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Exogenous Supply Chain Shocks and Onshoring: An Analysis of theTrump Trade War and the U.S.-China Bilateral Trade Relationship

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EXOGENOUS SUPPLY CHAIN SHOCKS AND ONSHORING: AN ANALYISIS OF THE TRUMP TRADE WAR AND THE U.S.-CHINA BILATERAL TRADE RELATIONSHIP

By
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Abstract

This paper examines the effects of the supply chain crisis on the U.S.-China bilateral trade relationship and on the health of the U.S. manufacturing sector. The policy goals and decision making of both the Trump administration and the Chinese Communist Party are examined, it is determined, within the context of the U.S.-China Trade War, that the Chinese Communist Party made more effective long-term policy decisions than the Trump Administration. However, despite the U.S's policy failures, this paper finds that U.S. manufacturing competitiveness, relative to China, has actually increased in recent years. This relative increase in manufacturing competitiveness is driving the reorientation of global supply chains away from China and through other low manufacturing cost countries, as well as pushing firms to onshore manufacturing to the U.S. The author creates an economic model of a typical supply chain crisis and uses the windfall profits of publicly traded global shipping companies in order to demonstrate that the world has been experiencing a supply chain crisis since 2021. The author also uses econometric regression analysis in order to analyze the strengths and weaknesses of the U.S. manufacturing sector, identifying the rising price of semiconductors as a constraining force on the economy and the growing number of job openings in the manufacturing sector as an indicator of a strong U.S. manufacturing sector recovery. Additionally, the author examines the effects of economic competition and trade tensions on the U.S.-China great power relationship, and concludes that a decoupling of the U.S. and Chinese economies decreases the costs of future conflicts and increases the risks of economic warfare escalating into conventional warfare.

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Introduction

Increasing onshoring, resulting from advances in automation technologies and exogenous supply chain shocks, caused by the U.S.-China Trade War and the Covid-19 pandemic, will decrease U.S.-China economic interdependence and intensify great power conflict between the two nations. The ongoing U.S.-China Trade War and Covid-19 pandemic have altered the U.S.-China great power relationship and reoriented global supply chains. Exogenous shocks, caused by both political and natural phenomenon, have increased the costs of importing goods from China, while automation has reduced the labor costs of manufacturing goods in the U.S. These economic forces have driven an increase in onshoring, the return of manufacturing from offshore countries, i.e. China, to the U.S. As the two greatest world powers, the U.S. and China have ample opportunities to collaborate on important issues such as combating climate change and terrorism, maintaining geopolitical stability, and promoting trade and economic growth, however their vastly different political systems and conflicting global ambitions could derail any progress. The return of manufacturing to the U.S. and the reorientation of global supply chains through low labor cost countries other than China has lessened U.S.-China economic interdependence. This disentanglement of the U.S. and Chinese economies will limit opportunities for collaboration and decrease the costs of conflict, damaging the already fraught Sino-American great power relationship.

Chapter 1 of this paper provides important background information about the relative status of the U.S. and Chinese economies, and explores existing theories of international trade, exogenous shocks, automation, and onshoring. Chapter 2 examines the chronology, details, and effects of the U.S.-China Trade War, and analyzes U.S. policy and decision making. Chapter 3 explores the Chinese Communist Party's responses to aggressive U.S. trade policies, as well as how Chinese trade policy fits into President Xi Jinping's long-term strategic goals. Chapter 4 introduces the author's definition of a supply chain crisis and examines market failures in the shipping sector. Chapter 5 proposes a model of the health of the U.S. manufacturing sector using econometric regression analysis. Chapter 6 examines the results of the econometric regression from Chapter 5 and places them in an economic context. The conclusion provides a summary of the paper's findings and proposes potential policy changes.

Chapter 1: Background and Literature Review

Theories of Exogenous Shocks, Automation, and Onshoring

The Ricardian comparative advantage (Ricardo, 1891) and Heckscher-Ohlin (Heckscher and Ohlin, 1933) theories of international trade (two of the models most widely used to explain international trade) predict that all nations can reap economic benefits from trade, by trading with nations that have different total relative factor productivity. These models assume that countries have different capital to labor ratios, and predict that countries with high capital to labor ratios can specialize in producing capital intensive goods, whereas countries with low capital to labor ratios can specialize in producing labor intensive goods; both sides can then make gains from trade. According to the Ricardian comparative advantage and Heckscher-Ohlin theories of international trade, a country with a relatively high capital to labor ratio, such as the U.S., would produce capital intensive products, such as passenger jets, and trade them to countries that lack the capital necessary to efficiently produce their own, such as China. While a country with a relatively low capital to labor ratio, such as China, would produce labor intensive products, such as clothing and apparel, and trade them to a country that has high labor costs, such as the U.S. The models predict that labor intensive manufacturing should occur in China and that capital intensive production should occur in America, which explains why numerous American clothing companies have offshored their labor intensive production to China. This model makes intuitive sense and often accurately predicts trade patterns. In 2010, for example, the U.S. produced 35% of the worlds passenger aircraft, but only 2.4% of the world's clothing and apparel. While China produced 25.8% of the world's clothing and apparel, but only .1% of the world's passenger aircraft (Morrow, 2010).

According to the Ricardian comparative advantage and Heckscher-Ohlin theories of international trade, the U.S. and China should have a productive and profitable trade relationship in which the U.S. exports capital intensive goods, which it can produce with relatively high efficiency, to China and in turn imports labor intensive goods, which China can produce with relatively low costs. However, the Ricardian comparative advantage and Heckscher-Ohlin theories of international trade rely upon the assumption that labor and capital are complements, not substitutes. Automation breaks this assumption by enabling firms to substitute capital for labor. With sufficient technology, firms can replace workers with machines, computers, and robots, enabling countries with high capital to labor ratios to efficiently produce previously labor intensive goods. With automation, the advantages of producing goods in China, mainly the low cost of labor, disappear. As such, it becomes more efficient for firms to produce all of their goods in America, where they have access to capital, lower shipping costs, and less vulnerability to supply chain volatility. Thus, onshoring should accelerate as firms replace large numbers of low wage workers in China with increasingly efficient automation technology in America. Kazmer (2014) predicts that in the coming decades manufacturing outputs will increase while manufacturing employment decreases, reducing the advantages of producing in countries with high labor to capital ratios, such as China, which would accelerate onshoring. However, a reorientation of the U.S.-China trade relationship would require a significant event to serve as an impetus.

