THE IMPACTS OF CLIMATE CHANGE UNCERTAINTY ON THE TRADE POLICY: EVIDENCE OF THE VOLATILITY OF THE U.S. TRADE POLICY

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Abstract

This study aims to determine the interactions between the climate policy uncertainty and the volatility of the trade policy in the USA between January 2000 and March 2021 based on monthly data. We employ multiple tests in the VAR model to analyze the dataset. We first utilized the Granger causality test and the results provide no causality between the two variables. Plus, the impulse response test shows no reaction to the shocks that come to the variables. Lastly, we employed the variance decomposition test and its outcomes support the results of the tests above. It shows that the indices are lagged by 95% of their dynamics and only 5% of the other index's dynamics. Generally, our results suggest that the trade policy cannot be affected by the uncertainty of the climate change risks in the dataset used in the USA.

Keywords: US trade policy, Climate policy uncertainty, VAR model, Granger Causality test

JEL Classification: F18, F17, F23, F21

Öz

Bu çalışma, Ocak 2000-Mart 2021 tarihleri arasında ABD'de iklim politikası belirsizliği ile ticaret politikasının oynaklığı arasındaki etkileşimi aylık verilere dayalı olarak belirlemeyi amaçlamaktadır. Bu amaç doğrultusunda veri setini analiz etmek için VAR modelinde üç farklı test kullanmaktadır. İlk önce Granger nedensellik testi kullanılmış ve testin sonuçlarına göre iki değişken arasında nedensellik ilişkisi olmadığını tespit edilmiştir. Ayrıca, etki tepki test sonuçlarına göre değişkenlere gelen şoklar sadece değişkenin kendisine tepki olduğunu göstermektedir. Bir başka ifadeyle, bir değişkenin diğer değişkene karşı hiç bir tepki göstermemektedir. Son olarak, Varyans ayrıştırma testin sonuçları yukarıdaki testlerin sonuçlarını desteklemektedir. Sonuçlar endekslerin %95'i kendi dinamiklerinden ve diğer endeksin dinamiklerinden sadece %5'i kadar gecikmeli olduğunu göstermektedir. Genel olarak, sonuçlarımız ABD'de kullanılan veri setindeki iklim değişikliği risklerinin belirsizliğinden ticaret politikasının etkilenmediğini göstermektedir.

Anahtar Kelimeler: ABD ticaret politikası, İklim politikası belirsizliği, VAR modeli, Granger Nedenselik testi

JEL Sınıflaması: F18, F17, F23, F21

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1. Introduction

Climate change is a worldwide environmental matter that requires collaborative solutions, multilateral collaboration, and coordinated action in accordance with the international community's greater economic growth and development goals. Trade and trade policy may and must be part of the policy toolkit to achieve agreed-upon climate targets at the depth and speed needed by the climate emergency. The transition to a worldwide low-carbon economy and a greener, more sustainable society relies heavily on trade. Production is increasingly dispersed around the world in an integrated international economy (Hummels, 2007); (Baldwin, 2009). The fragmentation of supply chains and the geographic dispersion of consumers and producers provide significant challenges for climate policy, making it more difficult to apportion blame for greenhouse gas emissions (Davis & Caldeira, 2010); (Skelton, 2013). Emissions are most often assigned to the national territory from which they are emitted, as indicated by production-based accounting of emissions (PBA) undertaken in accordance with the United Nations Framework Convention on Climate Change (UNFCCC) (United Nations , 1992); (Davis & Caldeira, 2010). Hence, many academic studies have been conducted regarding the linkage betwixt climate change and policy trade all around the globe. Economists have long stressed the importance of internationally synchronized climate policies, such as constant carbon pricing, in achieving cost-effective emission cutbacks. Climate policies, on the other hand, are restricted to the sphere of national policy-making in the absence of a global authority to administer and enforce them (Edenhofer, Flachsland, Jakob, & Lessmann, 2013). This reality is mirrored in the Paris Agreement's bottom-up nature, which compels nations to submit their promises for reducing emissions in the shape of 'Nationally Determined Contributions,' but does not include any duties addressing the severity of these commitments (UNFCCC, 2015). For the foreseeable future, the existing patchwork of climate policies with varying degrees of ambition among nations is likely to remain. A common concern in such a fragmented climate regime is that climate change mitigation measures implemented by a small number of nations could erode the competitiveness of energy-intensive and trade-exposed (EITE) industries in these nations without actually reducing emissions, as these industries may relocate to regions with softer emission bullseyes rather than switching to cleaner energy sources or more energy-efficient production processes (Jakob M. , 2021).

