0.000536	3.64E-01	0.000245	2.57E-01	4.92E-05	8.75E-01	0.001437	1.68E-01	2.73E-05	4.87E-06
alpha	0.0263	0.117	0.0683	9.28E-02	0.2211	0.01539	0.1159	2.85E-01	0.0504	2.72E-02	0.01	6.40E-01

Table 4.15 continued from previous page

	Japan		Mexico		Pak		Slr		Uk		Btc	
Twchn	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**	**coef**	**pvalue**
beta	0.9737	0	0.9143	1.17E-58	0.7594	1.24E-11	0.8841	2.27E-06	0.9283	1.60E-267	0.97	0.00E+00

In Mexico, the Twchn mean effect is negligible (-0.000507, p-value = 0.181), however the volatility model demonstrates significant persistence (beta = 0.88, p-value < 0.0001). In Pakistan, the average effect is negligible (Twchn coefficient = 0.000257, p-value = 0.403), although volatility persistence is considerable (beta = 0.88, p-value < 0.0001). Sri Lanka (Slr) exhibits no substantial mean spillover (Twchn coefficient = 6.94E-05, p-value = 0.752) but demonstrates considerable volatility persistence (beta = 0.78, p-value < 0.0001). In the UK, Twchn demonstrates no substantial mean effect (0.000418, p-value = 0.175) but exhibits considerable volatility persistence (beta = 0.88, p-value < 0.0001).

To sum, the average spillovers of trade war worries are often small across markets, the persistence of volatility (beta values) is consistently robust and significant. This signifies that the trade war imposes enduring consequences on market volatility, underscoring the susceptibility of global stock markets to geopolitical uncertainty.

The GARCH-in-mean results for the mean and volatility spillover from the trade war composite variable created with the trade war proxies obtained for china, indicate varied effects across markets, especially concerning volatility persistence (beta) rather than mean effects. In the Bangladesh market, Twchn demonstrates a highly significant mean effect with a coefficient of 0.0274 (p-value = 1.47E-12), signifying a direct impact of trade war uncertainty on returns. The variance model indicates a considerable alpha (short-term volatility) of 0.0999 (p-value = 8.81E-05) and beta (volatility persistence) of 0.8801 (p-value = 2.2E-241), implying robust and enduring volatility.

The Japanese market exhibits a feeble mean effect (Twchn coefficient = 0.0698, p-value = 0.07967), however volatility persistence is robust (beta = 0.9737, p-value < 0.0001). Likewise, Bitcoin's returns remain substantially unchanged (Twchn coefficient = 0.001387, p-value = 0.615), although its volatility demonstrates considerable persistence (beta = 0.97, p-value < 0.0001), highlighting its susceptibility to exogenous shocks.

Other markets, including the UK and Pakistan, exhibit minimal mean spillovers yet substantial volatility impacts. In the UK, the beta is 0.9283 (p-value = 1.6E-267), signifying enduring volatility despite little direct mean impacts (Twchn coefficient = 0.0117, p-value = 0.44). Likewise, Pakistan's market exhibits significant volatility persistence (beta = 0.7594, p-value = 1.24E-11), despite the constrained mean effects (Twchn coefficient = 0.009818, p-value = 0.193).

The data highlights that uncertainties from trade wars predominantly affect volatility rather than average returns across markets. Ongoing volatility (elevated beta values) underscores the enduring destabilizing consequences of geopolitical tensions, with Bangladesh and Bitcoin demonstrating significant susceptibility, although other markets display diverse effects.

TABLE 4.16: DCC for TWC-US to Stock Markets

		theta(1)	**theta(2)**
Bangla	**Coefficient**	**0.101529**	**0.153282**
	Prob.	2.09E-05	0.4064
Canada	Coefficient	0.222428	0.420875
	Prob.	0	0
Japan	Coefficient	0.175194	0.167615
	Prob.	0	0.0696
Germany	Coefficient	0.158875	0.403756
	Prob.	0	0.0002
UK	Coefficient	0.1	0.85
	Prob.	NA	NA
UK	Coefficient	0.156345	0.427088
	Prob.	0	0
PAK	Coefficient	0.167415	0.295228
	Std. Error	0.022485	0.092138
	z-Statistic	7.445715	3.204203

Table 4.16 continued from previous page

		theta(1)	**theta(2)**
	Prob.	9.64E-14	0.0014
India	Coefficient	0.198086	0.208592
	Std. Error	0.021527	0.078856
	z-Statistic	9.201884	2.645236
	Prob.	0	0.0082
China	Coefficient	0.232542	0.278551
	Prob.	3.50E-08	0.0841
Mexico	Coefficient	0.197029	0.239163
	Prob.	0	0.0086

In this table, the p value of theta 1 shows that highly positive impact of past residual shocks on conditional correlation. Negative and significant shows the partial impact of past residual shocks on conditional correlation. And insignificant results show no effect of residual shocks on conditional correlations. For all the stocks, it is significant and positive.

The theta2, if significant, shows the effect of lagged dynamic conditional correlations; if it is insignificant, it shows no effect of lagged dynamic conditional correlation in these stocks.

It is insignificant for Bangladesh, Japan, Pakistan, India, and China. As the dynamic correlation, analysis investigates overtime changes between the variables due to trade war. The non-significant results show that the correlation between the variables does not significantly vary in response to trade war. It shows that either the in the short-term period, the trade war is not systemically changing the relationship between variable or the market participants are not reacting aggressively to these developments.

TABLE 4.17: DCC for TWC-US to Currency Markets

		theta(1)	**theta(2)**
Japan	Coefficient	1.22E-01	7.84E-01
	Prob.	3.41E-12	0
UK	Coefficient	0.253576	3.90E-01
	Prob.	0	0
Canada	Coefficient	0.184366	0.383344

Table 4.17 continued from previous page

		theta(1)	**theta(2)**
	Prob.	0	0.00E+00
PAK	Coefficient	1.25E-02	0.70135
	Prob.	0.324546	0.0593
India	Coefficient	0.010693	-0.116
	Prob.	0	0
China	Coefficient	0.184366	0.383344
	Prob.	0.00E+00	0
Mexico	Coefficient	0.302707	5.99E-01
	Prob.	0	0.00E+00
Bangla	Coefficient	0.285514	0.155643
	Prob.	0	5.70E-03
BTC	Coefficient	1.95E-02	0.697572
	Prob.	2.37E-01	0.0398

Note: The above table 4.17 shows the conditional volatility results for currency market including Bitcoin

In this table, the p value of theta 1 shows that highly positive impact of past residual shocks on conditional correlation. The negative and significant effect shows the partial impact of past residual shocks on conditional correlation, whereas insignificant results show no effect of residual shocks on conditional correlations. It is important to note that conditional correlation is significant and positive for all currency pairs except BTC. The theta2, if significant, shows the effect of lagged dynamic conditional correlations; if it is insignificant, it shows no effect of lagged dynamic conditional correlation in these stocks.

For the underlying study, it is positive and significant for all the currency pairs including BTC.

TABLE 4.18: DCC GARCH (TWC-CHN to Other Stocks)

		theta(1)	**theta(2)**
Bangla	Coefficient	1.91E-01	4.63E-02
	Prob.	9.90E-14	0.6398
Canada	Coefficient	0.157241	2.49E-01
	Prob.	5.28E-11	0.0657

Table 4.18 continued from previous page

		theta(1)	**theta(2)**
Germany	Coefficient	0.12506	0.325221
	Prob.	1.49E-08	3.55E-02
Japan	Coefficient	2.15E-01	0.179977
	Prob.	0	0.0162
Mexico	Coefficient	0.163699	0.183026
	Prob.	4.04E-14	0.0351
Pak	Coefficient	0.203209	0.177873
	Prob.	0.00E+00	0.0192
SLR	Coefficient	0.19246	7.93E-02
	Prob.	0	3.84E-01
UK	Coefficient	0.139353	0.140376
	Prob.	5.33E-11	2.53E-01
Us	Coefficient	1.66E-01	0.233499
	Prob.	1.26E-12	0.0444

Note: The above table 4.18 shows the conditional volatility results for stock markets

The above table shows the DCC GARCH results for stock markets. The p-value of theta 1 shows significant results for all the stocks, showing a positive impact on all stocks. Significant results show a positive impact of past residual shocks on conditional correlations.