Punctuated Equilibrium Theory (Baumgartner and Jones, 1993) is a theory of public policy, which proposes that the political process is typically in a state of equilibrium, characterized by stasis and continuity, however, occasionally a crisis disrupts that equilibrium, producing rapid change (Sabatier, 2007 pp. 155-158). In macroeconomic terms, a crisis that punctuates an equilibrium, is often referred to as an exogenous shock: a large and sudden change from outside the system that has important effects on the macroeconomy. The Covid-19 pandemic and the trade policy decisions made by President Donald Trump, were both political crises that punctuated the existing political equilibrium, as well as exogenous shocks that disrupted the macroeconomies of the U.S and China. These simultaneous disruptions triggered massive changes to the U.S.-China bilateral relationship and increased the relative competitiveness of American manufacturing.

The U.S. Trade Commission has found that firms that onshore manufacturing to America have the advantages of: “manufacturing in close proximity to their customers, which facilitates quick delivery and product customization; being able to maintain smaller inventories, thereby lowering supply chain costs; locating production near headquarters, research and development labs, and engineering staff to rapidly make product design changes and improve quality control; and cutting transportation costs” (David et al., 2014). The primary advantage of onshoring is a shorter, less volatile supply chain. As such, it is expected that firms would not only onshore production in response to increasingly efficient automation technology, but also to increasingly inefficient international trade. Exogenous shocks to supply chains, such as newly imposed tariffs that dramatically increase the costs of importing foreign manufactured products or natural events that make shipping more expensive and difficult, such as pandemics, should accelerate onshoring. According to Studley, “The recent international crisis precipitated by COVID-19 has underlined the vulnerability of many industries to disruptions in global supply chains. As a response to this, onshoring of functions which had been moved to other nations decreases risk, but would increase labour [sic] costs if it were not for automation" (Studely, 2021).

The U.S.-China Trade War and the Covid-19 pandemic have increased the costs of international shipping and disrupted global supply chains. Meier and Pinto (2020) found that sectors of the U.S. economy with the highest reliance on imports from China suffered larger declines in production and employment during the Covid-19 pandemic than sectors of the economy with limited exposure to Chinese imports (Meier & Pinto, 2020). Kajjumba et al., (2020) found that the current environment of border closures and travel restrictions caused by the Covid-19 pandemic have negatively impacted firms that have outsourced manufacturing and benefited firms that have insourced manufacturing. Kajjumba et al.'s findings showed that the trend towards onshoring was particularly strong in the medical manufacturing sector, especially the manufacturing of personal protective equipment. The inability of American firms to source personal protective equipment from foreign countries, coupled with a massive increase in demand, lead to a resurgence of American manufacturing of personal protective equipment, ventilators, and other medical products. Additionally, the study found that firms that have outsourced manufacturing to China and Vietnam, countries that have enacted particularly strict lockdowns because of the Covid-19 pandemic, faced greater supply chain disruption than other firms (Kajjumba et al., 2020).

The U.S.-China Trade War and the Covid-19 pandemic are still ongoing phenomenon, their final effects are not yet clear. Considerable advances in automation technology have been made in the last decade and will almost certainly continue. Similarly, the global disruption to supply chains caused by Covid-19 and the resulting realignment of global manufacturing is not yet complete. The U.S.-China Trade War, the Covid-19 pandemic, and the disruption of global supply chains have all recently been topics of major interest in academia and in the news media. However, there has been little analysis of the onshoring that has resulted from these exogenous supply chain shocks, nor on how that onshoring will impact the U.S.-China great power relationship. This paper aims to address these gaps in the literature by examining how increasing onshoring, resulting from advances in automation technologies and exogenous supply chain shocks, will affect U.S.-China economic interdependence and the great power conflict between the U.S. and China.

Background

After a period of relative economic isolation in the 1960's and early 1970's, the Chinese Communist Party began to open international access to China's markets in the late 1970's. The opening of the Chinese economy marked the beginning of an era of tremendous economic growth. From 1978 to 2018, Chinese annual gross domestic product (GDP) grew at the unprecedented rate of 9.44%; because GDP growth compounds over time, China's real economy was 37 times larger in 2018 than it had been just 40 years earlier. (Yang, 2019). As the Chinese economy expanded, so did its role in international trade. The value of all Chinese trade increased from less than $20 billion annually in 1978, to more than $475 billion annually in 2000 (Lardy, 2001). Despite the rapid growth of China's economy, and the increase in the value of its trade, China was not fully integrated into the international economy by the 1990's. However, in 2001, China joined the world Trade Organization (WTO), strengthening its access to international markets and giving it the protection of WTO trade rules. Ascendance to the WTO greatly increased China's status as a trading partner and deepened the U.S.-China bilateral trade relationship.

The U.S. supported both the opening of China to international trade and the extension of WTO membership to China. At the time, U.S. policymakers argued that increasing international access to Chinese markets and forcing China to abide by WTO rules would naturally result in the liberalization and democratization of China. However, the Chinese Communist Party managed to expand international access to China and to integrate capitalist markets into its command economy without sacrificing one-party control. The Chinese Communist Party accomplished this by creating a new economic model, socialism with Chinese characteristics, and by harnessing the power of emerging technologies and its new-found wealth to create an increasingly authoritarian surveillance state. The U.S.-China trade relationship grew in value, but remained fraught with ideological and political tension, during the early 21st century.

China's growing economic power, coupled with the decline in the U.S.'s share of international trade and manufacturing, has created a clear rivalry between the world's two largest economies. China is better positioned than any country since 1945 to surpass the U.S. as the world's largest economy. China is closing in on the U.S. on a number of important economic metrics. Although the U.S.'s gross domestic product (GDP) remains larger than China's, China has already eclipsed the U.S. in annual gross domestic product adjusted for purchasing power parity (PPP) (World Bank, 2020). Annual GDP adjusted for PPP is a measure of a nation's buying power: how much stuff all of the people in a country could buy with one year's income. GDP adjusted for PPP is calculated by multiplying the GDP of a nation by the ratio of price levels between two countries. GDP adjusted for PPP accounts for the fact the prices are, on average, lower in China than in the U.S.; an individual can purchase a larger basket of goods with $100 in China than in America. In 2020, U.S. GDP was approximately $20.95 trillion, about 1.4X as large as China's GDP, which was approximately $14.72 trillion (World Bank, 2020). However, China's GDP adjusted for PPP in 2020 was approximately $24.28 trillion, about 1.15X larger than U.S. GDP adjusted for PPP, which was approximately $20.95 trillion in 2020 (World Bank, 2020). China has also thoroughly bested the U.S. in terms of manufacturing output, as shown in *Figure 1.1*.