It is important to determine the interactions between policy trade and climate policy uncertainty. The situation is varying from one part to another part of the world. The higher degree of temperature, the rise of sea levels, the increase of carbon dioxide, greenhouse gases, and the use of CO2 emissions, the recent floods, and the climate catastrophes can force the production and trade size worldwide. Concerns about the climate policy uncertainty rose when particularly after the (IEA, 2006) declared that the globe will require more electric power in the future years, but with fewer greenhouse gas emissions. Nevertheless, investment in the power sector is influenced by a number of factors, including the national economy, government policies and regulations, the energy market, technological advancements, and the operation and maintenance of new technologies, all of which can increase risk in a power investor's portfolio. Among these different reasons, uncertainty has become a growing source of concern for power plant investors. Energy markets and government climate change regulations, in particular, are becoming increasingly uncertain, making an investment project's revenue stream less reliable (Mandil, 2007). Moreover, the nature of trade policy is fundamentally ambiguous (Handley, 2011) and as the world becomes more unified, the benefits of reducing trade policy uncertainty tend to be more significant than the benefits of lowering the level of trade barriers (Limão & Maggi, 2015).

Our aim in this paper is to examine how the uncertainty of climate change policies affect the volatility of the US trade policy in the last twenty years. Therefore, we utilize the climate policy uncertainty index which is a newly constructed index based on monthly articles in eight U.S. major newspapers regarding climate change, uncertainties, emissions, climate risks, president's statements in the last twenty years (Gavriilidis, 2021). And also, the U.S. trade policy uncertainty (TP) index is based on monthly data between Jan-2000 and Mar-2021, and the data is gathered in (EPU, 2021) website. We employed the Vector-Autoregression (VAR , 2021) model (Stock & Watson, 2001); (Lütkepohl, 2005) in (Eviews, 2021) program to analyze the collected data. Furthermore, the Granger causality, the Impulse response, and the Variance decomposition tests are employed in the process. Our study is divided into five parts. It starts with the introduction in the first part, literature review in the second part, data and methodology in the section three, data analyses and outcomes in the fourth part, and finally a conclusion to the study in the last section. What makes the study to be different from literature is this study uses the twenty years of uncertainty of climate change and the volatility of trade policy in the nation.

