

Research on the Influence of Russia-Ukraine War on American Inflation and Strategy Optimization

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Abstract. The outbreak of the Russia-Ukraine War must be the most astonishing and significant event in 2022. It is a war caused by geopolitics but damages the global economy drastically. The necessity of studies on the specific influences of the Russia-Ukraine War on certain countries raises, and how to mitigate these influences becomes imperative. The research design is descriptive with secondary data like CPI and PPI. This paper will also complete the case study of how the Russia-Ukraine War led to U.S. inflation with economic models including an open economy market and demand and supply. The result reveals the influence of the war on the rise of prices of U.S. energy, food, and other products. The suggestions are to cease the war, imply contractionary monetary policy, cancel tariffs, increase energy supply, and seek alternatives to fossil fuels. This paper helps explain the impacts of the Russia-Ukraine War on American inflation and the strategies that are implicated carefully to improve citizens' lives.

Keywords: Russia-Ukraine War; American Inflation; Strategy Optimization

1. Introduction

1.1 Research background

With the development of technology and global transportation, globalization has become the main topic of the modern world. Countries become more dependent on one another and prosper the world economy together. They import, and export goods and services to one another so do their financial assets. However, with the outbreak of the Russia-Ukraine War on February 24, 2022, and the tough situation of Covid-19, the world economy is in chaos, and society is in unrest. The quantitative easing during Covid-19 and the negative shock of the war led to worldwide inflation. Some people believe that Russia-Ukraine War would only affect these two countries and their surrounding countries. But the truth is, the nations far away from Europe are affected as long as they are involved in international trade.

This paper examines the influence of the Russia-Ukraine War on the USA's price level. The USA is the biggest economy in the world and leads the financial sanction on Russia. It is the best sample to study how Russia-Ukraine War affects distant countries. After about six months since the war began, it is commonly acknowledged that it caused worldwide inflation and food and energy crisis because Russia and Ukraine play vital roles in world energy and food supply. Many scholars published their opinion about relevant but broad topics. Thus, studies on one specific country and economic indicator are scarce and need to be done.

This paper clarifies the reasons and factors that raise the USA's price level and explains the connection among these factors. This study is significant for people who care about the economy of the USA and try to understand the causes of inflation; Meanwhile, the interpretation and suggestions of this paper can help the U.S. government to control inflation accordingly.

1.2 Literature Review

Previous works tended to take a theoretical approach to the overview of the effects of the Russia-Ukraine War on global and U.S. inflation without specific data and precise explanation. Guirguis, Dutra, and McGreevy discover that global inflation leads the U.S. inflation and can be seen as a warning to the U.S. economy. The strong correlation between worldwide inflation and U.S. inflation is caused by globalization [1]. However, their article focuses on the new measure of global inflation

and the relationship between global inflation and U.S. inflation, which means it lacks a detailed analysis of how the Russia-Ukraine War affects U.S. inflation, like the negative shock to some specific markets. Therefore, their article will be utilized as the theoretical support for this paper. To prove that the U.S. would experience inflation, evidence that the Russia-Ukraine War would cause global inflation is required. Mbah and Wasum point out that the war would cause global inflation, especially in the energy and food markets. They also claim that although the import U.S. from Russia and Ukraine only accounts for a small percentage of total imports, the U.S. would still bear the inflation because it is an open economy [2]. IMF further developed this opinion by saying that many countries are experiencing elevating inflation, and the U.S. would be affected but at a relatively low level due to the solid growth of the U.S [3-4]. Economy and low dependence on Russia and Ukraine. These previous works lack data and detailed conductive processes from global inflation to U.S. inflation. This paper aims to demonstrate the complete chain of the economic impact of the war on the U.S. price level.

2. Research design and methods

This topic seems to be correlational research, but it is commonly acknowledged and proved the causal relationship between Russia-Ukraine War and U.S. inflation. Hence, the research design here is descriptive and aims to identify the conduction of the war to U.S. inflation. The methodology of this paper is interpreting the relevant secondary data, such as the CPI of the U.S.; all the data is from reliable online sources like the official website of the U.S. Bureau of Labor Statistics. This paper will also complete the case study of how the Russia-Ukraine War led to U.S. inflation with economic models including an open economy market and demand and supply.

3. Result

The most direct economic influence of the Russia-Ukraine War is global inflation, especially in the energy and food market. To reveal the change of U.S. price level, two economic indicators—PPI and CPI—from the U.S. Bureau of Labor Statistics are employed in this essay. Figures 1 and 2 overviews U.S. inflation in each major category [5].

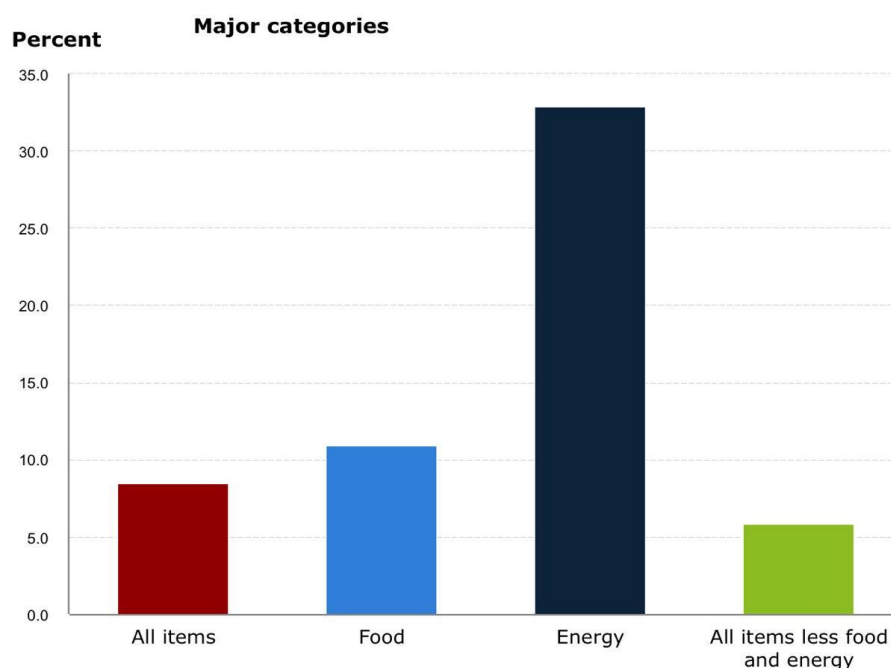


Fig 1. 12-Month CPI Percentage Change of Each Major Categories, July 2022, Not Seasonally Adjusted