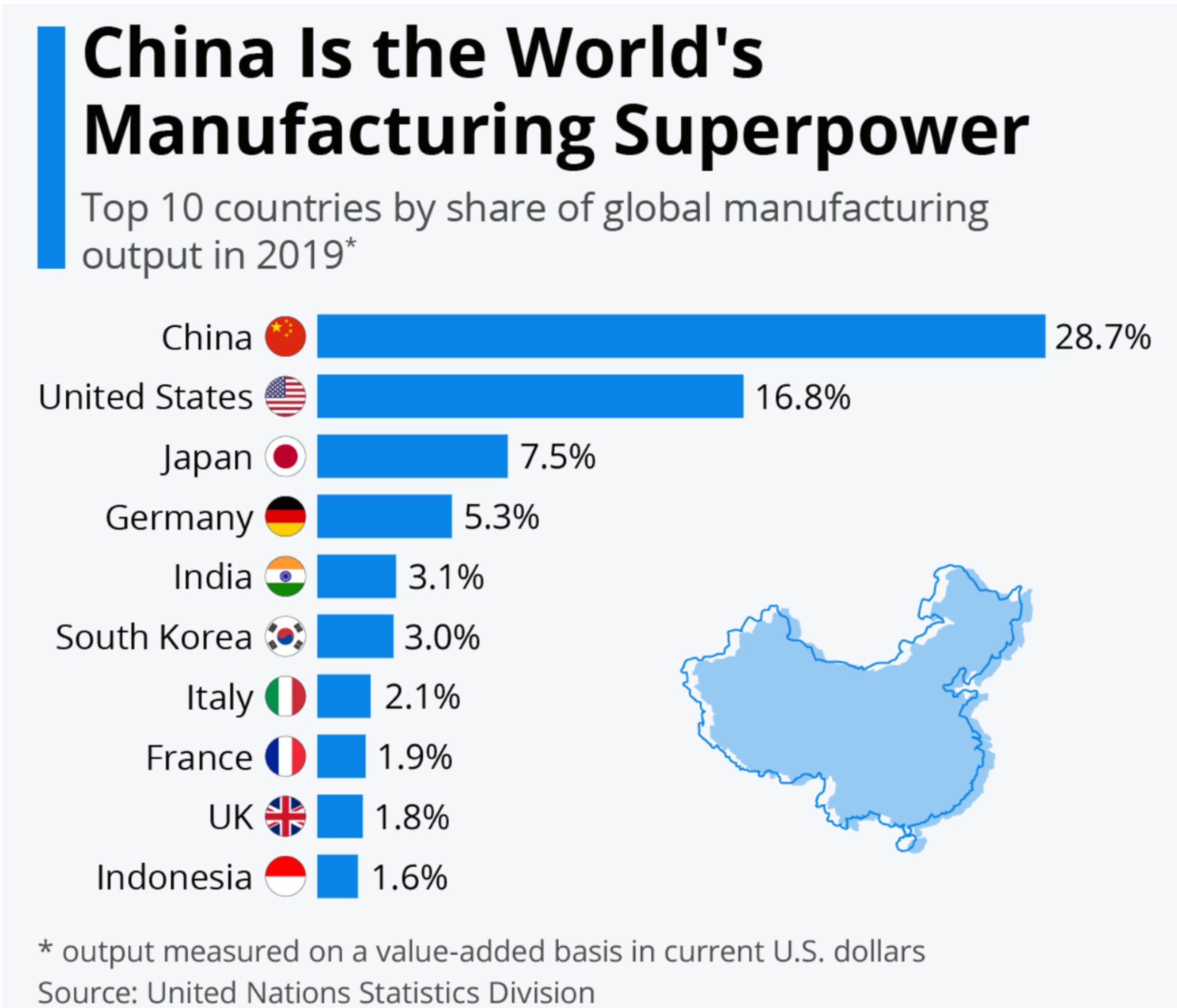


Figure 1.1: Percentage of World Manufacturing Output by Nation

(Richter, 2021) Infographic from Statista

China's status as the U.S.'s number one economic competitor, coupled with the stark ideological and cultural differences between the two countries, has created considerable political tension. U.S. politicians, and Donald Trump in particular, have bashed China and made promises to increase U.S. economic competitiveness with the goal of beating China. In domestic politics, anti-Chinese rhetoric (in the form of anti-Asian racism as well as more typical concerns about economic and ideological competitiveness) has become increasingly common (Huang, 2022). It is within this context that Donald Trump made the following promise while delivering a campaign speech to 13,000+ supporters in Fort Wayne, Indiana. (Warning: this quote contains language some may find offensive)

> *"We can't continue to allow China to rape our country, and that's what they're doing. It's the greatest theft in the history of the world… We're going to turn it around. And we have the cards, don't forget it. We're like the piggy bank that's being robbed. We have the cards. We have a lot of power with China."* – Donald J. Trump (Avaneesh, 2016)

Chapter 2: The U.S-China Trade War

Timeline

The Trump administration launched the U.S.-China Trade War with the goal of advancing several policy interests. Firstly, the U.S. sought to reduce the trade deficit that existed between the U.S. and China, based upon the economically dubious assumption that the trade deficit was harming the domestic economy. Secondly, the U.S. wanted to address the use of unfair trade practices and the theft of intellectual property and technology by Chinese companies. Thirdly, the U.S. aimed to stall China's rise as an economic competitor and reduce its international standing, in order to protect national security interests and to maintain the U.S.'s status as a hegemonic world power (Liu and Woo, 2018). Lastly, the Trump administration aimed to bring manufacturing jobs back to the U.S. The U.S.-China Trade War did not effectively accomplish any of these policy goals.

In April of 2017, the U.S. and China entered into high-level trade negotiations to resolve trade tensions, which President Trump had stoked during his 2016 campaign. During the negotiations, the Trump administration ordered a review of steel and aluminum import policy and launched section 301 (unfair trade) investigations to review China's actions and policies relating to the acquirement of intellectual property and technology (Kapustina et al., 2020).

In early 2018, after a breakdown in the trade talks between the Chinese Communist Party and the Trump administration, the U.S. unilaterally imposed tariffs on all imported steel and aluminum products, citing national security concerns (Li et al., 2020). The U.S. increased tariffs on steel by 25% and tariffs on aluminum by 10% (Carvalho et al., 2019). China, a major exporter of steel and aluminum products, lacked a trade deal protecting it from the tariffs (countries that were parties to existing U.S. trade deals, such as Mexico and Canada, were exempted from the tariffs). In addition to the tariffs on steel and aluminum, the U.S. imposed a 30% tariff on imported washing machines and a 25% tariff on imported solar panels, of which China is the world's largest manufacturer (Kapustina et al., 2020). Further antagonizing China, the U.S. imposed direct tariffs on Chinese aerospace and information technology imports, citing the results of the section 301 (unfair trade) investigations that the Trump administration had ordered (Li et al., 2020).