2. Literature Review

In making decisions, businesses are used to dealing with risk and uncertainty, and they will continue to do so in the face of climate change policy uncertainty. Risk is not always a negative concept. Companies attempt to produce profits that exceed their cost of capital by taking measured risks. Nonetheless, continued increased risk raises the cost of capital and affects investment decisions (Mandil, 2007). Carbon pricing is expected to change between countries if countries reduce emissions by different amounts. For two reasons, imports from nations with lower carbon costs may be subject to extra border charges in countries with higher carbon prices. They may desire to compensate for the loss of competitiveness and the leakage of carbon emissions by increasing production in countries with lower carbon costs (Mattoo, Subramanian, Mensbrugghe, & He, 2009). Messerlin in 2010 stated that the relations between the climate and trade groups were distinguished by common ignorance at best, and more often by deep antagonism when dealing with the issue of carbon emissions, on which this letter concentrates. The climate community rejected to be hampered by trade restrictions in any manner. The international trade community was so concerned about the potential harm that climate change measures could cause to the global trading system that it was fiercely against any dliberation of such issues. Also, common devastation seems to be unavoidable (Messerlin, 2010). Low et al 2010,. Worked to determine how particular WTO regulations apply to the intersection of climate change and trade. They imply that due to leakages, various amounts and sorts of climate change mitigation efforts amidst nations have straight environmental implications. Due to the worldwide mobility of resources and the prevalence of trade, carbon limits in a nation can cause economic activity to relocate to another nation where the costs of carbon constraints are less expensive (Low, Marceau, & Reinaud, 2011). Ahmad et al, examined the lawful difficulties of climate change to trade policy. They found that climate change policies give certain economies an excuse to protect domestic industry, and the least developed countries get affected by the strict of climate change because they have no action plan to mitigate their climate risks (Ahmed & Long, 2013). Dumorrtier examined the cap and trade policies to fight climate change in the USA. The impact of uncertainty on tree planting, carbon sequestration, and arable land allocations using the real options framework and product prices are evaluated in the study. Compared to a deterministic model, landholders prefer to wait before altering land use to get more information on changes in carbon prices, so farmland over a 40-year forecast period. Less land will be converted to forestry. The simulation also indicates that most of the afforestation takes place in the south and northeast, with almost no conversion taking place in the Corn Belt. The lesson for policymakers is that when there is uncertainty about the price of carbon, there is less afforestation and sequestration. To encourage afforestation, mechanisms are needed to decrease uncertainty at the expense of a lofty raw material prices (Dumortier, 2013).

Since the 1990s, global commerce has increased at twice the ratio of the international economy. Global trade reduces fabricating wages in high-income nations, Making whole industries in certain communities uncompetitive, thereby triggering nationalist politics that seek to prevent or inverse farther commerce enlargement (Karabarbounis & Neiman, 2014); (Timmer, Erumban, Los, Stehrer, & De Vries, 2014). The rapid changes in intercontinental trade can lead to an increase the climate risks. At United Nations’ 2015 conference countries pledged to invest in renewable energy and projects. On the other hand, cut down their carbon emissions. Hence, Barak Obama announced an action plan to mitigate the climate risks in the United States named Clean Power Plan for climate change. European Union and China also announced their plan to reduce their carbon emission (UNCTAD, 2015). Furthermore, the importance of trade agreements has been seen in the last few years. Plus, the non-tariff barriers that lead to climate sakes could also be addressed through trade agreements. Redundantly onerous laws or regulations that testimonial standards that significantly contrast from worldwide norms which can create such impediments. Trade agreements could equip for the alinement of such measures, fluctuating from common identification of concordance evaluate procedures (the process of ensuring that products meet a standard) to common recognition of standard equality, and regulatory convergency, for example through standard harmonization (Holzer & Cottier, 2015). Meanwhile, swiftly growing international commerce in the last three decenniums has lifted millions of people out of penury (Brown, et al., 2016). In recent years, the global trade regime has also seen remarkable modifications. Despite the fact that a well-established scheme of commerce laws has been in site for longer than 20 years and the WTO now includes all of the earth's main trading countries, the single-undertaking method that led to the WTO in the first place is still in existence (Droege, Asselt, Das, & Mehling, 2016). Dellink et al., 2017 used various models to analyze the influnces of climate change on trades. Their paper examines the consequences of climate change on commerces, taking into account both direct and indirect impacts on infrastructure and transportation routes, as well as changes in endowments and production. The paper emphasizes the significant regional variances in climate change's consequences on regional and sectoral economic activities, as well as the competitiveness. As a result, changes in international commerce are influenced not just by national climate effects, but also by the asperity of these influences in comparison to significant trading coworkers. Eventually, they suggest that countries should be aware of the climate risks and the reaction of trade volume to the risks (Dellink, Hwang, Lanzi, & Chateau, 2017). Nevertheless, there is an international obligation that encourages countries to protect their interests and follow the global roles based on the agreements. The Paris Accord is the first global agreement that requires both rich and developing countries to take paces to prevent and adjust to the impacts of climate change. In line with this goal, trade agreements and case law specifically recognize governments' authority to place environmental limits on trade in order to protect public health and preserve clean air (Di Leva & Shi, 2017). Asselt in a study declares that climate-related measures can already be present in several regional trade agreements. And also, it finds that the regional trade agreements can be used to address a variety of issues, including climate change (Asselt, 2017).