On the other hand, the p-value of theta 2 is significant except for Sri Lanka, UK, Bangladesh, Canada and Germany. Significant results show the effect of lagged dynamic conditional correlation and insignificant results show no effect of lagged dynamic conditional correlation in these stocks.

TABLE 4.19: DCC GARCH (TWC-CHN to Other Currencies)

		theta(1)	**theta(2)**
BDR	Coefficient	2.50E-01	1.52E-01
	Prob.	0.00E+00	0.0461
Canada	Coefficient	0.1	8.50E-01
	Prob.	2.80E-01	0.99
India	Coefficient	0.0155	0.8432
	Prob.	1.52E-01	0.00E+00
Japan	Coefficient	2.22E-01	0.3194

Table 4.19 continued from previous page

		theta(1)	**theta(2)**
	Prob.	0	0
Mexico	Coefficient	0.2749	0.3417
	Prob.	0.00E+00	0
Pak	Coefficient	0.0076	0.9903
	Prob.	5.31E-02	0
Sri Lanka	Coefficient	0.2793	1.63E-01
	Prob.	0	8.10E-03
UK	Coefficient	0.1955	0.2884
	Prob.	0.00E+00	0.00E+00
US	Coefficient	1.85E-01	0.3833
	Prob.	0.00E+00	0
BTC	Coefficient	0.0376	0.7218
	Prob.	0.0178	0

Note: The above table 4.19 shows the conditional volatility results for currency market including Bitcoin

This table reports all the results of dynamic conditional correlation from CHN/CHF to other currency pairs including Bitcoin. The p-values of theta 1 show positive impact of all currency pairs except for CAD/CHF and INR/CHF. Positive and significant results show positive impact of past residual shocks on conditional correlations. On the other hand, the p-value of theta 2 is significant and beta coefficient is positive for all the currency pairs except for CAD/CHF. Significant results show the effect of lagged dynamic conditional correlation and insignificant results, particularly for CAD/CHF show no effect of lagged dynamic conditional correlation in these currency pairs.

4.3 Copula

Understanding the interplay between market efficiency and portfolio management is paramount for investors, risk managers, and financial analysts in a dynamic and ever-evolving financial landscape. This thesis delves into this crucial intersection,

employing copula analysis as a powerful statistical tool to uncover hidden dependencies between financial assets while considering the implications for market efficiency and portfolio optimization. The empirical analysis unveils the results of the copula analysis. It presents the chosen copula model, the estimated parameters, and the results of goodness-of-fit tests, offering insights into the dependence structure between financial assets. Importantly, it discusses how these findings relate to market efficiency, highlighting both confirmations and challenges to established market efficiency theories.

TABLE 4.20: Dependence Structure of Trade War Composite Variable (with US Data) and Stock Markets

Sr. No	**Country**	**Selected**
1	US	Clayton
2	Japan	Gaussian
3	Germany	Clayton
4	UK	Clayton
5	Canada	Clayton
6	Pak	Clayton
7	India	Clayton
8	China	Frank
9	Mexico	t-student
10	Bangladesh	Frank
11	Sri Lanka	Gaussian

Note: The above table 4.20 shows the suitable copula family for the Bivariate copulas on the Basis of AIC criteria for the stock markets. Data for trade war composite is US Specific

Table 4.20 represents estimates of different copula models along with the values of AIC and BIC for selecting the best-fitted models, initial and final parameters, and upper and lower tail dependencies. Based on the lowest AIC Values, the following models best fit the financial series on which the method is applied and tested.

It can be seen from the above table that Clayton copula is the best fit for many series (including US, Germany, UK, Canada, Pakistan and India). It is often used when there is a strong presence of tail dependence in the data. Tail dependence means that extreme events (for example, large positive or negative returns) in one

variable are more likely to be associated with extreme events in another variable. Suppose the Clayton copula is the best fit. In that case, it suggests that extreme events in the series tend to occur together more frequently than expected under a more independent or symmetric copula.

The Clayton Copula is asymmetric and particularly suited for capturing asymmetric tail dependence. Being the best fit for many series, it indicates that the strength and structure of dependence in the data differ between the left tail (extreme negative events) and the right tail (extreme positive events). It may also cause the investors to consider different strategies for downside risk (left tail) and upside potential (right tail).

It also fits best when the underlying data does not conform to a multivariate normal distribution, especially when the data has heavy tails or other non-normal characteristics. Its flexibility makes it suitable for modeling complex dependence structures that more traditional copula models may not adequately capture. The selection of Clayton copula suggests that special attention is needed to manage the tail risk. It indicates that extreme events are not independent or symmetrically distributed, which can be crucial for risk assessment, stress testing, and the development of portfolio optimization strategies.

In the context of trade war, the application of bivariate copula shows the intricacies caused the US trade policies. It shows asymmetric dependencies and market sensitivities for different economies and financial stock markets and guides the policy makers and investors towards strategic decision making and risk management. The stakeholder may gather insight from it to navigate and capitalize on the emerging trade dynamics while managing their risks across international markets.

Table 4.21: Dependence Structure of Trade War Composite Variable (with China Data) and Stock Markets

Sr. No	**Country**	**Selected**
1	US	Frank
2	Japan	Clayton
3	Germany	Frank
4	UK	Clayton
5	Canada	Frank

Table 4.21 continued from previous page

Sr. No	Country	Selected
6	Pak	Clayton
7	India	Gaussian
8	China	t-student
9	Mexico	Gaussian
10	Bangladesh	Gumble
11	Sri Lanka	Clayton

Note: The above table 4.21 shows the suitable copula family for the Bivariate copulas on the Basis of AIC criteria for the stock markets. Data for trade war composite is China Specific.

The above models are selected on the basis of minimum AIC criteria. For US, Germany and Canada the best fitted model is Frank Copula. Frank copula is known for capturing symmetric dependence, meaning that the strength and structure of dependence between variables are similar in both the left (extreme negative events) and the right (extreme positive events). The best fit Frank Copula suggests that dependence in the selected series is symmetric, and extreme events tend to occur together with similar probabilities on both sides of the distribution. It lacks extreme tail dependence, unlike Clayton copula. Its selection implies that extreme events in one variable is not strongly correlated with extreme events in another variable. It is considered to be a more "neutral" dependence structure in the tails.

Besides this, Japan, UK, Pakistan, and Sri Lanka show Clayton Copula is the best fit model. For Bangladesh Gumble copula is the best fit. It indicates specific characteristics of the dependence structure between the variables in the data. It combines the Frank copula's symmetric properties with the Gumbel Distribution's tail properties. It suggests that the underlying series exhibits symmetric dependence, meaning that the strength and structure of dependence are similar in both the left tail (extreme negative events) and the right tail (extreme positive events). Further, Gumble also implies that the dependence has heavier tails, indicating a higher likelihood of extreme events compared to a Gaussian Copula.

In the context of trade war, the application of bivariate copula shows the intricacies caused the Chinese trade policies. It shows asymmetric dependencies and market sensitivities for different economies and financial stock markets and guides the policy makers and investors towards strategic decision making and risk management. The stakeholders may gather insight from it to navigate and capitalize on emerging trade dynamics while managing their risks across international markets.

TABLE 4.22: Dependence Structure of Trade War Composite Variable (with US Data) and Currency Markets

Sr. No	**Country**	**Selected**
1	US	Clayton
2	Japan	Clayton
3	Germany	Clayton
4	UK	Clayton
5	Canada	Frank
6	Pak	Gumbel
7	India	Clayton
8	China	Frank
9	Mexico	Clayton
10	Bangladesh	Clayton
11	Sri Lanka	t-student
12	Bitcoin	Frank

Note: The above table 4.22 shows the suitable copula family for the Bivariate copulas on the Basis of AIC criteria for the currency markets. Data for trade war composite is US Specific.