The Chinese Communist Party responded in a tit-for-tat manner by raising tariffs on U.S. imports, particularly on agricultural products, thus beginning the U.S.-China trade war. The Chinese Communist Party imposed 15-25% tariffs on U.S. produced pork, wine, fruit, steel pipes, soybeans, and recycled aluminum, they also imposed a 178% tariff on imported sorghum (Kapustina et al., 2020). In July of 2018, the U.S. imposed a 25% tariff on 818 imported Chinese products, worth approximately $34 billion in annual imports (Liu and Woo, 2018). China responded proportionally, by placing 25% tariffs on 545 U.S. products, the majority of which were agricultural, valued at approximately $34 billion in annual imports (Kapustina et al., 2020). The Chinese also stopped all imports of U.S. soybeans, which had a negative impact on the U.S. agricultural sector and placed domestic political pressure on the Trump administration and the Republican Party (Li et al., 2020).

In August 2018, the Trump administration imposed a 25% tariff on an additional 279 Chinese products valued at approximately $16 billion in annual imports. In particular, the U.S.

targeted advanced manufacturing and the Chinese semiconductor industry. The Chinese Communist Party responded in kind, imposing a 25% tariff on 333 imported U.S. products valued at $16 billion, targeting coal, manufactured medical products, and motor vehicles (Kapustina et al., 2020). This first round of the trade war resulted in new tariffs on approximately $50 billion in annual imports from both the U.S. and China.

Carvalho et al. (2019), using the Global Trade Analysis Project Model, found that the $50 billion round of tariffs decreased welfare in China by approximately $40 billion, while welfare in the U.S. decreased by half as much, approximately $20 billion. The Carvalho et al. (2019) results showed that the U.S. China trade war resulted in increased domestic manufacturing of goods targeted by U.S. tariffs and a reduction in the U.S.-China trade deficit. However, it also showed that the trade war decreased welfare in the U.S. and in the global economy, indicating that American economic gains were more than offset by losses. The reduction in the U.S.-China trade deficit was in part caused by some firms onshoring manufacturing.

In the face of high tariffs and unstable global supply chains, it was cost-effective for some firms to relocate manufacturing facilities from China to the U.S. However, the majority of the reduction in the U.S.-China trade deficit was caused by a shift in imports from China to imports from India, Brazil, and other developing nations. Hence, the U.S. China trade war did not decrease the U.S.'s overall trade deficit (Carvalho et al., 2019). Onshoring to the U.S. is also heavily driven by automation; as such, the return of manufacturing does not necessarily bring about the return of manufacturing jobs.

In September 2018, the Chinese Communist Party abandoned trade negotiations with the U.S. The end of trade talks prompted the U.S. to impose an additional 10% tariff on $200 billion in Chinese imports; the Chinese countered with 5-10% tariffs on only $60 billion in U.S. goods (Kapustina et al., 2020).

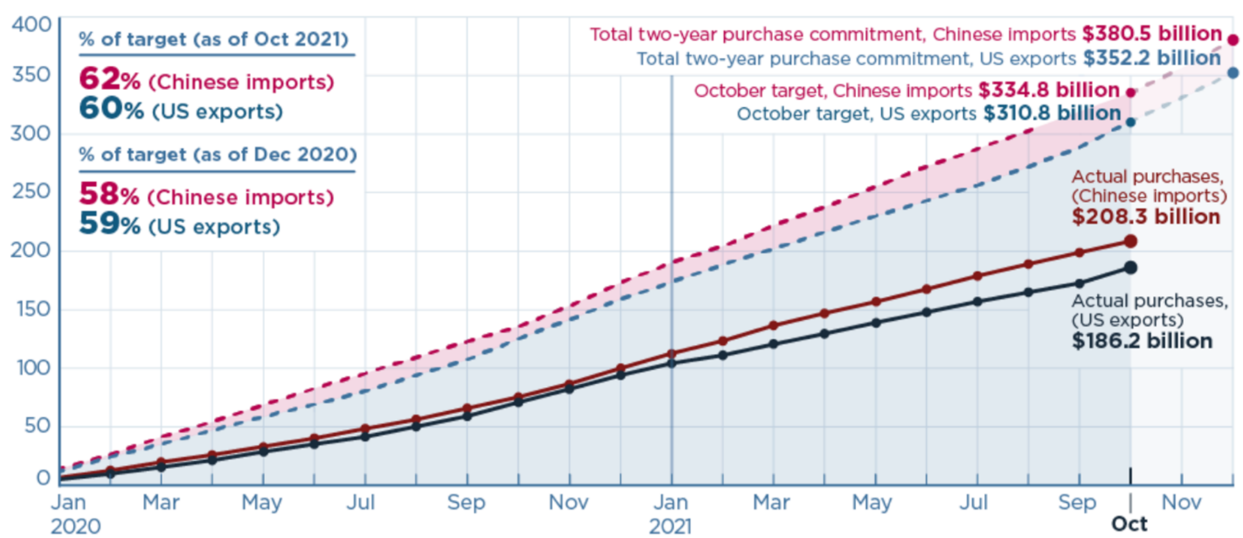
In the initial rounds of the trade war, China was able to match U.S. tariffs on Chinese goods with proportional tariffs on American imports. However, as a result of China's export driven economy and the un-balanced nature of the U.S.-China trade relationship (the U.S. had a $285.5 billion trade deficit with China in 2020), the Chinese quickly ran out of non-essential American imports to impose tariffs on (Office of the U.S. Trade Representative, 2020). Meanwhile, the U.S. continued to impose tariffs on broader and boarder categories of Chinese imports (Li et al., 2020). As such, the later rounds of the trade war inflicted more harm on the Chinese economy than on the U.S. economy.

In December 2018, the U.S. and China began working to end the trade war. The Trump administration and the Chinese Communist Party engaged in successful negotiations at the G20 Summit in Buenos Aires, Argentina. Both nations agreed to a 90-day moratorium on new tariffs, and the Chinese unilaterally reduced tariffs on U.S. motor vehicles and auto part imports from 25% to 15% (Kapustina et al., 2020). However, this lull in the U.S.-China trade war would not last.