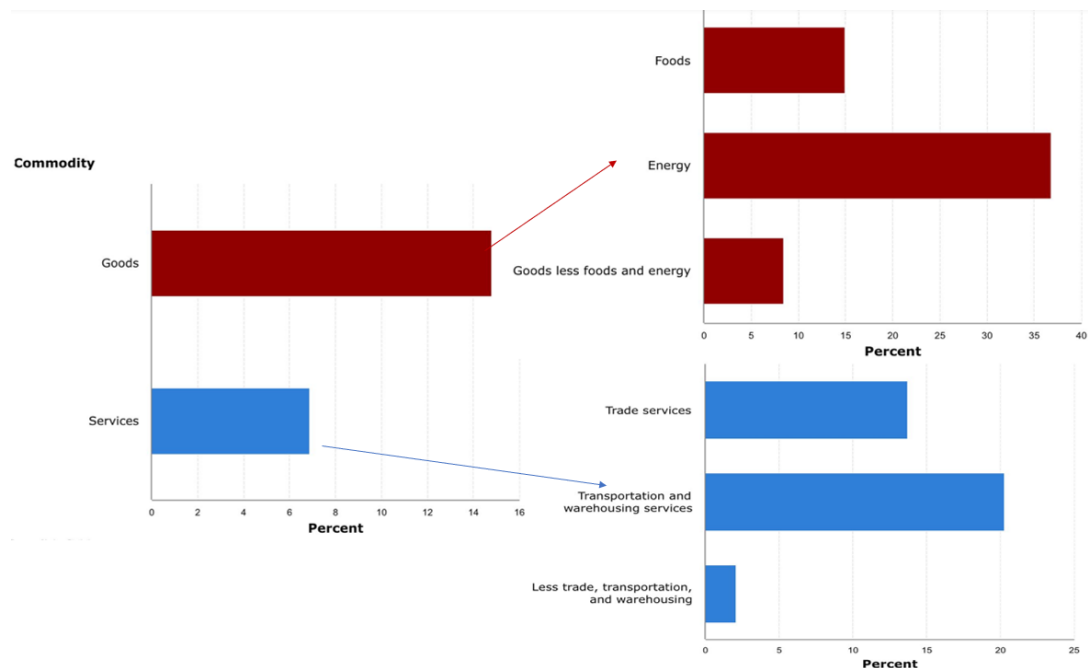


Fig 2. 12-Month Percentage Change of PPI for Final Demand Components of Each Major Categories, July 2022, Not Seasonally Adjusted

3.1 Energy Market

According to U.S. Energy Information Administration, Russia was the third biggest oil producer in 2021, producing 10.78 million barrels daily, and its share of world total oil production is about 11% [6]. With the start of the war and the western sanctions like embargoes, Russia's oil production decreased by about 10%, and the reduction of its oil export drastically decreased the global oil supply [7]. Figure 3 is the economic model of the world oil market before and after the war, where Line S represents the supply of oil before the war and S₁ represents the supply of oil after the war. According to the law of demand and supply, the reduction of world oil supply would lead to a surging price of oil but a smaller level decrease in the consumption of oil because the oil demand is inelastic due to its few substitutes and high necessity. The data on Brent Crude, the international oil price benchmark, proves the result of Figure 1, which increased greatly after the beginning of the war on February 24, as shown in Figure 4 [8].