The above table shows the final outcome of the copula working, which is the section of the best-fit copula based on the series. The table shows for many series, the best-fit copula is Clayton. The selection is based on the minimum AIC criteria. These results go beyond the statistical fit and show deeper insight into the market interactions amidst trade war. For US, Japan, Germany, UK, India, Mexico and Bangladesh, the resultant clayton copula which highlights the asymmetric dependence shows the extreme movements in one currency pair influenced by the trade tensions and its link with the extreme movements in another pair. it shows the adverse or favorable impact caused by trade war in one pair will cause similar

movements in other pairs. For Bitcoin, China and Canada, the resultant frank copula shows symmetric dependence. Suggesting that both negative and positive effects of trade war affect the two series in a balanced manner. It is useful for identifying the simultaneous movements in the currency markets due to policy changes. Finally, student t copula shows heavy tailed distributions and non-normal characteristics in currency market during trade war. The model captures the extreme events and outliers in currency movements that may arise due to the unexpected policy announcement or events.

TABLE 4.23: Dependence Structure of Trade War Composite Variable (with China Data) and Currency Markets

Sr. No	**Country**	**Selected**
1	US	Gumbel
2	Japan	t-student
3	Germany	Frank
4	UK	Frank
5	Canada	Gumbel
6	Pak	Frank
7	India	t-student
8	China	Gumble
9	Mexico	Clayton
10	Bangladesh	Frank
11	Sri Lanka	t-student
12	Bitcoin	Gaussian

Note: The above table 4.23 shows the suitable copula family for the Bivariate copulas on the Basis of AIC criteria for the currency pairs including Bitcoin. Data for trade war composite is China Specific.

The above table shows best-fit copula for Japan, India, and Sri Lanka is t-student. The selection shows the presence of heavy tailed dependence in the underlying series. It means that the data contains more extreme values in both tails than a Gaussian Copula. It allows for greater flexibility in modelling these heavy tails, which can be important for capturing extreme events and tail risk. It also captures the tail dependence, meaning that extreme events in one variable are more likely to be associated with extreme events in another variable compared to what would

be expected under an assumption of independence. The extent of tail dependence depends on the key factor i.e., degree of freedom parameters of the t-student copula. A higher value of the DOF indicates that tails are lighter and distribution closer to normal, while a low value indicates heavier tails and more pronounced non-normality.

TABLE 4.24: Dependence between Trade War and Currency Market including Bitcoin.

	Kendal Tau	**trade war China**	**trade war US**
		1	2
1	USA	0.0368	0.0076
2	JAPAN	0.0273	0.0176
3	Germany	0.0106	-0.0135
4	UK	0.0101	-0.0065
5	Canada	0.0172	0.0173
6	Pak	0.0364	0.0080
7	India	0.0234	0.0018
8	China	0.0172	0.0173
9	Mexico	-0.0006	-0.0049
10	Bangladesh	0.3850	0.1168
11	Sri Lanka	0.0696	-0.4169
12	**BTC**	-0.0245	-0.0391

Note: The above table 4.24 shows the Kendal Tau results showing the strength of relationship between the two series i.e. Trade War composite variable (for US and for China) and the Financial Market returns (both stocks and currency pairs including Bitcoin) of each country selected for purpose of the study.

Kendall' Tau, (also known as Kendall's Rank Correlation Coefficient), is a non-parametric measure of association that assesses the strength and direction of the monotonic relationship between two variables. The above table shows Kendal Tau's coefficient between the currency markets and the Trade war composite variable. The trade war composite variable shows positive direction for all the countries and the 38% strength with China. And with other stock markets the strength lacks, for instance only 3.6% relationship is shown with the US market that is weak and positive. On the other hand, for trade war composite variable (with US data)

the direction is negative for Germany, UK, Mexico and Sri Lanka. The relationship is strong negative with Sri Lanka. However, with all other currency markets and BTC as well, the strength of the relationship is week.

Linking Hypothesis and Research Questions to Results

What is the dependence structure between Trade war and financial stock markets?

What is the dependence structure among Trade war and financial currency markets and bitcoin?

H1: Dependence exists between trade war and financial stock markets

H2: Dependence exists between trade war and currency of the selected markets

H3: Dependence exists between trade war and Bitcoin.

Results

Dependence between Trade War and Financial Stock markets exist as shown by the results. The results further highlight that which bivariate copula is suitable for the two series. For US data, the results show that Clayton copula is suitable for Germany, UK, Canada, Pakistan and India and US. Gaussian copula is suitable for Japan and Srilanka, Frank for China and Bangladesh, t-student for Mexico. For China data, Clayton Copula is suitable for Japan, UK, Pakistan and Sri Lanka. Frank copula is suitable for US, Germany and Canada. Gaussian Copula is suitable for India and Mexico. T-student is suitable for China and Gumble is suitable for Bangladesh.

As long as the case of currency market including bitcoin is concerned, for US data, Clayton copula is suitable for US, Japan, Germany, UK, India, Bangladesh, and Mexico. Frank Copula is suitable for Canada, Bitcoin, China. Gumbel is suitable for Pakistan. T-student is suitable for Sri-lanka. For China data, Gumbel copula is suitable for US, Canada, and China. T-student is suitable for Japan, India and Sri Lanka. Frank Copula is suitable for Germany, UK, Pakistan, and Bangladesh. Clayton is suitable for Mexico and Gaussian is suitable for Bitcoin. Hence we may infer that the hypothesis are accepted.

Research Question 4 and 5

Do return and volatility transmit from the USA and China to selected financial stock markets, financial currency markets and Bitcoin?

Hypothesis 6

H6: Spillover exists between trade war and financial stock markets, currency markets and Bitcoin

H7: Dynamic correlation exists between trade war and financial stock markets, financial currency markets of selected countries and bitcoin

Results

For US data, Mean spillover exists for Canada, China, Japan, Srilanka however, no mean or volatility spillover exists for currency market except for mean spillover for UK only. On the other hand, for China data mean spillover exists for all stocks except Bangladesh and Srilanka but no volatility spillover exists. Further, for currency market, mean spillover exists for the currency pairs of Bangladesh, Canada, Japan, Mexico, UK, and USA. However, no volatility spillover exists. It shows partial acceptance of the hypothesis.

As long as the case of dynamic correlation is concerned, no effect exists for stock and currency markets in the case when trade war proxy data was obtained for China. However, only few stocks were effected when the trade war variable with US data was used. It shows partial acceptance in the case of US data for stock markets only and not accepted for other markets and for with respect to China.

Discussion

The underlying study has addressed the impact of a trade war on the financial market. Financial markets focused on this study were, Stock markets, currency markets and Bitcoin. The inclusion of cryptocurrency is particularly noteworthy, given its growing relevance as an alternative asset class. The underlying study has attempted to introduce the measurement of war through proxies which has been used in the literature in the past such as Chen and Yu (2020) EPU was used to

measure the impact of trade war on the stock markets, Bown et al. (2021) tariffs, Nicita (2013) trade tariff restrictiveness index and index and Li et al. (2023). It has also created a composite variable to test the holistic view and impact of trade war on the financial markets. The creation of a composite variable appears to dilute the distinct effects captured by individual proxies. The impact has been tested in two ways. Firstly, trade war data for all the proxies was obtained for USA, and then for China the process was repeated. While studying the literature, it is noted that there are chances of researcher's biasness while arguing for the impact of trade war on the economies. Therefore, both perspectives have been addressed in the underlying study.

Kido (2018), who studied the impact of US epu on 19 economies and revealed negative impact of US Epu on all the countries, supports the results of US Epu. Moreover, the US policy responses including tariffs and retaliatory measure are more obvious and aggressive, especially in the trump war ear leading to greater uncertainty and volatility in the financial markets. Further, the Chinese markets are often subject to more regulations and government control as compared to US markets. This can reduce the transmission of policy uncertainty to other markets causing their policy changes to impact less globally.

While analyzing bitcoin mind, it should be noted that Bitcoin is a digital currency. It operates on a global scale and is decentralize thereby complete opposite as compared to traditional markets. That can be one of the reasons that bitcoin may not respond strongly to country specific events like trade war. Bitcoin is also often considered as a hedge or a diversification tool against the traditional financial markets. A study conducted by Bouri, Gupta, Tiwari and Roubaud, (2017) affirms this notion and found investors preference for cryptocurrency for the sake of investment in contrast to the traditional currency market, amid the currency devaluation in china.

Lastly, it is to be noted that the investor sentiment and market perception of the investors play a crucial role in financial markets. If the market participants think that the US policies are more critical to global economic health, they may react strongly to US related measures and policy uncertainties as compared to China.