The Chinese Communist Party and the Trump administration continued trade discussions in the leadup to the 2019 G20 summit in Osaka, Japan. However, the Trump Administration tanked the negotiations, by announcing a 15% increase in tariffs on approximately $200 billion in Chinese imports, and by imposing targeted sanctions on Huawei and ZTE, two of the largest and most advanced Chinese telecommunication firms. Huawei and ZTE are partially state-owned companies with strong ties to the Chinese Communist party. Both Huawei and ZTE are central to Xi Jinping's Made in China 2025 plan. The unilateral sanctions imposed on Huawei and ZTE hindered their development, reduced their ability to expand internationally, and damaged their reputations, significantly impacting the development of China's high-tech manufacturing sector. The Trump administration also baselessly accused China of currency manipulation (Kapustina et al., 2020). Although China has intentionally devaluated its currency, the Renminbi (RMB, or "People's Currency"), in the past, there is no evidence that China has recently violated its obligations to follow World Trade Organization (WTO) rules (Chow, 2016). As such, the U.S. tariffs imposed on China to counter supposed currency manipulation were illegal and in violation of WTO rules. Hence, China filed a WTO complaint attacking the Trump administrations justifications for the new round of tariffs and alleging that the U.S. was engaging in unfair and illegal trade practices (Kapustina et al., 2020). In addition to the WTO complaint, China responded to the U.S.'s sabotage of the trade talks by imposing a 5% tariff on $75 billion in U.S. imported products and crude oil.

As it became obvious that the tariffs were harming both nations' economies, the U.S. and China began gradually lifting tariffs in late 2019. In January of 2020, the U.S. and China managed to strike a new trade deal, in which China agreed to purchase $200 billion in U.S. goods in exchange for the U.S. lifting some tariffs. However, the new agreement left tariffs in place on $360 billion in Chinese goods, affecting 65% of all Chinese products imported to the U.S. China maintains tariffs on 58% of all products imported from the U.S. The two sides also failed to reach an agreement on intellectual property concerns, and China refused to commit to preventing the hacking of U.S. firms by Chinese actors (Swanson and Rappaport, 2020). Despite a change in U.S. presidential administrations in January of 2021, the U.S.-China Trade War continues.

China has failed to fulfil its obligations under the trade deal and the U.S. has ceased lifting tariffs. The U.S. has also provoked China by signing agreements with the European Union and Australia; Moves which China perceives as thinly veiled efforts to contain its rise. “So far, China is on a pace to fall short of its 2021 purchasing commitments by more than 30 percent, after falling short by more than 40 percent last year, according to Chad P. Bown, a senior fellow at the Peterson Institute for International Economics, who tracks the purchases” (Swanson and Rappaport, 2020). As shown in *Figure 2.1,* China has failed to meet its purchasing obligations in every month since the agreement was signed and has little chance of fulfilling the terms of the agreement before the deadline expires in December of 2021. Despite being critical of the Trump administration’s trade war during his political campaign, President Biden has yet to lift tariffs on Chinese products or to complete a new trade deal, indicating that the tariffs imposed during the U.S.-China trade war may become permanent.



Measured in USD (Billions)

January 2020-October 2021

Figure 2.1: U.S. Exports and Chinese Imports of Goods Covered by the Jan 2020 Trade Deal (Bown, 2021)

Evaluating the Effects of Trump's Trade Policy

From 2016-2021, U.S. trade policy was largely ineffective at changing Chinese policy or behavior. The Trump administration's goal, of eliminating the trade deficit between the U.S. and China and of reducing the U.S.'s overall trade gap, was a failure. In 2017, Trump stated "We have an almost $800 billion a year trade deficit with other nations. Unacceptable! We are going to start whitling that down and as fast as possible" (Palmer, 2020). Trump seemed to have confused the U.S.'s trade deficit for goods, which was approximately $800 billion, with the U.S.'s overall trade gap, the net difference between goods and services exported and imported annually. Because the U.S. is a net exporter of services, the overall trade gap (or deficit) is smaller than the trade deficit for goods alone. However, the U.S. trade gap grew from approximately $503 billion annually in 2016 to approximately $678 billion annually in 2020 (U.S. Bureau of Economic Analysis, 2021).

Trade deficits are not typically considered to be a good indicator of the health of an economy; there is nothing inherently wrong with having a large trade deficit with China. However, the Trump administration's policy of reducing the trade gap by unilaterally imposing tariffs on China was not successful. The economies of both China and the U.S. were negatively impacted by the trade war, although China suffered worse effects. Whether or not reducing the overall trade gap is important for the health of the U.S. macroeconomy (spoiler alert: it's not), the Trump administration was clearly unable to do so. If however, Donald Trump had campaigned on increasing pre-pandemic manufacturing sector employment in Brazil and Vietnam (admittedly a hard sell to his base), his trade policy could be considered a tremendous success.

In 2020, the Office of the U.S. Trade Representative estimated that the U.S.-China trade deficit was approximately $285.5 billion annually. This was a reduction from 2016, when the U.S.-China trade deficit was estimated to be approximately $346 billion annually (U.S. Bureau of Economic Analysis, 2021). However, the increase in the overall trade gap, coupled with the decrease in the U.S.-China trade deficit, indicates that the trade war did nothing to reduce the U.S.'s reliance on foreign manufacturers in low labor cost countries. The U.S. simply shifted some of the balance of its trade deficit with China onto other low labor cost countries, such as India and Vietnam. For instance, the U.S.'s trade deficit with Vietnam increased rapidly from 2017-2020, indicating that the U.S. simply substituted Chinese manufacturing with Vietnamese manufacturing, as opposed to creating a market for new domestic manufacturers (Castano et al., 2020).

The Trump administration's goal, of changing the Chinese Communist Party's stance on intellectual property rights and preventing the hacking of U.S. firms, was a failure. Protecting the intellectual property of U.S. firms is a worthy policy goal, however the Trump administration's focus on trade deficits and appearing tough on China limited its ability to achieve policy change. In the final trade deal negotiated between China and the Trump administration, the two sides failed to reach an agreement on intellectual property concerns, and China refused to commit to make efforts to prevent the hacking of U.S. firms (Swanson and Rappaport, 2020). After repeatedly antagonizing the Chinese Communist Party with unilateral tariffs and sanctions on their largest tech companies, Chinese leadership had little interest in cooperating with the Trump administration to prevent the theft of U.S. technology and information by Chinese firms. Because the majority of the tariffs imposed during the trade war still remain in place, the Chinese Communist Party has no incentive to cooperate with the U.S.

on intellectual property rights. Additionally, in order to fulfil Xi Jinping's Made in China 2025 Plan, China must make considerable advances in high-end manufacturing and technological development over the next four years. Acquiring U.S. intellectual property and technology by forcing U.S. firms that do business in China to hand it over, or by stealing, hacking, or other duplicitous means, advances the Chinese Communist Party's policy interest of ensuring that China is not dependent on the U.S. for high-end manufacturing or technology.