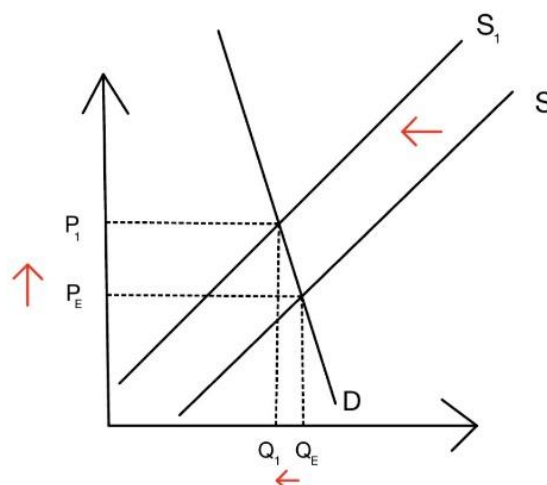


Fig 3. Demand and Supply Model of World Oil Market

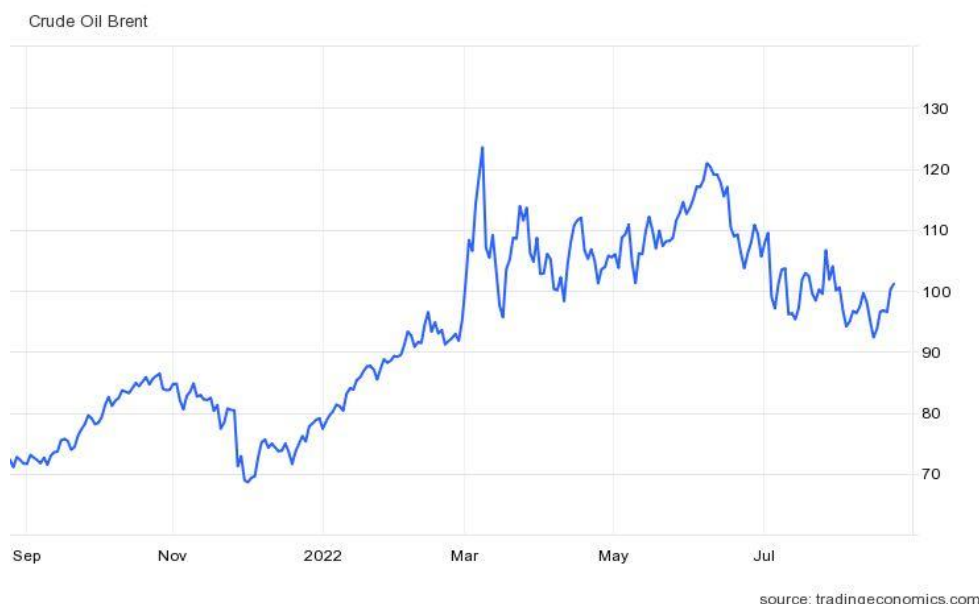


Fig 4. Crude Oil Brent from September 2021 to August 2022

World oil prices would influence U.S. oil prices because the U.S. is an open economy, and large American oil enterprises like ExxonMobil are international. The producers would sell their products at a profit-maximizing price. Figure 5 represents the oil market in a closed economy where the price is only determined by domestic demand and supply.

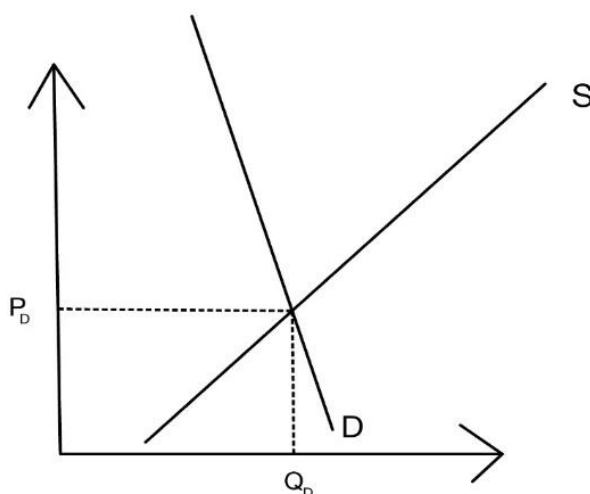


Fig 5. Market of a Close Economy

In comparison, an open economy like the U.S. will adjust to the world price instead of the original domestic price. In the Russia-Ukraine War case, the world oil price surged and exceeded the domestic price of the U.S. Hence, the U.S. oil companies will sell at world price to maximize their profits. And the surplus at the domestic market at world price will convert into export to other countries, as shown in Figure 6. This is how the rise in world oil prices conducts to the rise in U.S. oil prices. The fact conforms to the economic model that there is a rise in the U.S. energy market. Figure 7 reveals the increase in energy price in terms of CPI, and figure 8 shows the increase of WTI, the oil price benchmark for the U.S [8].

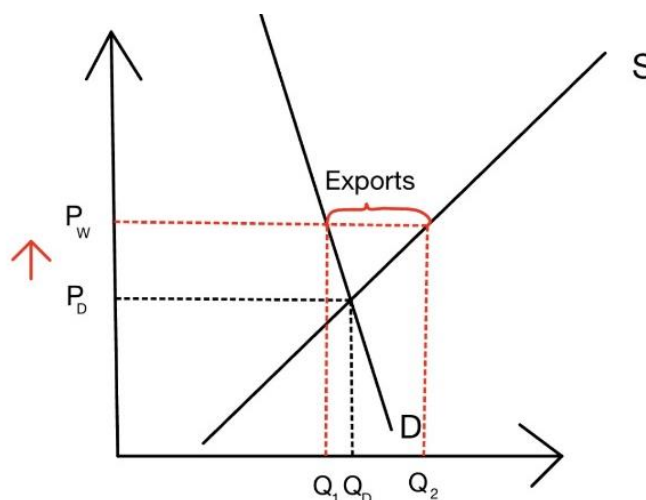


Fig 6. Market of an Open Economy (Exporter)