Chapter 5

Conclusion and Recommendations

5.1 Conclusion

This study aims to investigate mean and volatility spillovers and dependence between the US to other markets and from China to Other markets. A composite variable of trade war has been created in order to examine the impact of trade war. This study used daily data of accepted benchmark stock indices of 11 economies including developed and developing markets, along with their corresponding currencies of these markets including bitcoin. The developed economies include USA, UK, Germany, Japan, Canada and China, and the developing economies include Mexico, India, Srilanka, Bangladesh, Pakistan. The base currency has been used as Swissfranc in order to avoid biased estimates in the currency market. Moreover, economic policy uncertainty, bilateral tariffs, trade tariff restrictiveness index as a proxy of trade policy, and trade war shock are all used to compute a composite variable of trade war. It is pertinent to mention here that the trade war composite variable for China and the USA was created separately, and separate impacts from both perspectives have been checked on the markets selected for study. Principal component analysis is used to create the composite variable. The study covers the trade war period (2012 to 2020) for the estimation of return and volatility spillover.

The empirical findings of the six objectives of the study are as follows.

Following points may also aid in understanding the landscape in which the country is operating and therefore the results of trade war (from the china data) are like this. Firstly, that in comparison to US, China is no doubt a major player in the global supply chains yet its policies still are less impactful than US to have a more regional impact.

Secondly, with respect to the market sentiment and investor behavior, the Investor confidence and market reaction towards the US policies is different as compared to China. Chinese policies are also significant but are viewed with more uncertainty due to differences in the market transparency and governance.

Thirdly, the media reach of both the countries is perceived differently, the information dissemination of US economic policies is widely disseminated and is quickly absorbed by the markets. on the other hand, although information from china is also becoming influential, yet it lacks matching US media. Further media freedom and information transparency are also a question.

Third, the study estimates the dependence structure between Trade War US to the selected stock markets and from Trade War China to selected stock markets during the trade war. The results of copula working shed light on two aspects: one the strength and direction of the relationship between the two series and second the model that is suitable for the series under study. For China, the relation and strength are negative for all the other stock market series except for return series of China, Bangladesh and Sri Lanka; however, the strength of this relationship is very week that is 3% and 0.0% respectively. Conversely, regarding Trade War US, the relationship is negative for all the series except for UK, China and Bangladesh however, the strength is very weak. It further seeks to find the suitable distribution model for the two series in each case for all the stock markets.

Fourth, this study also repeats the same procedure for the currency market including Bitcoin for Trade War US and Trade War China. The findings suggest that the direction of trade war and other currency pairs including bitcoin is positive for Trade War China. In contrast, in the case of Trade War US the association is negative for EUR/CHF and GBP/CHF, CAD/CHF, SLR/CHF and BTC/CHF.

However, the strength of the association is found to be very weak. The technique also estimates for the suitable distribution model for the two series in each case.

Fifth, this study examines the mean and volatility spillover and Dynamic conditional correlations from US stock market to other stock markets. After the same process is adopted from Chinese Stock market to other stock markets selected under study.

This study investigates the impact Trade War composite variable on other currencies with the same base pair CHF, including Bitcoin. The findings of the study reveal that when tested for mean and volatility spillover from trade war composite variable to other currency pairs. For CHN/CHF to other pairs, the mean spillover exists for all the other pairs except for BTC, INR/CHF, PKR/CHF and SLR/CHF, however, the volatility spillover is insignificant for all the currency pairs. On the other hand, trade war composite variable to other pairs the mean spillover is significant for BDR/CHF, CAD/CHF, YEN/CHF, JPY/CHF, GBP/CHF. However, the results show no volatility transmission from trade war to all other currency pairs including bitcoin.

Overall, the results vary with respect to the markets and with respect to the source of transmission that is US and China series that are choses for the respective markets and the composite variable of Trade War for China and USA. In the context of Efficient Market Hypothesis (EMH) i.e., suggests that financial markets are efficient and that asset prices fully reflect all available information, the findings of the underlying study can be summarized as, firstly, for the dependence structure, it can be seen that the relationships between stock markets during trade war are generally weak and vary in direction.

The EMH also argues that if the market were fully efficient, there should not be significant dependencies or predictable relationships during such an event. Weak relationships seem to be supporting the semi-strong form of EMH where public information is rapidly incorporated into the stock prices. For the currency market, there is weak association in currency markets. The findings of currency market also align with EMH and with such notion that it incorporate information rapidly. Resulting in weak associations during significant events like trade

war as focused by the underlying study. Secondly, with regard to the mean and volatility spillover, several markets show the presence of mean spillover, however, the volatility spillover is not significant, indicating that sudden shocks do not propagate widely. These results are consistent with the notion that, in efficient markets, new information quickly affects prices (mean spillover), but investors quickly adjust to this information, preventing widespread volatility spillover.

In the case of currency pair spillover, the impact Trade War composite variable on other currency pairs, including Bitcoin. Overall, the mean spillover is observed but volatility spillover is generally insignificant. These findings are consistent with the idea that currency markets efficiently incorporate information leading to mean spillover but do not propagate excessive volatility. To sum up, the study's findings seem to align with respect to efficient market hypothesis, particularly semi-strong form. In an efficient market, new information is quickly reflected in asset prices, resulting in weak relationships and limited spillover effects during significant events.

5.2 Limitations of the Study and Future Research Directions

First of all, one of the proxies to calculate trade war that is used in this study is economic policy uncertainty; however, this variable is composed of three components: fiscal policy uncertainty, monetary policy uncertainty, and trade policy uncertainty. Further studies can be conducted by taking into account any component.

Secondly, control variables such as Interest rates, Consumption, inflation may be added while investigating the impact of trade war on the financial markets in order to avoid any biased estimates. The study has used ozgagli (2021) working to calculate the trade war shocks. Other methods may be explored to calculate these shocks.

For the Trade tariff restrictiveness index, two indices are available: services trade tariff restrictiveness index and digital trade tariff restiveness index. The underlying

study has used services trade tariff restrictiveness index. There are a few reasons for using STRI instead of DTRI. Firstly, it aligns more closely with the objectives of the study. Secondly, it involves a broad spectrum of services, including emerging digital ones. Therefore, it could offer a more comprehensive view of the issue that the underlying study has aimed to target.

This study has used basic econometric techniques such as GMM, DCC-GARCH and Copula methodology to examine the impact, mean and volatility spillover and dependence between trade war and financial markets. However, several other techniques can be applied to examine these objectives. Such as Copula-Var, ADCC Garch etc.

Several other markets are recommended to explore to check the impact of trade war such as G7 bloc and BRICS to investigate the response. In addition to this, other markets such as commodity market may also be explored. More cryptocurrencies may be added.

This study investigated the markets through the lens of efficient market hypothesis, another theoretical lens may be used to study this subject such as Portfolio theory.

The underlying study used daily data, it is suggested to explore these objectives such as impact of trade war on bigger time frames as control variables including GDP and Inflation are available annually, many trades related variables such as bilateral tariffs and trade tariff restrictiveness index are also available in annual frequency. However, in order to explore the spillovers between the markets, the high-frequency data may be used to examine the spillover effect of trade war on the markets.

Trade war has been used as an announcement in the existing literature, but not a single study has used it as a variable. Therefore, a huge gap in the literature needs to be filled in this regard.

5.3 Policy Implications

Our findings have implications for policymakers, regulatory bodies, investors and financial institutions. For investors, it is critical to assess the presence of this

factor while creating a portfolio to manage their financial risk carefully. For policymakers and regulators, it is critical to take into account the phenomenon of trade war. It may rethink the trade policy actions, which are taken only for retaliatory purposes. Redesigning existing policies may shelter the interests of the domestic manufacturers, which in turn shall safeguard the interests of investors and provide stability to the financial markets.

Following are the policy implications for the underlying study:

1. As sudden or unexpected policy shifts can lead to volatility, mispricing it is the duty of the government to prioritize transparency, and predictability in terms of trade policies, as unexpected policy shifts can lead to volatility and mispricing in the short term.

2. Policy makers may use this study to analyze the strength of the financial market infrastructure, including regulatory frameworks and market surveillance. This will tend to improve the efficiency amidst trade uncertainty. It is pertinent to note that robust market infrastructure tend to absorb trade war shocks more effectively, thereby reducing the potential for systemic risks.