Effects of the Trade War on Onshoring

One of the goals of the Trump administration's trade war was to bring manufacturing jobs back to the U.S. In 2016, prior to launching the U.S.-China trade war, Donald Trump stated "My plan includes a pledge to restore manufacturing in the United States," and in 2017, just as the trade war was beginning, President Trump told a group of manufacturing industry CEO's "We're going to find out a way to bring more jobs back." Despite these bold claims, manufacturing employment in the U.S. declined slightly under the Trump administration, from 12.367 million jobs in January 2016 to 12.213 million jobs in January 2021 (U.S. Bureau of Labor Statistics, 2021). As shown in *Figure 2,* manufacturing employment in the U.S. had been increasing since 2011 and peaked in August of 2019. There does appear to have been some acceleration in manufacturing employment growth, from 2017-2019, indicating that the U.S.-China Trade War may have resulted in a resurgence in manufacturing employment (U.S. Bureau of Labor Statistics, 2021). However, any gains in manufacturing employment were wiped out in early 2020, when the Covid-19 Pandemic gained widespread attention and caused a recession in the U.S. The subsequent recession and pandemic-related closures of factories substantially decreased manufacturing employment.

Figure 2.2: Manufacturing Employment in the U.S. (2010-2021)

(U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

Onshoring is a measure of manufacturing jobs that have returned to the U.S. from foreign countries, making it a good measure of the Trump administration's success in bringing back jobs. The data on onshoring from 2019-2021, the years in which the U.S.-China Trade War could be a factor, is mixed. The ratio of U.S. manufactured goods versus imported goods declined from 2018-2021. However, as shown in *Figure 2.3,* the decline was small, approximately 0.1%. As shown in *Figure 2.4,* the ratio of U.S. manufactured versus imported goods increased sharply in 2019, however this was driven largely by a reduction in foreign manufacturing and imports, not an increase in domestic manufacturing. There does not appear to have been a substantial increase in U.S. domestic manufacturing over the past two years. However, increasing manufacturing capacity requires a significant amount of time; new factories cannot be constructed overnight, especially during a pandemic. Additionally, U.S. building codes and environmental protection laws make it extremely difficult to begin construction of new factories, even if the economic headwinds are blowing in the right direction. It would be nearly impossible for a firm to have acquired the necessary permitting to build a large-scale American factory, if they began the planning and permitting process in 2020. U.S. imports from China declined in the first quarter of 2020, when the emergence of Covid-19 became apparent, and have yet to recover. However, this trend was primarily driven by shifting imports from China to other countries with low labor costs, such as India. *Figure 2.5* shows that the percentage of U.S. imports from LLC's (low labor cost countries) sourced from China has declined substantially since the first quarter of 2020.

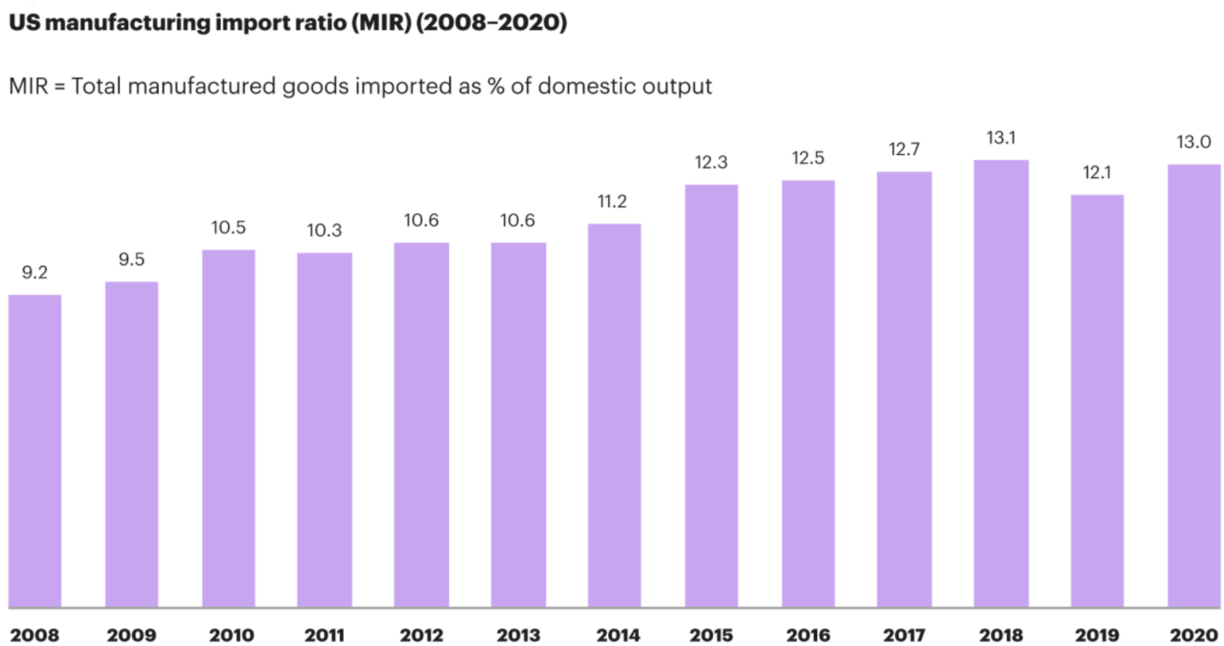


Figure 2.3: Ratio of U.S. Imported Goods Versus Domestic Production

(Castano et al., 2020)