Climate policy, particularly trade policy, should be aligned with as many international policies as possible. Global climate protection can be accelerated through free commerce in environmental goods or the implementation of domestic emission standards to commerced goods. The World Trade Organization (WTO) and its dispute settlement agencies will only provide legal backing for this goal in the long run. As a result, the EU and its affiliate nations should focus their efforts on two fores. To begin, the United Nations (UN) and the World Trade Organization (WTO) fora should make the linkages betwixt the two policy sectors even more visible. Second, the EU can use its territorial free commerce accords as a lever to press for climate policy implementation in its coworker nations (Dröge & Schenuit, 2018). Holding the world average heat wave to far under 2 degrees below pre-industrial levels will necessitate parties reaching a global peaking of greenhouse gas emissions promptly and then swiftly reducing emissions. This kind of ambition will necessitate a once-in-a-lifetime social and economic transformation in a relatively short period of time. As parties seek to reorganize toward "greener" production and consumption systems, the means utilized to bring about that shift will have substantial economic consequences. Some of these ramifications will be felt internationally, as national policies affect the demand and supply of traded goods, affecting export and import markets in other countries. These have been referred to as the impacts of response measures implementation in long-running UNFCCC deliberations on the subject. One of the main goals of all those negotiations has been to minimize any negative consequences as much as possible, in accordance with numerous treaty obligations (UNCTAD, 2018); (Ermolieva, et al., 2018); (Das, Asselt, Susanne, & Mehling, 2018). However, since the Paris Agreement entered into force on November 4, 2016, the political climate in the EU and the United States (US) have shifted dramatically. The "America First" strategy has put pressure on both US climate safeguarding and open trade since President Donald Trump took office. For example, the Mexican undersecretary for habitat strategy and planning has publiclly discussed placing a carbon levy on the United States. Furthermore, even before the 2016 US elections, the EU was experiencing substantial internal divisions over transatlantic trade negotiations (Dröge, Asselt, Das , & Mehling, 2018). Since the year of 2018, the US has implemented a slew of substantial trade policy alteration. Most importantly, it has slapped significnt tariffs ranging from ten to fifty percent on items such as washing machines, solar panels, aluminum, steel, and around $250 billion in Chinese imports, and it has planned potential penalties affecting almost $300 billion in more goods. Canada, China, the European Union (EU), and Mexico have all responded by imposing retaliatory duties (Cavallo, Gopinath, Neiman, & Tang, 2019).

A study conducted by Carvajal et al, illustrates the duty of Hydropower in climate change policies. They imply that it will continue to be one of the most economical and low-emission solutions in Ecuador's power sector in the long run. Constraints on deployment and a lack of confidence regarding the effects of climate change, on the other hand, could limit its potential to come up with the achievement of NDC targets and raise uncertainty about long-term power system costs. Hydropower expansion will very certainly need to be supplemented by alternative sources, such as increased thermoelectric generating with natural gas, biomass, and geothermal energy, to mitigate these hazards (Carvajala, Lia, Soria, Cronin, Anandarajah, & Mulugetta, 2019). Besides Ecuador, Rouf et al, examine Bangladesh’s new climate change challenges. They believe that because ecological, cultural, and other societal variables affect Bangladesh's economy, there is the prospect of switching from unsustainable growth to sustainable growth through the blue economy. Bangladesh can be a successful blue economy benchmark for the developing globe if the sustainable blue economic method is effectively pursued. As a result, they see the blue economy as more than just a way of exploiting ocean and marine resources; it's also a way of ensuring a secure future for Bangladesh's most vulnerable coastal residents (Rouf, Rahman, Rahman, & Ahsan , 2019). An analysis by the economist intelligence unit demonstrates that if the world is to stay below 1.5 degrees Celsius, commerce must be a key component of the solution. Without robust and cohesive trade and environmental policies, governments would be unable to reach their ambitious Paris Agreement commitments. Therefore, there should be more integration between the countries around the globe (The Economist Intelligence Unit, 2019). Many factors could be at play in the causal connection betwixt US trade policy and climate policy uncertainty. These factors can be determined as consumption, investment, GDP, and CPI which all suffer as a result of rising trade tensions and climate risks. A diminishing export market leads to a drop in exporter size and, as a result, a reduction in capital accumulation (Caldara, Iacoviello, Molligo, Prestipino, & Raffo, 2019).