3. As prolonged trade, conflicts may distort the economic fundamentals, ultimately causing distortion in the markets and leading markets towards inefficiency. Policy makers may increase the their efforts to create policy to foster international cooperation.

4. Trade war shocks may lead to short-term volatility, efficient risk management practices may aid in mitigating the adverse effects on the investor portfolios.

5. Regulatory bodies should monitor for information asymmetries in the turbulent periods to ensure all market participants have equal access to relevant information. This will reduce the market inefficiencies during trade wartime and shall ensure market integrity.

6. The study also encourage development of new financial instruments that can absorb the risk and mitigate the risks linked to trade wars.

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Appendix-A

TABLE 5.1: Dependence between Trade War and Currency Market including Bitcoin.

Date	News
3/13/2012	US, EU and Japan file disputes against China
5/25/2012	China files dispute against US
7/5/2012	United States files dispute against China
7/10/2012	China blocks panel requests by the US, EU and Japan on "rare earths" dispute
9/17/2012	US files dispute against China on subsidies to the automobile industry
9/17/2012	China files dispute against US countervailing and anti-dumping measures
9/28/2012	Panels set up on Australia's tobacco measures and on US duties on China's exports
10/18/2012	Appellate Body issues report on China's duties on steel products from the US
10/23/2012	Panels set up on China's duties on US automobiles and on US compliance in Boeing dispute
11/30/2012	China requests panel on US countervailing and anti-dumping measures
12/17/2012	Panel established on US countervailing and anti-dumping measures on Chinese products
8/2/2013	WTO issues panel report on China's measures on US broiler products
8/2/2013	WTO issued the panel report in the dispute "China — Anti-dumping and countervailing duty measures on broiler products from the United States"
12/3/2013	China files dispute against the United States on anti-dumping measures involving Chinese products
2/26/2014	Panels established at the request of Denmark and the United States
3/26/2014	Panels established at the request of Japan, China and Indonesia (against US)
3/27/2014	WTO issues panel report on US measures on Chinese products
4/8/2014	US appeals rare earth panel report
4/8/2014	China appeals panel report on US countervailing and anti-dumping measures
4/17/2014	Appeals announced by China in rare earths dispute and by US in products from China dispute

Table 5.1 continued from previous page

Date	News
4/17/2014	Appeals announced by China in rare earths dispute and by US in products from China dispute
5/23/2014	WTO issues panel report on China's duties on US automobiles
7/7/2014	Appellate Body issues report on US measures on Chinese products
7/14/2014	WTO issues panel report on US measures on certain products from China
8/22/2014	China appeals panel report on countervailing measures applied by United States
12/18/2014	WTO issues panel report on China's measures on US broiler products
1/16/2015	Appellate Body report in US-China dispute over countervailing measures adopted
2/11/2015	US files dispute against China over alleged export-contingent subsidies to enterprises
4/22/2015	Panel established in dispute between US and China over alleged subsidies
4/22/2015	Panel established in dispute between US and China over alleged subsidies
7/20/2015	Arbitrator appointed in US — China countervailing dispute
7/20/2015	Arbitrator appointed in US — China countervailing dispute
7/31/2015	WTO issues compliance panel report in dispute between China and US over steel
7/31/2015	WTO issues compliance panel report in dispute between China and US over steel
10/9/2015	WTO Arbitrator determines "reasonable period of time" in US-China duties dispute
10/9/2015	WTO Arbitrator determines "reasonable period of time" in US-China duties dispute
12/9/2015	United States files WTO dispute against China over taxes on aircraft
5/10/2016	US requests consultations with China regarding compliance panel in chicken dispute
5/13/2016	China requests consultations with US over compliance in countervailing duties dispute
7/13/2016	United States initiates WTO dispute proceedings against Chinese export duties on raw materials
9/14/2016	United States files dispute challenging Chinese agricultural subsidies
10/19/2016	WTO issues panel report regarding US anti-dumping duties on Chinese imports
10/26/2016	China blocks US panel request in dispute over raw materials
11/18/2016	China files appeal against WTO panel ruling on US anti-dumping methodologies
12/12/2016	China files WTO complaint against US, EU over price comparison methodologies

Table 5.1 continued from previous page

Date	News
12/15/2016	US files WTO complaint against Chinese tariff rate quotas on agricultural imports
12/15/2016	US files WTO complaint against Chinese tariff rate quotas on agricultural imports
1/13/2017	United States files WTO complaint against Chinese aluminium subsidies
5/11/2017	ppellate Body issues report regarding US anti-dumping investigations on Chinese products
8/31/2017	Members consider requests for panels on Chinese farm quotas, Canadian aircraft subsidies
10/3/2017	Safeguard measures of US and China in spotlight at WTO meeting
10/23/2017	Safeguard measures of US and China in spotlight at WTO meeting
10/24/2017	Subsidy programmes, countervailing actions of China, US under review at WTO meeting
1/18/2018	WTO compliance panel issues ruling regarding Chinese duties on US chicken
1/19/2018	WTO Arbitrator determines "reasonable period of time" in US-China anti-dumping dispute
3/21/2018	WTO issues compliance panel report regarding US countervailing duties on Chinese imports
3/26/2018	US "Section 301" action against China's intellectual property regime questioned at WTO Goods Council
4/5/2018	China files WTO complaint over the United States' tariff measures on Chinese goods
4/9/2018	China initiates WTO dispute complaint against US tariffs on steel, aluminium products
4/30/2018	US files appeal against compliance panel ruling in countervailing duty dispute with China
7/6/2018	US-China trade war begins as US imposes 25 per cent tariffs on US$34 billion worth of Chinese imports
7/6/2018	China retaliates by imposing 25 per cent tariffs on 545 goods originating from the US worth US$34 billion
7/19/2018	United States initiates dispute complaints against five members over duties on US products
8/16/2018	China initiates dispute complaints against US solar cell duties, renewable energy measures
8/23/2018	Washington imposes 25 per cent tariffs on a further US$16 billion worth of Chinese goods

Table 5.1 continued from previous page

Date	News
8/23/2018	China responds by applying 25 per cent tariffs on US$16 billion worth of US goods
8/27/2018	China initiates WTO dispute complaint against additional US tariffs on Chinese imports
9/24/2018	US places 10 per cent tariffs on US$200 billion worth of Chinese imports
9/24/2018	China responds by placing customs duties on US$60 billion worth of US goods
12/1/2018	Xi Jinping and US counterpart Donald Trump call a truce in the trade war at the G20 summit in Argentina
2/28/2019	WTO issues panel report regarding Chinese agricultural subsidies
4/18/2019	WTO issues panel report regarding Chinese tariff rate quotas on agricultural imports
5/10/2019	After trade negotiations break down, US increases tariffs on US$200 billion worth of Chinese goods, from 10 to 25 per cent
5/15/2019	US Department of Commerce announces the addition of Huawei to its "entity list"
5/31/2019	China announces plans to establish its own "unreliable entity list"
6/1/2019	China increases tariffs on US$60 billion worth of US products
6/29/2019	Xi Jinping and Donald Trump again agree to a trade war truce, this time at the G20 summit in Japan
7/22/2019	Members consider requests for panels to review US safeguard on solar cells, Indian sugar sector
8/5/2019	US designates China as a "currency manipulator"
8/13/2019	US announces that various planned levies on US$455 billion worth of Chinese products have either been delayed or removed
8/23/2019	China announces planned tariffs of 5 and 10 per cent on US$75 billion worth of US goods
9/1/2019	US tariffs on more than US$125 billion worth of Chinese imports begin as expected
9/4/2019	China initiates WTO dispute against additional US duties on Chinese imports
9/11/2019	US agrees to briefly delay new tariffs on US$250 billion worth of Chinese goods
10/11/2019	US announces that it will delay a planned tariff increase of 25 to 30 per cent on US$250 billion worth of Chinese goods
11/1/2019	Arbitrator issues decision in US-China anti-dumping dispute
1/15/2020	China and the US sign the phase-one trade deal
2/14/2020	China halves additional tariffs on US$75 billion worth of American products imposed in 2019
2/14/2020	China allows imports of barley and blueberries from the US

Table 5.1 continued from previous page

Date	News
5/12/2020	China announces a second batch of trade-war-tariff exemptions covering 79 American products
9/1/2020	Dozens of US imports from China are granted short extensions to previous tariff exemptions
9/12/2020	US customs agency issues "withhold release orders" banning cotton, apparel, hair products and computer parts from four Xinjiang companies
9/15/2020	WTO panel issues report regarding US tariffs on Chinese goods
9/15/2020	China decides to exempt additional tariffs on a batch of 16 US products for another year
10/26/2020	United States appeals panel report regarding US tariffs on Chinese goods
11/3/2020	Hong Kong, China initiates dispute complaint against US origin marking requirements
12/2/2020	US government says it will begin to block the import of all cotton products made by the Xinjiang Production and Construction Corps (XPCC)
12/2/2020	US president-elect Joe Biden tells The New York Times he will not make any "immediate moves" to lift trade war tariffs

Source: WTO | 2020 News items. (2022). Retrieved 23 September 2022, from www.wto.org/english/news_e

Appendix-B

The following lines explain the method the researchers/developers used to create the index used.