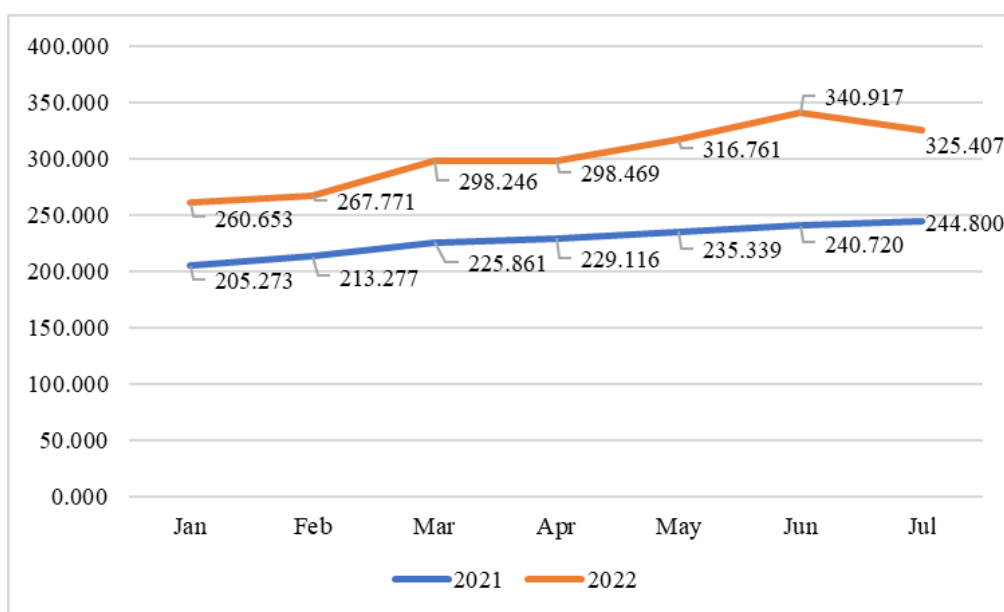


Fig 7. CPI-U of Energy from January to July, Not Seasonally Adjusted

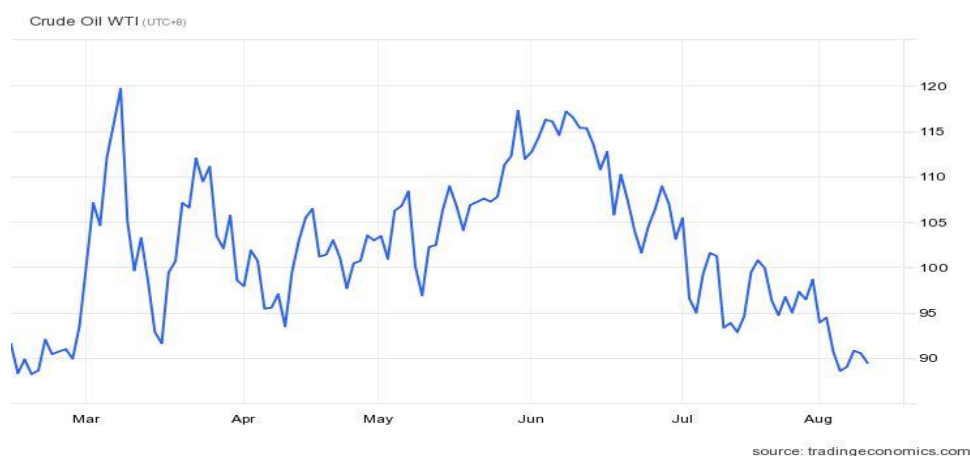


Fig 8. Crude Oil WTI from March 2022 to August 2022

Figure 9 shows the dramatic rise in the CPI of gasoline, the main oil derivative. Figure 10 gives a 12-month percentage change of CPI of energy commodities separated into fuel oil and gasoline [5]. Both graphs demonstrate the influence of the Russia-Ukraine War on U.S. energy prices.

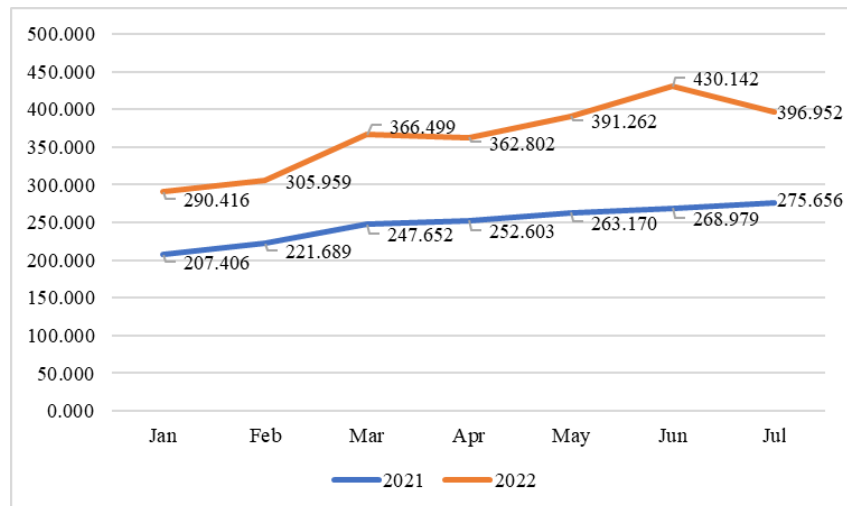


Fig 9. CPI-U of Gasoline (all types) from January to July, Not Seasonally Adjusted

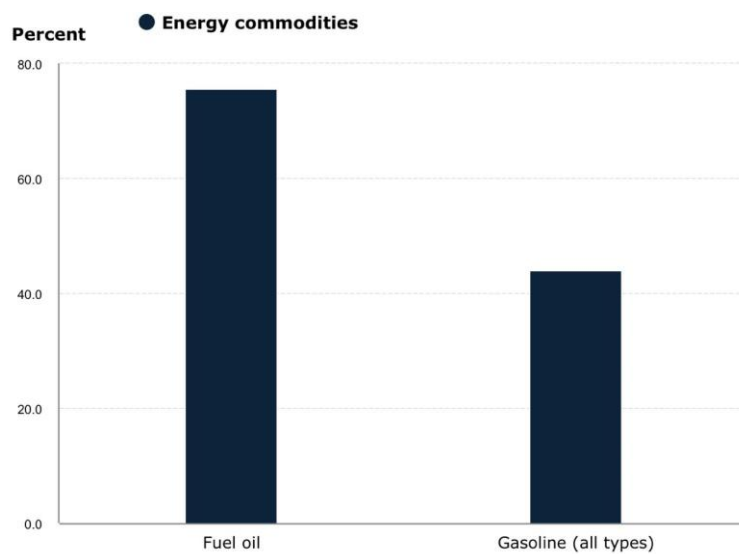


Fig 10. 12-Month Percentage Change of CPI of Energy Commodities, Not Seasonally Adjusted, July 2022

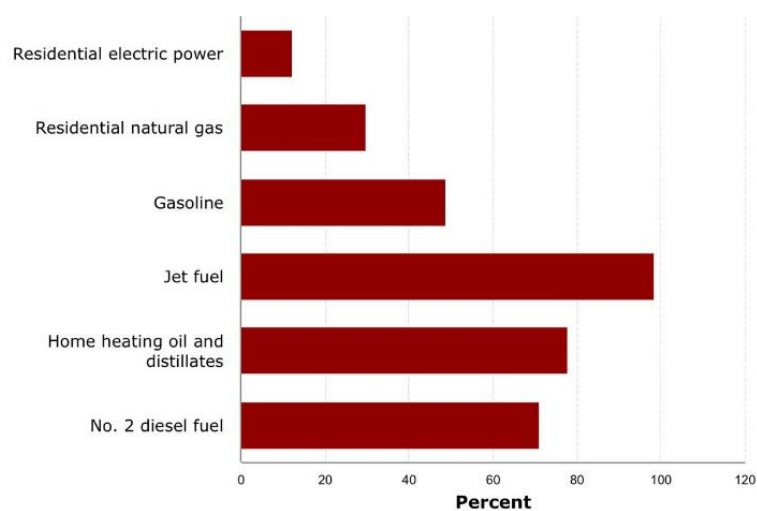


Fig 11. shows the rise of PPI in each energy category [5].