Climate change and also increased globalisation and trade are having an increasingly negative impact on tree and forest health. Climate change allows animals to colonize new settings, and species that were formerly hampered by native predators can cuurently thrive with little or no resistance in these new environments. Furthermore, the expanding commerce in alive plants and wood artifacts leads to the unintentional transfer of species; such as pests or fungi in soil, from far-flung parts of the planet. As a consequence, new forest and tree dangers can emerge, posing a serious threat to forest and tree health. Controling these repercussions via legislation and policy, on the other hand, is a difficulty, especially when it comes to stabilizing a majority free commerce policy with significant bio-security doubts (Marzano & Urquhart , 2020); (Rueche , 2020). Jakob 2021 has claimed that imposing carbon levies on a few energy-intensive items and services would be a practical solution. These carbon levies do not correspond to the embodied emissions in a one-to-one ratio. They could also be constructed as export tariffs imposed by the commerce coworker to boost their political feasibility and make them more equal. Furthermore, carbon leakage is reduced if trading partners' carbon-intensive businesses are also governed by climate policies. This could be accomplished, for example, by sectorial climate accord, targeted technology transfer, or climate policies supported by multi- or bilateral financing (Jakob M. , 2021). Moreover, Adams et al, argue that climate change will have a significant effect on agricultural production all around the world. Warmer temperatures may diminish yields in some cases, but they may boost agricultural production in some limited circumstances. Anyhow, the risks are much higher than the opportunities (Adams, Benzie, Croft, & Sadowski, 2021). The climate change policies also make uncertainty over trade policy and move consumers away from imported commodities and toward domestically produced items, causing a disruption in US imports from other countries. And then, the import costs rise as a result of the assumption of increased trade policy uncertainty in the shape of higher future tariffs (Williams, 2021). The United Kingdom is on the front line in the fight against climate risk. However, the core of the UK's issue in combining trade and climate policy is global in nature rather than national. Because the UNFCCC framework fails to level the playing field, nations such as the United Kingdom that are committed to addressing climate change are becoming progressively solictious about bearing expenses that their trading coworkers do not share, raising the likelihood of trade restrictions. In this sense, the UK is bound not by a legal or technical issue imposed by stringent WTO rules, however by a political issue imposed by other nations not applying the same regulatory costs and economic ameliorations and responding to latest commerce barriers (Lydgate & Anthony, 2021). However, in the U.S.A. the climate policy risk lowers carbon emissions by shrinking the capital stock and making it cleaner whereas a carbon tax would cost less than half as much to produce the same decrease in emissions (Fried, Novan, & Peterman, 2021).

3. Data and Methodology

As we mentioned in the introduction part, we use the climate policy uncertainty index (CPU) which has recently been constructed by (Gavriilidis, 2021), and the volatility of the US trade policy data inside the US equity market volatility tracker. The time-series data is starting from January 2000 and ends in March 2021 based on monthly data, the data obtained from (EPU, 2021) website. Significant to say that the CPU has been constructed based on the articles and news regarding climate change in eight US newspapers based on monthly news.

We employed the Vector-Autoregression (VAR , 2021) model constructed by (Stock & Watson, 2001) via the (Eviews, 2021) program to analyze our data. Given that the model can be useful to determine the interactions between the two variables by using multiple tests in the process. Our first test is the Granger causality test which was constructed by (Engle & Granger, 1987) and determines the causality relationship between the variables, and then the Impulse response test was employed to determine the reactions of each variable to the other one. Lastly, we employed the Variance decomposition test to identify the connection between the two indices.