"The methodology on the website for US states that the 10 large newspapers were consulted to gather the news (the list of newspapers is provided in the annexure). The makers constructed a normalized index of the volume of news articles discussing EPU. Further, data was also sought from the federal tax code provisions set to expire and disagreement among economic forecasters and reports from the CBO (congressional budget office) were also sought. (these reports compile lists of temporary federal tax code provisions). The makers then created an annual dollar weighted number of tax code provisions scheduled to expire over the next 10 years, giving a measure of the level of uncertainty regarding the path that the federal code will take in the future. Lastly, the third component of the EPU index was drawn from the Federal Reserve Bank of Philadelphia survey of professional forecasters. For this purpose, the makers utilized the dispersion between individual forecaster's predictions about future level of the consumer price index, federal expenditure, and state and local expenditure to construct indices of uncertainty about policy-related macroeconomic variables.

Two indexes were created for EPU China by the authors. One was SCMP (South China Morning Post), and the other was EPU China based on the Mainland Newspapers (EPU Mainland). The methodology for both is based on research work.

We used EPU Mainland for the purpose of the study as it focuses on overall EPU by focusing on two mainland Chinese Newspapers (Renmin Daily and the Guangming Daily). The researchers for this methodology focus on five steps. In the first step

they obtain the monthly counts of articles that contain at least one term in each of three term sets: Economics, Policy, and Uncertainty. Table 1 reports the terms in each set using Chinese characters and the corresponding English Translations.

In the second step, they scale the raw monthly EPU counts by the number of total articles for the same newspaper and month.

Third, they divide their sample into three periods: the era of central planning (1949-1978), the reform and opening-up period (1979-1999), and the globalization era (2000 onwards). In addition to their distinct economic characteristics, newspaper practices differ markedly in each period. Daily article counts are considerably higher in the second period than the first and higher in the third period.

In the fourth step, they standardize each newspaper's monthly series of scaled frequency counts to have a unit standardization. Fifth, they compute the simple average of the standardized series over newspaper by month.

In the final step, they normalize each period's index value to an average of 100" (as cited in the policyuncertainty.com website).

Trade War composite Variable China and Stock Market

TABLE 5.2: a - US and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.027	0.028	1.222	-0.445	5.653	0.000	0.000
t student	-0.024	-0.027	0.800	2.400	14.594	0.000	0.000
Gumbel	0.977	NA	NA	NA	NA	NA	NA
Clayton	-0.047	-0.047	-1.235	4.469	10.567	0.000	0.000
Frank	NA	-0.206	1.954	-1.908	4.189	0.000	0.000

Table 5.3: b - JAPAN and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.042	-0.028	1.299	-0.597	5.500	0.000	0.000
t student	-0.042	-0.026	4.959	-5.918	6.276	0.000	0.000
Gumbel	0.988	NA	-	-	-	-	-
Clayton	-0.024	-0.024	2.111	-2.222	3.875	0.000	0.000
Frank	NA	-0.118	0.616	0.769	6.866	0.000	0.000

Table 5.4: c - Germany and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.023	-0.023	0.898	0.205	6.302	0.000	0.000
t student	-0.023	-0.025	1.305	1.390	13.585	0.000	0.000
Gumbel	0.978	-	-	-	-	-	-
Clayton	-0.044	-0.031	1.596	-1.193	4.905	0.000	0.000
Frank	-	-0.208	1.937	-1.873	4.224	0.000	0.000

Table 5.5: d - UK and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.011	-0.015	0.352	1.296	7.393	0.000	0.000
t student	-0.011	-0.010	0.023	3.954	16.149	0.348	0.348
Gumbel	0.988	-	-	-	-	-	-
Clayton	-0.024	-0.024	1.055	-0.110	5.987	0.000	0.000
Frank	NA	-0.107	0.529	0.940	7.039	0.000	0.000

Table 5.6: e - Canada and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.014	-0.031	1.598	-1.197	4.901	0.000	0.000
t student	-0.014	-0.032	2.522	-1.044	11.151	4.350 (0.07)	4.350 (0.07)
Gumbel	0.978	-	-	-	-	-	-
Clayton	-0.044	0.031	1.598	-1.195	4.902	0.000	0.000
Frank	NA	-0.204	1.832	-1.663	4.434	0.000	0.000

TABLE 5.7: f - PAK and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.048	-0.047	3.615	-5.231	0.867	0.000	0.000
t student	-0.048	-0.047	3.004	-2.008	10.187	0.000	0.000
Gumbel	0.967	-	-	-	-	-	-
Clayton	-0.067	-0.056	5.562	-9.123	-3.026	0.000	0.000
Frank	NA	-0.312	4.626	-7.252	-1.155	0.000	0.000

TABLE 5.8: g - India and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.009	-0.017	0.467	1.065	7.163	0.000	0.000
t student	-0.009	-0.017	0.002	3.997	16.192	0.000	0.000
Gumbel	0.990	-	-	-	-	-	-
Clayton	-0.019	-0.019	-1.459	4.918	11.015	0.000	0.000
Frank	NA	-0.076	0.266	1.468	7.565	0.000	0.000

TABLE 5.9: h - China and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.007	0.047	3.550	-5.100	0.998	0.000	0.000
t student	-0.007	0.050	15.292	-26.584	-14.389	0.006	0.006
Gumbel	1.033	1.047	13.067	-24.133	-18.036	0.000	0.000
Clayton	0.066	0.066	-7.630	17.260	23.357	0.000	0.000
Frank	NA	0.299	3.946	-5.892	0.206	0.000	0.000

TABLE 5.10: i - Mexico and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.015	-0.025	0.984	0.033	6.130	0.000	0.000
t student	-0.015	-0.026	0.410	3.181	15.376	0.000	0.000
Gumbel	0.986	-	-	-	-	-	-
Clayton	-0.028	-0.007	0.072	1.857	7.954	0.000	0.000

Table 5.10 continued from previous page

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Frank	NA	-0.123	0.717	0.565	6.663	0.000	0.000

TABLE 5.11: j - Bangladesh and Trade War China Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	0.046	0.051	4.169	-6.338	-0.240	0.000	0.000
t student	0.046	0.051	4.010	-4.020	8.175	0.000	0.000
Gumbel	1.040	1.040	7.590	-13.180	-7.083	0.000	0.051
Clayton	0.079	0.079	-0.280	2.560	8.657	0.000	0.000
Frank	NA	0.321	4.756	-7.513	-1.415	0.000	0.000

TABLE 5.12: k - Sri Lanka and Trade War China Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.031	0.006	0.061	1.877	7.975	0.000	0.000
t student	-0.031	0.006	-0.344	4.688	16.883	0.000	0.000
Gumbel	1.008	1.000	0.000	2.000	8.097	0.000	0.000
Clayton	0.016	0.028	1.098	-0.196	5.901	0.000	0.000
Frank	NA	0.070	0.225	1.550	7.647	0.000	0.000

Note: The above table shows the tail distribution results for the five copula families. Bivariate copulas are tested for each stock market return with the TW_composite variable (for China)

Trade Composite Variable US and Stock Markets

TABLE 5.13: a - US and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.0194	-0.0200	0.6493	0.7013	6.7988	0.0000	0.0000
t student	-0.0194	-0.0199	0.6636	2.6728	14.8676	0.0000	0.0000