Figure 11 12-Month Percentage Change of PPI for Final Demand Components of Energy, Not Seasonally Adjusted, July 2022

3.2 Food Market

Both sides of the war—Ukraine and Russia—play significant roles in the world’s food supply of vital crops such as wheat and maize. The specific data in 2019 is shown in figures 12 and 13 [9]. Sunflower oil is the main type of unsaturated fat used in cooking. Wheat is mainly processed into wheat flour that can make noodles and Bread [10].

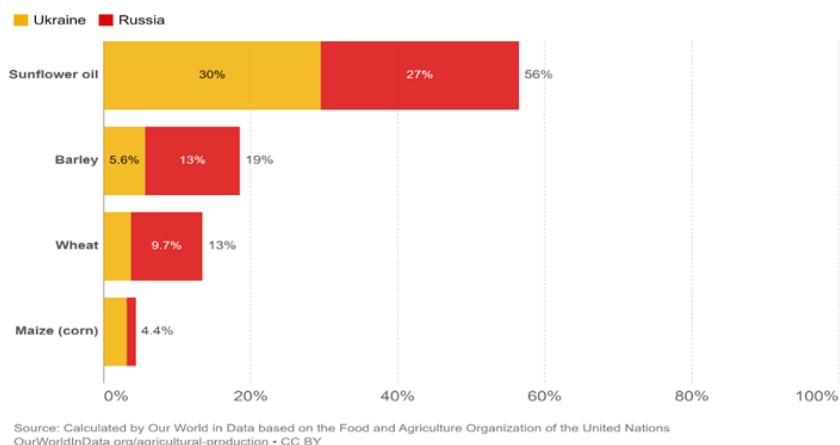


Fig 12. Global food production: How much comes from Ukraine & Russia? 2019

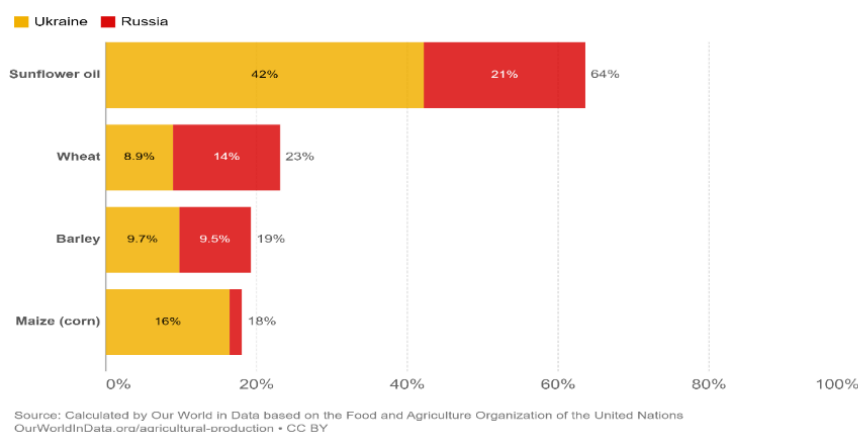


Fig 13. Global food exports: How much comes from Ukraine & Russia?, 2019

Bread is one of the major food choices for American households, so the increase in wheat price will increase the input price of Bread and, finally, the bread price. Barley is mainly used to create starch and beer. Maize is an excellent food source with plentiful vitamins and can also be processed into maize flour to replace wheat flour in baking products [11]. The same conductive process from the rise in world price to the rise in U.S. price in the energy market (Figures 5 and 6) happens in the food market.

Figure 14 demonstrates the acceleration of food price increases after the war in terms of CPI [5]. As a necessity, the rise in food prices is not limited to an inflation problem: instead, it may cause starvation, leading to riots and death.

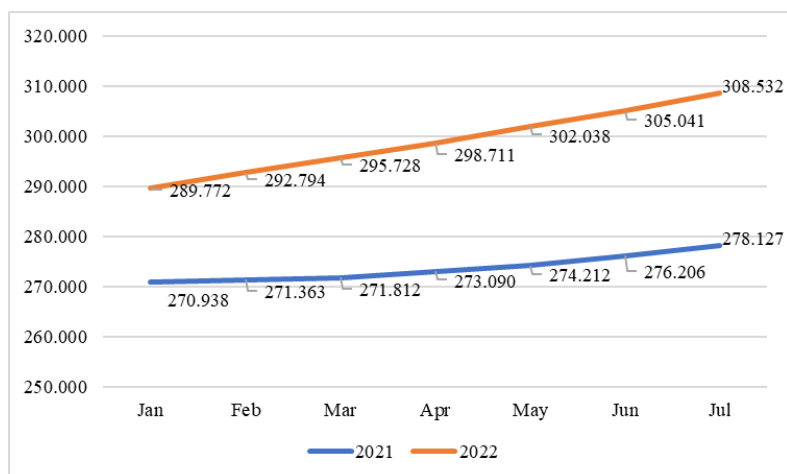


Fig 14. CPI-U of Food from January to July, Not Seasonally Adjusted

In addition, Russia is the biggest exporter of fertilizer (figure 15 provides the nitrogen fertilizer exports data of top exporters in 2020), so the impact of the Russia-Ukraine War on the world food market is not only in the present but also in the future [12]. The decrease in world fertilizer supply reduced the food production of the countries that rely on fertilizer imports, increasing food imports. However, Ukraine and Russia are also leading exporters, so if the war continues, the world price of food and fertilizer will boom. Then the same conducting process of world price to U.S. price occurs, and the PPI of fertilizer in the U.S. is shown in figure 16 [5].