4. Data Analysis and Results

In order to examine the collected data, we first looked at the statistical status of the data as can be seen in the appendix-1 below.

The second appendix provides the outcomes of the ADF unit root test to designate whether the data is stationary or not. As can be seen, the data is not stationary at level but taking one difference for both indices makes them stationary. Therefore, we took the first difference for both indices.

The second important phase here is the heteroskedasticity test for the data. It is important to apply this test to determine whether the collected data suits the VAR model or not. As can be seen in appendix-3, the probability is higher than 10%, therefore, heteroscedasticity exists between the data.

The appendix-4 illustrates that Autocorrelation exists between the collected data. Given that all the data are bigger than 10% and the result is also supporting the previous results.

The last phase of the VAR creation is the AR roots graph. Locating all the roots inside the circle can prove that we have a healthy model and the VAR model created at 20 lag. The results of this test are also located in the appendixes below.

Table 1. Granger Causality Test

Granger Causality	
DLCPU ≠ > DLTP	0.7278
DLTP ≠ > DLCPU	0.1953

After creating the VAR model, our first test would be looking at the causality betwixt the data. Using the Granger causality test we determine that there is no causality between the data we collected. In other words, the CPU index is not a good predictor for the US trade policy, and the US trade policy is not a good predictor for the CPU in the Unites States in the dataset used. Although many studies claim that climate change is a big threat to trade policy but our study suggests that these two factors are not connected to each other. This may be because of the dataset we used and/or the model we applied to analyze the data.

The next test in our model is the Impulse response test as shown below:

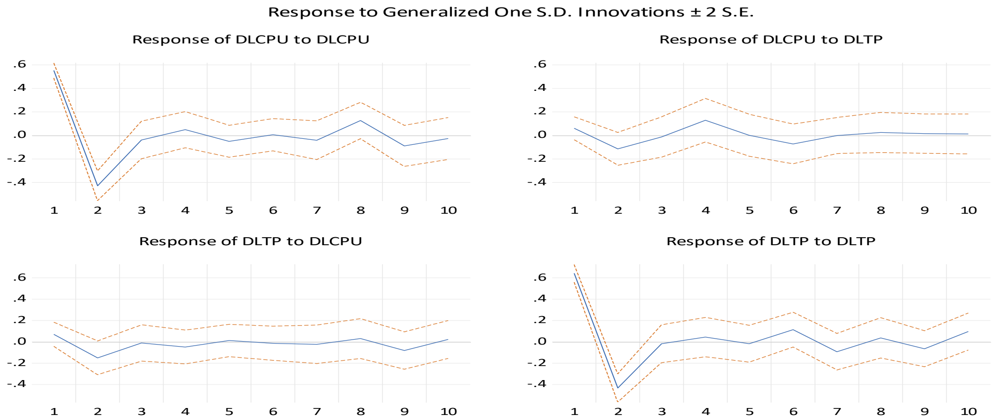

Figure 1. Impulse Response

The figures above show the response of the indices to the shocks that come to each index. The first figure on the left-hand reveals the response of CPU to TP for two months positively. It means that the CPU reacts to the shocks that come to the CPU itself for two months positively. Though the second and third figures are the most significant indicators in this test, they provide meaningless results. The last figure illustrates the response of TP to TP itself for two months positively. Shortly, the results of this test only show the responses of one index to the same index not to the other one, and each of them reacts are two months positive reactions for each shock.

The last test in our model is the variance decomposition test which determines the linkage between the two indices and shows how one index depends on the other index when a shock comes to them.