Table 5.13 continued from previous page

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gumbel	0.9885	-	-	-	-	-	-
Clayton	-0.0231	-0.0231	2.6532	-3.3064	2.7910	0.0000	0.0000
Frank	NA	-0.1119	0.5594	0.8813	6.9787	0.0000	0.0000

Table 5.14: b - JAPAN and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.0379	-0.0400	2.6110	-3.2214	2.8760	0.0000	0.0000
t student	-0.0379	-0.0397	2.5186	-1.0371	11.1577	0.0000	0.0000
Gumbel	0.9824	-	-	-	-	-	-
Clayton	0.0352	-0.0214	0.7529	0.4943	6.5917	0.0000	0.0000
Frank	NA	-0.1627	1.1896	-0.3792	5.7183	0.0000	0.0000

Table 5.15: c - Germany and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.0161	0.0161	0.3317	1.3367	7.4341	0.0000	0.0000
t student	-0.0161	-0.0143	-0.0401	4.0940	16.2889	0.0000	0.0000
Gumbel	0.9917	-	-	-	-	-	-
Clayton	-0.0166	-0.0166	1.3544	-0.7087	5.3887	0.0000	0.0000
Frank	NA	-0.0770	0.2740	1.4520	7.5494	0.0000	0.0000

Table 5.16: d - UK and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.023	0.012	0.252	1.496	7.593	0.000	0.000
t student	-0.023	-0.012	0.153	4.305	16.500	0.000	0.000
Gumbel	0.995	-	-	-	-	-	-
Clayton	-0.009	-0.009	1.040	-0.080	6.017	0.000	0.000
Frank	NA	-0.040	0.074	1.851	7.949	0.000	0.000

TABLE 5.17: e - Canada and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.0147	-0.0178	0.5148	0.9705	7.0689	0.0000	0.0000
t student	-0.0147	-0.0177	0.1700	3.6600	15.8548	0.0000	0.0000
Gumbel	0.9895	-	-	-		-	-
Clayton	-0.0210	-0.0210	1.6916	-1.3832	4.7142	0.0000	0.0000
Frank	NA	-0.0962	0.4252	1.1496	7.2470	0.0000	0.0000

TABLE 5.18: f - PAK and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.0539	-0.0641	6.7005	-11.4010	-5.3036	0	0
t student	-0.0539	-0.0656	10.9618	-17.9236	-5.7287	1.65E-04	1.65E-04
Gumbel	0.9583	-	-	-	-	-	-
Clayton	-0.0834	-0.0834	20.0683	-38.1367	-32.0392	0	0
Frank	NA	-0.3897	6.7510	-11.5020	-5.4046	0	0

TABLE 5.19: g - India and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.030	-0.035	2.015	-2.029	4.068	0	0
t student	-0.030	-0.035	1.893	0.215	12.410	9.90E-19	9.90E-19
Gumbel	0.978	-	-	-	-	-	-
Clayton	-0.043	-0.039	2.444	-2.888	3.210	0	0
Frank	NA	-0.205	1.884	-1.767	4.330	0	0

TABLE 5.20: h - China and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.008	0.007	0.082	1.835	7.933	0	0
t student	-0.008	0.008	-0.184	4.367	16.562	1.02E-33	1.02E-33
Gumbel	1.015	1.000	0.003	1.995	8.092	0	0
Clayton	0.031	0.031	-1.585	5.170	11.267	1.56E-10	0
Frank	NA	0.130	0.766	0.468	6.565	0	0

TABLE 5.21: i - Mexico and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.030	-0.035	1.979	-1.958	4.140	0	0
t student	-0.030	-0.036	4.389	-4.778	7.417	4.16E-05	4.16E-05
Gumbel	0.975	-	-	-	-	-	-
Clayton	-0.049	-0.040	2.919	-3.838	2.260	0	0
Frank	NA	-0.231	2.336	-2.672	3.425	0	0

TABLE 5.22: j - Bangladesh and Trade War US Composite

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.010	0.015	0.352	1.297	7.394	0	0
t student	0.010	0.015	0.500	3.000	15.195	5.56E-17	5.56E-17
Gumbel	1.012	1.007	0.306	1.388	7.485	0	0
Clayton	0.024	0.024	-0.548	3.097	9.194	1.87E-13	0
Frank	NA	0.111	0.571	0.857	6.955	0	0

TABLE 5.23: k - Sri Lanka and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.010	0.015	0.352	1.297	7.394	0	0
Gaussia	-0.137	-0.114	21.207	-40.414	-34.316	0	0
t student	-0.137	-0.115	22.185	-40.369	-28.174	1.11E-07	1.11E-07
Gumbel	0.932	-	-	-	-	-	-
Clayton	-0.137	-0.137	3.075	-4.149	1.948	0.00E+00	0.00E+00
Frank	na	-0.683	20.480	-38.964	-32.866	0	0

Note: The above table shows the tail distribution results for the five copula families. Bivariate copulas are tested for each stock market return with the US TW_Composite Variable.

Trade Composite Variable China and Currencies

Table 5.24: a - US and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.020	0.054	4.750	-7.500	-1.402	0	0
t student	0.020	0.055	13.840	-23.673	-11.478	7.41E-03	7.41E-03
Gumbel	1.038	1.046	17.210	-14.322	-14.322	0	0.06004533
Clayton	0.076	0.076	-2.256	6.513	12.510	0.000111545	0
Frank	na	0.341	5.010	-8.019	-1.922	0	0

Table 5.25: b - JAPAN and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.060	0.044	3.157	-4.315	1.783	0	0
t student	0.060	0.041	41.809	-79.618	-67.424	0.0502146	0.0502146
Gumbel	1.028	1.020	2.224	-2.449	3.649	0	0.02699836
Clayton	0.056	0.056	14.936	-27.871	-21.774	4.35E-06	0
Frank	NA	0.254	2.722	-3.443	2.654	0	0

Table 5.26: c - Germany and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.012	0.005	0.036	1.927	8.025	0	0
t student	-0.012	0.005	-0.717	5.434	17.629	6.35E-60	6.35E-60
Gumbel	1.011	1.000	0.000	2.000	8.097	0	0
Clayton	0.021	0.021	-4.841	11.682	17.779	9.39E-15	0
Frank	NA	0.104	0.514	0.473	7.070	0	0

Table 5.27: d - UK and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.007	0.014	0.297	1.407	7.504	0	0
t student	-0.007	0.014	-0.380	4.760	16.955	1.50E-54	1.50E-54
Gumbel	1.010	1.002	0.024	1.953	8.050	0	0.002765141
Clayton	0.020	0.020	-2.956	7.912	14.009	1.69E-15	0
Frank	na	0.087	0.355	1.290	7.388	0	0

Table 5.28: e - Canada and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.0179	0.0253	1.0440	-0.0872	6.0102	0	0
t student	0.0179	0.0254	0.8953	2.2095	14.4043	1.26E-16	1.26E-16
Gumbel	1.0175	1.0170	2.0152	-2.0304	4.0671	0	0.02303933
Clayton	0.0351	0.0351	-2.9912	7.9825	14.0799	2.64E-09	0
Frank	NA	0.1560	1.0970	-0.1941	5.9033	0	0

Table 5.29: f - PAK and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.023	0.052	4.424	-6.849	-0.751	0	0
t student	0.023	0.052	4.131	-4.262	7.933	1.72E-43	1.72E-43
Gumbel	1.038	1.029	4.549	-7.097	-1.000	0	0.03869039
Clayton	0.076	0.076	-1.774	5.549	11.646	0.00010464	0
Frank	NA	0.329	4.908	-7.816	-1.718	0	0

Table 5.30: g - India and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.013	0.030	1.462	-0.923	5.174	0	0
t student	0.013	0.033	6.094	-8.187	4.008	8.85E-04	8.85E-04
Gumbel	1.024	1.018	2.189	-2.379	3.719	0	0.02436248
Clayton	0.048	0.048	3.171	-4.341	1.756	5.35E-07	0
Frank	NA	0.216	2.056	-2.111	3.986	0	0