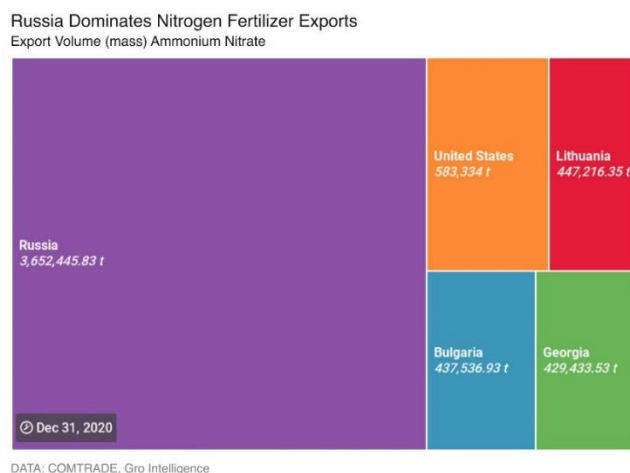


Fig 15. The Top Exporters of Nitrogen Fertilizer

[July 2022, Index base 1982=100, unless otherwise indicated]

Title	Commodity code		Other index base	Unadjusted index ¹				
	Group code	Item code		Mar. 2022	Apr. 2022 ^p	May 2022 ^p	June 2022 ^p	July 2022 ^p
Agricultural chemicals and chemical products.....	06	5		362.244	385.460	384.959	372.415	365.540
Mixed fertilizers.....	06	51		260.466	264.657	265.945	264.106	256.466
Mixed fertilizers.....	06	5105	06/86	274.841	279.262	280.622	278.681	270.619
Mixed fertilizers.....	06	510501	06/86	274.841	279.262	280.622	278.681	270.619
Mixed fertilizers, made in plants which manufacture fertilizer materials.....	06	5105011	12/09	243.029	247.674	248.887	248.887	248.887
Mixed fertilizers, dry, mixing only.....	06	5105012	12/09	128.319	130.656	131.787	131.219	124.995
Mixed fertilizers, liquid, mixing only.....	06	5105013	12/09	176.590	176.590	174.786	168.500	163.122
Fertilizer materials.....	06	52		495.943	520.110	517.992	485.555	458.295
Nitrogenates.....	06	5201		614.573	665.277	659.675	622.835	590.278
Fertilizer materials of organic origin.....	06	520137	12/93	234.613	234.613	234.613	234.613	234.613
Synthetic ammonia, nitric acid, ammonium compounds, and urea.....	06	52013A	12/14	201.388	218.633	216.727	204.198	193.124
Phosphates.....	06	5202		411.243	418.078	418.215	389.183	—
Phosphoric acid, 52-54 percent APA, superphosphates and other phosphate fertilizer materials.....	06	52026A	12/14	178.038	180.997	181.056	168.488	—
Other agricultural chemicals.....	06	53		226.703	253.330	253.528	255.695	268.002
Other agricultural chemicals.....	06	5301		226.703	253.330	253.528	255.695	268.002
Lawn and garden pesticides and chemicals.....	06	530107	06/03	170.615	173.435	173.435	173.435	173.435
Household and institutional pesticides and chemicals.....	06	530108	06/03	164.923	164.923	164.955	172.828	172.828
Agricultural and commercial pesticides and chemicals.....	06	530109	06/03	150.359	171.287	171.440	172.261	182.014

Fig 16. PPI for Agricultural Chemicals and Chemical Products, Not Seasonally Adjusted

3.3 Other products

Due to the advanced transportation technologies, people can trade with one another and specialize in the things they are good at. The raw materials and manufacturing plants do not need to be in the same or close places. But because of the energy price boom, transportation costs surge, as shown in figure 17 and figure 18 [5]. Because goods and services rely on transportation services, including vehicles, trains, airplanes, and ships, the rise in transportation costs of these goods and services will be reflected in their prices. Due to the enormous number of goods and services that depend on transportation, the problem upgrades from a rise in one market to inflation in the U.S. price level.

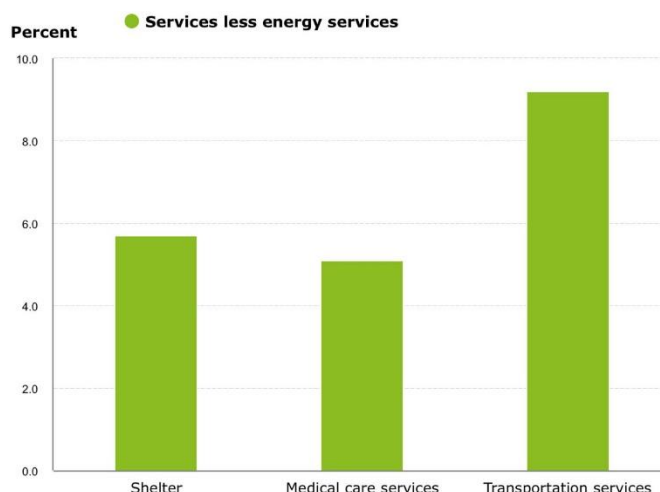


Fig 17. 12-Month Percentage Change of CPI of Services Less Energy Services, Not Seasonally Adjusted, July 2022