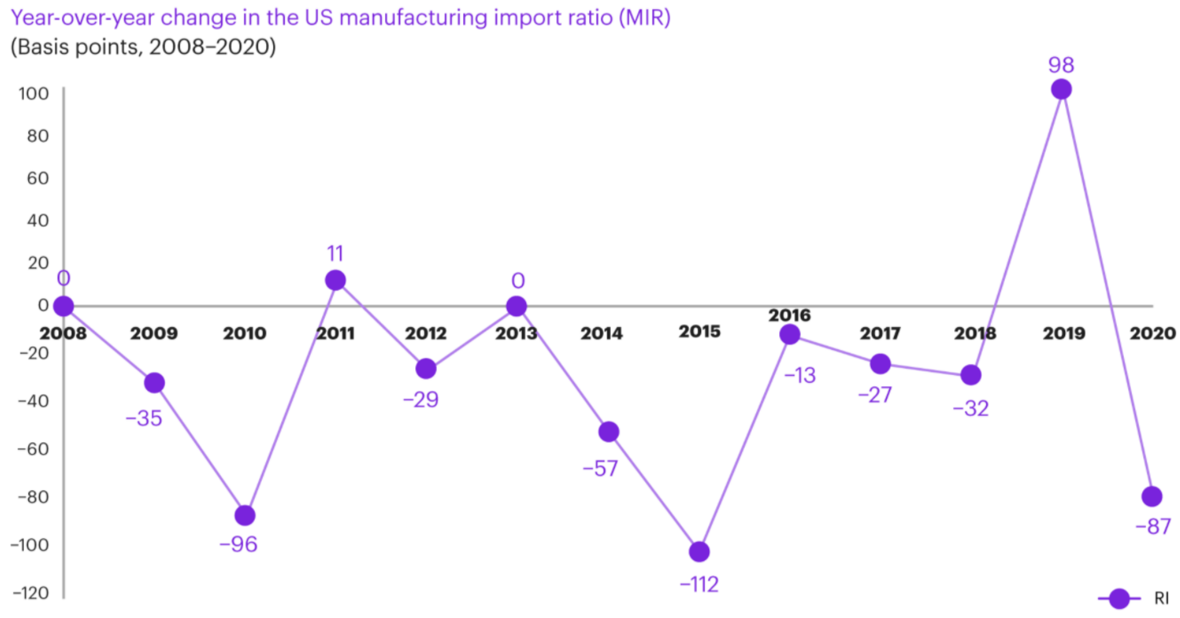


Figure 2.4: Year-Over-Year Change in Ratio of U.S. Imported Goods Versus Domestic Production

(Castano et al., 2020)

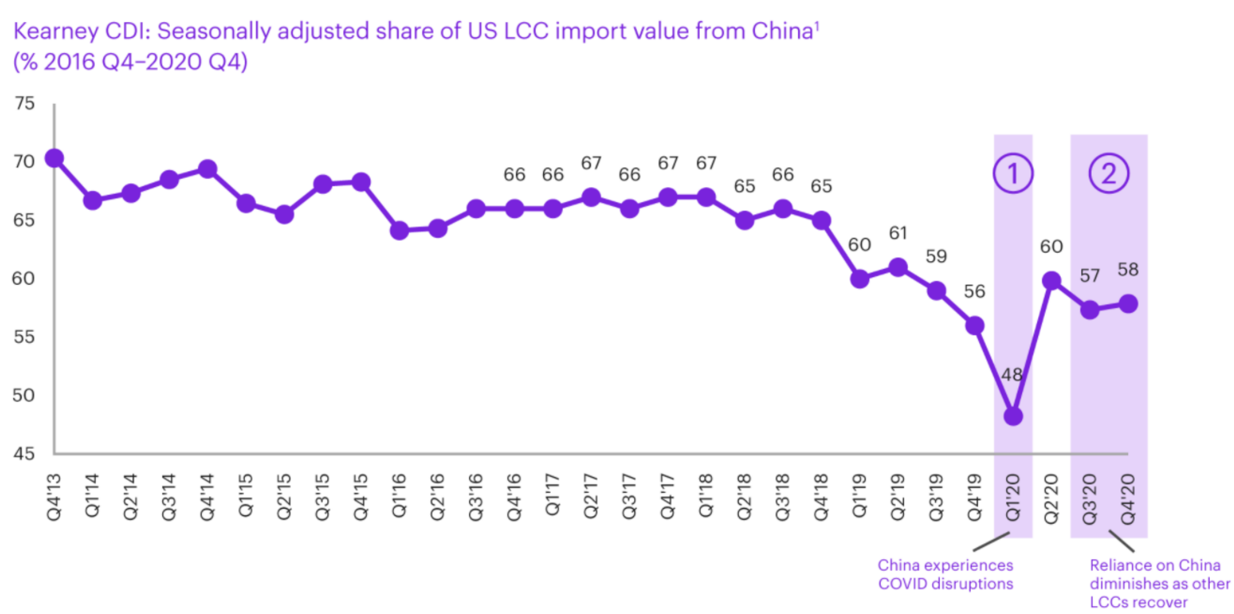


Figure 2.5: Chinese Percentage of U.S. imports from Low Cost Countries (LCC's)

(Castano et al., 2020)

Although manufacturing employment did not increase under the Trump administration, manufacturing productivity did. From 2017-2021, the utilization of new technological progress enabled America's factories to produce more goods with fewer workers. As shown in *Figure 2.6,* Manufacturing productivity declined until mid 2020, but has increased substantially since. This indicates that the supply chain shocks caused by the trade war and the Covid-19 pandemic resulted in initial losses in productivity, as workers were laid off and factories were shuttered, but ultimately resulted in productivity growth, as new automation technologies and shorter, more efficient supply chains increased hourly worker productivity (U.S. Bureau of Labor Statistics, 2021). The disruption caused by the pandemic and the U.S.-China trade war ultimately resulted in an increase in productivity, as manufacturers were able to adopt more efficient policies, and utilize technology to develop new means of production.

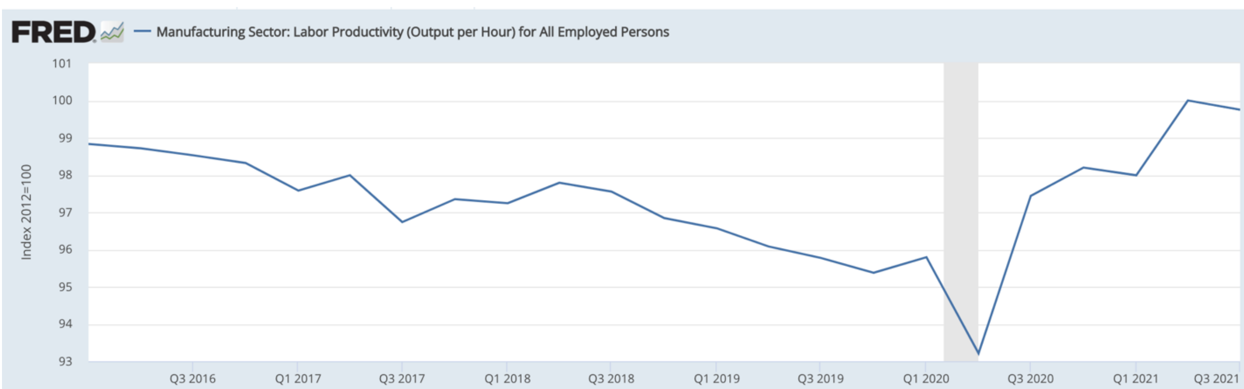


Figure 2.6: U.S Manufacturing productivity (2016-2021)