Table 2. Variance Decomposition

CPU	
CPU	TP
100.0000	0.000000
99.06660	0.933399
99.05332	0.946078
96.05396	3.946044
96.06545	3.934549
95.07526	4.924741
95.08912	4.910885
95.21535	4.784652
95.17227	4.827733
95.13863	4.381372

The table above shows the result of variance decomposition when the CPU is dependent on the dynamics of both the CPU index itself and the dynamics of TP. As can be seen in the short term time which is for two months, the CPU is independent of the TP. In other words, the CPU is lagged by its dynamics only. However, in the long term, for instance, in the tenth month, the CPU is lagged by 95% of its dynamics and lagged by 5% of the TP dynamics. This tells us that the CPU has a very low interaction with TP. Generally, the CPU index is lagged by nearly 96% of its dynamics and 4% of the TP dynamics.

Table 3. Variance Decomposition

TP	
CPU	TP
1.211788	98.78821
4.506482	95.49352
4.521133	95.47887
4.869304	95.13070
4.889248	95.11075
4.811056	95.18849
4.831050	95.16895
4.961064	95.03894
5.908924	94.09108
5.899277	94.10072

When we look at the TP as the dependent variable, the proportion of its connection with the CPU starts in the first month and increases month by month. Nevertheless, the connection is very low. The TP is lagged by 5% of CPU dynamics and lagged by 95% of the dynamics itself.

Generally, the results of the variance decomposition test provide a very low connection between the two indices, given that each index lagged by 95% of its dynamics. This tells us that the changes or the shocks that come to CPU cannot affect the US trade policy and vice versa in the dataset used. These results can support the results of the impulse response test and the Granger causality test.

5. Conclusion

Droughts that are more frequent and severe, hurricanes, heat waves, rising sea levels, melting glaciers, and warmer oceans can all impact businesses around the world, destroying output, changing the roles of imports and exports, and wreaking havoc on people's livelihoods and communities. Ominous weather events are increasing more common and severe as climate change progresses. In this scope, we intend to examine the impacts of climate policy uncertainty on the volatility of the US trade policy between January 2000 and March 2021 based on monthly data. Generally, the results of all the tests are supporting each other and this tells us that the uncertainties of the US climate change do not affect the trade policy in the dataset used. This may be because of the data we used because it is for twenty years and unfortunately the U.S.A. is not following her climate pledges. However, we suggest that companies, policymakers, producers, importers, and exporters in the U.S.A. be aware of the huge climate risks that will come to their value of investments, especially in the forthcoming years. Moreover, the literature proved that businesses face a wide range of hazards as a result of global warming, from disrupted supply chains to higher insurance costs to labor issues. Climate change and extreme weather phenomenons like hurricanes, floods, and fires, for instance, have a straight influence on 70% of all global economic sectors. Furthermore, while the United States does not have a nationwide carbon tax, there is general recognition that such a policy may be implemented in the future. The potential of a future carbon price raises the risk of investing in the capital that will be utilized in conjunction with fossil fuels. Because fossil fuels play such a dominating role in the creation of goods and services, the threat of a carbon price might have far-reaching consequences across the macro-economy. This of course will affect the trade policy in the country. Lastly, we believe that by providing greater access to clean technology and better supply chains, international trade can help speed decarburization. However, multinational climate and trade policy platforms must better support these processes. The goals of the United Nations Framework Convention on Climate Change (UNFCCC) and the World Trade Organization (WTO) must be better aligned.

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Appendices

Appendix-1: Descriptive Statistics

	Mean	Std.Dev	Skewness	Kurtosis	Jarque_bera
DLCPU	0.007217	0.743132	0.210947	2.985543*	43.60743***
DLPT	4.776610*	2.787347*	0.251691	3.142680*	2.783138*

1%*5%**10%***

Appendix-2: ADF Unit Root Test

ADF UNIT ROOT TEST	Intercept	Trend& Intercept
DLCPU	<0.01	<0.01
DLTP	<0.01	<0.01

Appendix-3: Heteroskedasticity Test

Heteroskedasticity test result	
Prob.	0.1218

Appendix-4: Autocorrelation LM Test

Prob.
0.2091
0.4224
0.2328
0.6080
0.8003
0.5992
0.6498
0.3411
0.7290
0.5422

Appendix-5: AR Roots Graph