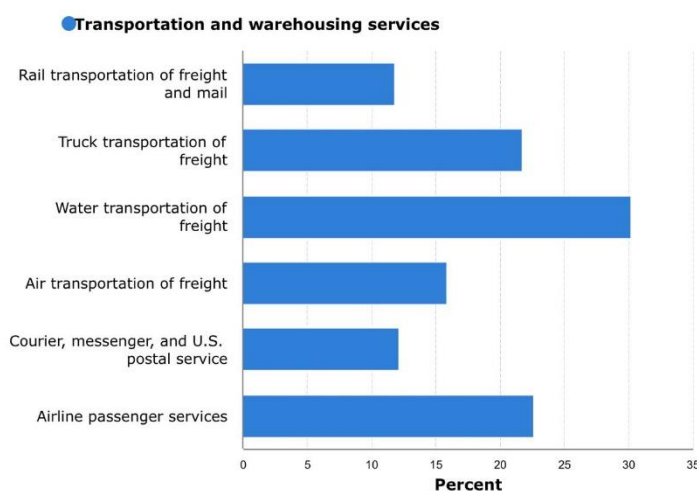


Fig 18. 12-Month Percentage Change of PPI of Transportation and Warehousing Services, Not Seasonally Adjusted, July 2022

Moreover, energy use is not the sole use of oil. There are other commodities made from oil. The most influential one is plastic. Although the contemporary world is advocating the reduction of plastic like plastic bags and straws due to its harmful chemical identity to the environment, plastic is still widely used, like the packaging of the new iPhone. Another implication of oil is in medical fields like aspirin, one of the most commonly used medicines, and gloves.

4. Discussion

4.1 To Stop Russia-Ukraine War as Soon as Possible

After examining the negative shock of the Russia-Ukraine War on the U.S. price level, the first way to eliminate inflation is to end the war as soon as possible. The winter is approaching, and the energy shortage has become emergent in the regions like Europe. With more economic damage done by the war, the number of victims is rising, and their desire for a truce becomes fierce. With the unity of victims like Germany and ordinary Americans, the negotiation and diplomacy will be more effective and more likely to set up terms to end the war. However, the beneficiaries of the war, such as international energy corporations represented by Exxon Mobile and international food corporations like Archer Daniels Midland (ADM), may use their economic power to influence politics and hinder the process of dealing with the war. This solution is too idealistic and not realistic.

4.2 Contractionary Monetary Policy

Contractionary monetary policy is a common-used way to control inflation, which the U.S. government is implementing now, as shown in Figure 19 [13].

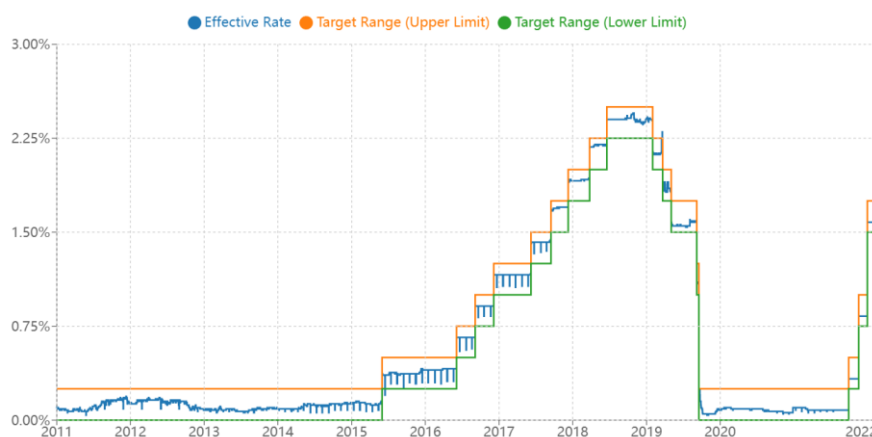


Fig 19. Federal Funds Rate 2015-2022 August

It is a demand-side policy that reduces the quantity of money and credit in the U.S by increasing the nominal interest rate. There are three methods to increase the nominal interest rate: increasing the required reserve ratio, decreasing the discount rate, and selling bonds in the open market. When one of these methods is applied by the Fed, the number of money decreases, and the nominal interest rate increases, as shown in figure 20. Then the aggregate demand for the U.S. decreases, resulting in a lower price level and real GDP, as shown in figure 21.

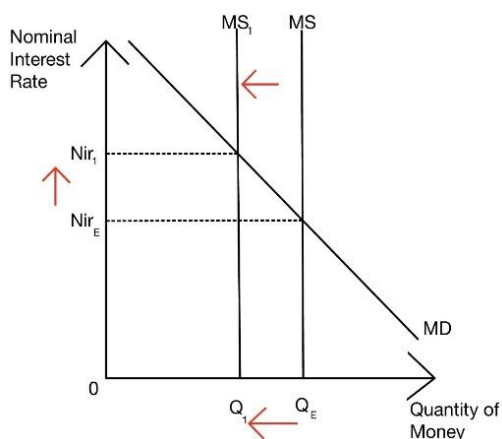


Fig 20. U.S. Money Market (After Implemented Contractionary Monetary Policy)

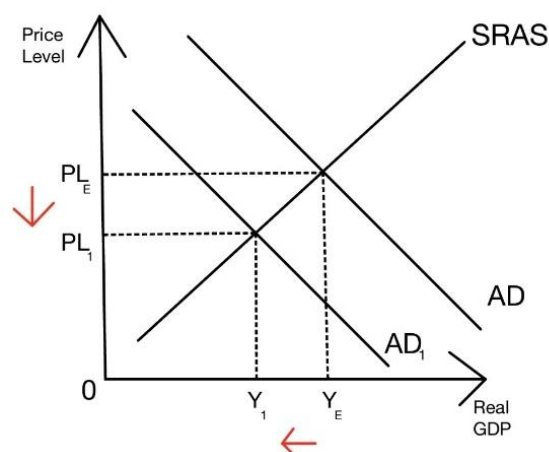


Fig 21. U.S. AD-AS Model (After Implemented Contractionary Monetary Policy)

With the decrease of the price level, contractionary monetary policy decreases the real GDP simultaneously, which means unemployment increases and the living standard of citizens drops. Money flows from the stock market and real estate to the banking system to earn the rising interest and impairment of assets. Fortunately, part of the drop in U.S. real GDP is due to increased imports. The increase in the U.S. real interest rate attracts more capital to invest in the U.S. and causes the U.S. dollar to foreign currencies to be appreciated. Thus, U.S. consumers' purchasing power for imports rises and leads to an increase in imports, a leftward shift of the aggregate demand curve. Still, things are cheaper and mitigate domestic inflation. Figure 22 shows higher imports to the U.S. after rising interest rates [8].