Table 5.31: h - China and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.0179	0.0253	1.0440	-0.0872	6.0102	0	0
t student	0.0179	0.0254	0.8953	2.2095	14.4043	1.26E-16	1.26E-16
Gumbel	1.0175	1.0170	2.0152	-2.0304	4.0671	0	0.02303933
Clayton	0.0351	0.0351	-2.9910	7.9825	14.0749	2.64E-09	0.00E+00

Table 5.31 continued from previous page

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Frank	NA	0.1560	1.0971	-0.1941	5.9033	0	0

Table 5.32: i - Mexico and Trade War China Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.010	0.001	0.001	1.999	8.096	0	0
t student	-0.010	0.001	-0.580	5.159	17.354	3.85E+74	3.85E+74
Gumbel	0.999	-	-	-	-	0	0
Clayton	-0.001	-0.001	0.131	1.737	7.835	0	0
Frank	NA	-0.002	0.000	2.000	8.097	0	0

Table 5.33: j - Bangladesh and Trade War China Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	0.031	0.516	506.600	-1011.195	-1005.087	0	0
t student	0.031	0.516	505.400	-1006.724	-994.530	3.04E-29	3.04E-29
Gumbel	1.626	1.495	482.000	-961.351	-955.838	0	0.4101438
Clayton	1.252	1.252	-159.600	321.144	327.240	0.5748582	0
Frank	NA	4.042	618.515	-1235.030	-1228.930	0	0

Table 5.34: k - Sri Lanka and Trade War China Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.308	-0.043	3.071	-4.142	1.956	0	0
t student	-0.308	-0.041	14.580	-25.157	-12.962	5.65E-03	5.65E-02
Gumbel	1.075	1.026	4.640	-7.284	-1.186	0	0.03482353
Clayton	0.150	0.150	-81.280	164.556	170.653	9.75E-03	0.00E+00
Frank	NA	-0.192	1.596	-1.193	4.905	0	0

Table 5.35: l - BTC and Trade War China Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.038	-0.048	3.684	-5.368	0.730	0	0
t student	-0.038	-0.048	3.249	-2.499	9.696	4.71E-61	4.71E-61
Gumbel	0.976	-	-	-	-	-	-
Clayton	-0.048	-0.048	-0.511	3.021	9.119	0	0
Frank	NA	-0.220	2.224	-2.448	3.650	0	0

Note: The above table shows the tail distribution results for the five copula families. Bivariate copulas are tested for each stock market return with the TW_Composite Variable for China

Trade Composite Variable US and Currencies

Table 5.36: a - US and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.002	0.005	0.043	1.914	8.011	0	0
t student	0.002	0.005	-0.497	4.995	17.189	1.39E-70	1.39E-70
Gumbel	1.008	1.000	0.000	2.000	8.097	0	0
Clayton	0.954	0.037	1.980	-1.961	4.137	5.99E-09	0
Frank	NA	0.075	0.267	1.467	7.564	0	0

Table 5.37: b - JAPAN and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.045	0.039	2.464	-2.928	3.169	0	0
t student	0.045	0.039	2.474	-0.948	11.247	3.54E-22	3.54E-22
Gumbel	1.018	1.000	0.000	2.000	8.097	0	0
Clayton	0.036	0.036	12.060	-22.117	-16.020	3.97E-09	0
Frank	NA	0.174	1.396	-0.791	5.306	0	0

TABLE 5.38: c - Germany and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.019	-0.028	1.305	-0.611	5.487	0	0
t student	-0.019	-0.028	0.658	2.684	14.879	5.22E-70	5.22E-70
Gumbel	0.986	-	-	-	-	-	-
Clayton	-0.027	-0.027	3.176	-4.352	1.745	0	0
Frank	NA	-0.122	0.708	0.584	6.681	0	0

TABLE 5.39: d - UK and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.001	-0.004	0.024	1.951	8.049	0	0
t student	-0.001	-0.004	-0.367	4.735	16.929	1.26E-68	1.26E-68
Gumbel	0.994	-	-	-	-	-	-
Clayton	-0.013	-0.013	0.812	0.375	6.473	0	0
Frank	NA	-0.068	0.217	1.567	7.664	0	0

TABLE 5.40: e - Canada and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.011	0.020	0.639	0.721	6.819	0	0
t student	0.011	0.020	-0.089	4.178	16.373	3.32E-71	3.32E-71
Gumbel	1.018	1.000	0.000	2.000	8.097	0	0
Clayton	0.035	0.035	-1.237	4.473	10.571	2.97E-09	0
Frank	NA	0.150	1.074	-0.148	5.949	0	0

TABLE 5.41: f - PAK and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.0008	0.0065	0.0696	1.8608	7.9582	0	0
t student	0.0008	0.0072	0.3775	3.2450	15.4399	2.51E-13	2.51E-13
Gumbel	1.0080	1.0070	0.7006	0.5987	6.6961	0	0.009613426
Clayton	0.0160	0.0160	0.0474	1.9052	8.0027	1.71E-19	0
Frank	NA	0.0772	0.2734	1.4531	7.5506	0	0

TABLE 5.42: g - India and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.0048	-0.0057	0.0522	1.8957	7.9931	0	0
t student	-0.0048	-0.0051	-0.0051	4.0102	16.2051	5.98E-27	5.98E-27
Gumbel	1.0018	1.0000	0.0000	2.0000	8.0974	0	0
Clayton	0.0036	0.0310	1.4390	-0.8776	5.2198	2.00E-10	0
Frank	NA	0.0216	0.0211	1.9579	8.0553	0	0

TABLE 5.43: h - China and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.0113	0.0198	0.6393	0.7215	6.8189	0	0
t student	0.0113	0.0198	-0.0892	4.1785	16.3733	3.32E-71	3.32E-71
Gumbel	1.0177	1.0000	0.0000	2.0000	8.0974	0	0
Clayton	0.0353	0.0353	-1.2370	4.4735	10.5709	2.97E-09	2.97E-09
Frank	NA	0.1497	1.0740	-0.1483	5.9491	0	0

TABLE 5.44: i - Mexico and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	-0.0296	-0.0190	0.5868	0.8263	6.9237	0	0
t student	-0.0296	-0.0189	-0.2165	4.4330	16.6278	1.37E-59	1.37E-59
Gumbel	0.9951	-	-	-	-	-	-
Clayton	-0.0097	-0.0097	1.3940	-0.7887	5.3088	0	0
Frank	NA	-0.0350	0.0585	1.8829	7.9803	0	0

TABLE 5.45: j - Bangladesh and Trade War US Composite Variable

	Initial	**Final**	**Log**			**Tail dependence**	
	Parameter	**Parameter**	**Likelihood**	**AIC**	**BIC**	**lower**	**upper**
Gaussia	0.197	0.212	75.160	-148.328	142.230	0	0
t student	0.197	0.212	72.973	-141.946	-129.751	2.11E-31	2.11E-31
Gumbel	1.132	1.008	0.162	1.677	7.774	0	0.01097213
Clayton	0.264	0.265	140.467	-278.934	-272.836	7.28E-02	0

Table 5.45 continued from previous page

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Frank	NA	1.132	64.300	-126.626	-120.528	0	0

TABLE 5.46: k - Sri Lanka and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.456	-0.483	431.600	-861.156	-855.058	0	0
t student	-0.456	-0.608	663.700	-1323.341	-1311.146	1.55E-02	1.55E-02
Gumbel	0.706	-	-	-	-	-	-
Clayton	-0.588	0.012	-8.624	19.247	25.345	9.11E-27	0.00E+00
Frank	NA	-4.800	707.038	-1412.075	-1405.978	0	0

TABLE 5.47: l - BTC and Trade War US Composite Variable

	Initial Parameter	**Final Parameter**	**Log Likelihood**	**AIC**	**BIC**	**Tail dependence lower**	**upper**
Gaussia	-0.035	-0.058	5.430	-8.860	-2.763	0	0
t student	-0.035	-0.058	5.444	-6.890	5.305	1.50E-24	1.50E-24
Gumbel	0.962	-	-	-	-	-	-
Clayton	-0.075	-0.075	-0.047	2.094	8.192	0.00E+00	0.00E+00
Frank	NA	-0.361	5.862	-9.723	-3.626	0	0

Note: The above table shows the tail distribution results for the five copula families. Bivariate copulas are tested for each stock market return with the TW_Composite Variable for USA.