Fig 22. Imports of U.S. 2021 September-2022 June (Vertical Axis Unit: Million USD)

Moreover, the rise in interest rates would make it harder for people with debts to repay. Their income is cut, but the interests they need to pay regularly rise, increasing the risk of default and damaging the banking system. The non-discretionary fiscal policy, like transfer payments and progressive taxes of the U.S. government, will reduce the effectiveness of the monetary policy. The mechanism is that because more people lose their jobs due to the contractionary monetary policy, the quantity of government transfer payments automatically increases. Meanwhile, the government can not collect income taxes from these unemployed people, leading to a decrease in tax revenue.

For inelastic markets like necessity markets, the contractionary policy is ineffective. Unfortunately, the two categories whose prices rise the most—energy and food—are relatively inelastic, requiring a supply-side policy to decrease inflation effectively.

4.3 Cancel Tariffs

For the markets where the world price is lower than the domestic price, the U.S. can further decrease inflation and increase the number of goods and services for domestic consumers by

canceling the tariffs. The biggest exporter to the U.S. is China, which exports goods valued at 506.4 billion dollars, so if the U.S. cancels some of the tariffs on China, it can effectively decrease the domestic price level [14]. Treasury Secretary Janet Yellen said the White House was considering this action to cool down the surging inflation on June 8, 2022. Still, the opponents argued about this action for political reasons [15].

4.4 Increase Energy Supply

There are two ways to make up for the energy shortage caused by the war—inside the U.S. and outside of it.

To increase the energy production inside of U.S., the companies need to be ratified to explore new oil basins, which may not be successful and has a great cost of time, investment, and environment. Although fracking is limited due to its water contamination and relationship with small earthquakes, its limits should be reduced to help the U.S. be over the energy hump. To reduce the negative effects on surrounding inhabitants, the locations of exploiting energy should be carefully set and notify the surrounding citizens.

On the outward, the U.S. government can negotiate with the main oil producers like the members of OPEC. U.S. oil companies can utilize their advanced technologies to promote the quantity and quality of the oil produced in other countries, but this has some potential political problems, like threatening the independence of their domestic oil production. OPEC and its allies consented to increase oil production on August 3, 2022; this increase is too modest and expected to improve world crude prices [16] significantly. There are some political reasons OPEC did not want to break their relationship with Russia besides limiting their productivity.

4.5 Develop Alternatives

The U.S. needs to find alternatives to decrease the reliance on fossil fuels. For example, people can use electric vehicles instead of traditional cars to reduce their reliance on gasoline. This method works, and the stock prices of new energy companies like Tesla surge. But there are still lots of machines fueled by fossil fuels that can not be replaced in the short-term, like airplanes, because it costs a lot and some of the technologies like battery technology are not mature enough, requiring much more R&D investment and time.

Thermal electricity generation based on fossil fuels occupies a big percentage of U.S. electricity generation, as shown in Figure 23 [6]. The surging price of fossil fuels provide enough motivation for countries like the U.S. and Germany to increase spending on developing clean energy like wind and solar. On the other hand, developing clean energy can not solve inflation in the short term. The use of biomass electric generation is controversial because its inputs are crops like maize. More food is used as biofuel, and less food is left for people to eat, which deteriorates the price condition of the domestic food market and even causes starvation.

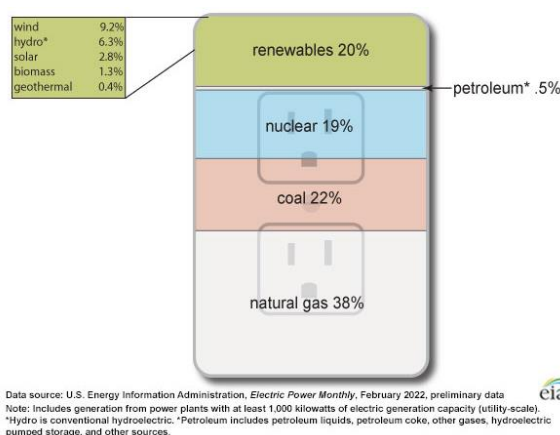


Fig 23. Sources of U.S. Electricity Generation, 2021

5. Conclusion

Due to Russia and Ukraine's significant roles in the global supply chain, the outbreak of the conflict negatively shocks the global economy by causing cost-push inflation. The surging price of food and energy and their inelasticity threaten citizens worldwide. The U.S., as a vital victim, faced the highest inflation in two scores because it is an open economy. The world inflation would conduct the U.S. through international trade. High energy prices increase the input price of products like transportation costs and the price of general goods, worsening inflation. Fortunately, there are five ways to alleviate the negative shock of the war in the short term and stop similar world crises in the future. Accelerating the war's end is the most effective but hardest to actualize, as it is more about politics, not economics. The contractionary monetary policy tries to resolve inflation from the demand side, although the war-damaged more on the supply side. It works, but it decreases economic activity and real GDP. The government needs to balance between inflation and recession. Canceling tariffs is favorable from an economic perspective but terrible from a political aspect. Increasing the energy supply can mitigate inflation just a little. Developing alternatives can not deal with inflation in the short run but has the potential to end the era of oil. This essay provides detailed insight into one country affected by the Russia-Ukraine War and practical suggestions for the U.S. government with pros and cons listed.

The limitation of the study is that the data on the world price level and U.S. price level is secondary. CPI and PPI have some limitations in reflecting the real price level condition in the U.S. Most of the suggestions have already been implicated. Future studies can focus more on innovative ways of solving inflation.

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