(U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

The results of the U.S.-China Trade War are largely explained by the Ricardian comparative advantage and Heckscher-Ohlin theories of international trade. Tariffs create barriers to trade, and the potential for escalating rounds of tariffs cast uncertainty on future supply chain reliability. Furthermore, tariffs are primarily paid by the citizens of the country that imposes them, in the form of higher prices for goods and services, although the country they are imposed upon also suffers losses from a reduction in total trade. Tariffs decrease the efficiency of international trade, resulting in deadweight loss for all parties involved. In other words, there are no winners in a trade war. This is precisely what happened during the U.S.-China War, both the U.S. and China experienced deadweight loss as the result of erecting barriers to trade, reducing economic growth in the U.S. and in China (Carvalho et al., 2019)

Although tariffs have historically been ineffective at changing Chinese policy, they serve an important role in domestic politics, i.e. enabling a leader to appear tough on China. From a realist political perspective, the Trump administration's trade policy may have been designed to benefit Donald Trump and the Republican Party in domestic politics, and not necessarily to benefit the U.S. economy. However, the U.S.-China Trade War does not seem to have benefited the Republican Party politically, as may have been expected. In a working paper, Schwartz and Fetzer (2019) found, that in the 2018 midterms, Republican candidates fared comparatively worse in districts that had been targeted by Chinese retaliatory tariffs than in districts that were less affected. Any political gains that the Trump administration may have made by appearing to take a tough stance on China, were wiped out by the economic damage caused by the trade war. The political consequences of the trade war were exacerbated by China's choice of targets for retaliatory tariffs. The Chinese tariffs specifically targeted U.S. agricultural products, especially soybeans, which are disproportionally produced in Midwestern swing states (Schwartz and Fetzer, 2019).

Chapter 3: Made in China 2025

China's Long-term Policy Response to the U.S.-China Trade War

While the Trump administration waged its trade war, the Chinese Communist Party made efforts to dampen the effects of future U.S. efforts to decouple their economies. Made in China 2025, is President Xi Jinping's strategic plan to transition China's economy from an export driven economy, to an economy driven by domestic consumption, through investment in technology and advanced manufacturing. The goal of Made in China 2025 is to make China into a manufacturing superpower by the year 2049.

Made in China 2025 specifically promotes advanced manufacturing in the following industries: automotive, aviation, machinery, robotics, high-tech maritime and railway equipment, energy-saving vehicles, medical devices, and information technology (Zenglein and Holzman, 2019). This ambitious industrial policy is designed to create a self-sufficient China, that is not dependent on the U.S. or other Western nations for technological advancement or high-end manufacturing. U.S. efforts to contain the growth of Chinese tech firms like Huawei and ZTE have stalled the success of Made in China 2025, but also demonstrated its necessity.

The U.S.-China Trade War has made apparent the risks of relying upon the U.S. for advanced imports, and galvanized Chinese Communist Party leadership behind the Made in China 2025 industrial plan. "In 2018, the [Chinese] economy expanded by 6.6 percent, the weakest pace since 1990. The country also risks being caught in the middle-income trap, a problem many developing countries faced when rising wages eroded their comparative advantage, making them unable to compete with the productivity and innovation of advanced economies. For China's leadership, there is no alternative to substantially upgrading its industrial and economic base" (Zenglein and Holzman, 2019). The Chinese government views substantial improvements in high-end manufacturing as essential to ensuring its ability to compete with developed economies in the future. China plans to increase its manufacturing capabilities by implementing existing technologies and by developing new technologies and methods of production.

In U.S. policy making circles, it is common to remark that the U.S. thinks in years while China thinks in decades. There is no clearer example of this phenomenon than the U.S.-China trade war. The U.S. pursued a short-sighted policy designed to appeal to President Trump's political base. Those policy decisions were then inherited by President Biden, who disagreed with the policy goals and xenophobia that motivated the trade war, but who has also been unable to end it. This has led to a bi-polar policymaking process in which the U.S. has no clear policy goals. While the U.S. seesaws between political parties and leaders, the Chinese, by contrast, have been led by Xi Jingping since 2012 and by the Chinese Communist Party since 1949. This enables the Chinese to pursue long-term strategies, such as investing in the research and development of new manufacturing technologies, in order to counter U.S. policy. It is unfathomable to imagine a U.S. politician proposing a policy that would take 24 years to unfold, the structure of America's government renders it virtually impossible to act on that long of a time horizon. China, however, has experience playing the long game. According to Ryan Hass, a senior foreign policy fellow at the Brookings Institution and former U.S. Foreign Service Officer to China, "President Xi Jinping and others have been touting that time and momentum are on China's side in its quest to move closer to the center of the world stage. Chinese officials recognize that they will need to overcome obstacles in their country's pursuit of its national goals. To do so, China appears to be pursuing a three-pronged medium-term strategy: maintaining a non-hostile external environment in order to focus on domestic priorities; reducing dependence on America while increasing the rest of the world's dependence on China; and expanding the reach of Chinese influence overseas." (Hass, 2021).

Understanding China's Strategic Decision Making

Chinese policy makers are aware that the U.S.'s economic and geopolitical power is declining relative to China's, and they perceive time as being on their side (Hass, 2021). However, despite its weaking status, the U.S. is still clearly the more powerful nation. As such, the Chinese maintained a defensive posture during the trade war, responding to U.S. tariffs and sanctions in tit-for-tat manner, but refraining from engaging in unilateral aggression. The Chinese Communist Party strongly advocated for trade talks and diplomatic solutions (although they were largely unwilling to make concessions on intellectual property, the U.S.'s most straightforward and reasonable trade policy concern). Additionally, the Chinese Communist Party issued carefully worded statements during the trade war and mostly avoided antagonizing the U.S (Hass, 2021).

China's policy decisions reflect a clear set of policy goals: preserving the U.S.-China trade relationship for as long as possible, while bidding its time, building its strength, and increasing its access and presence in non-American global markets. This enables China to reap gains from trade with the U.S., while also preparing for a future with more antagonistic and less profitable U.S.-China relations. China is currently the weaker player in the U.S.-China great power conflict, but may not always be. Thus, the Chinese Communist Party has made the rational policy decision to strengthen its hand, before it attempts to take on the U.S. in a head-to head contest.

Impact on U.S.-China Bilateral Great Power Relationship

In *Destined for War: Can America and China Escape Thucydides's Trap?,* Graham Allison argues that great-power relationships grow increasingly fraught as the nations involved approach power-parity. If China continues on its current trajectory, it will soon surpass the U.S. as the world's economic superpower. This will be a perilous undertaking, as Chinese efforts to flex its newfound strength will be met by U.S. efforts to contain it, creating ample opportunity for conflict (Allison, 2018). Furthermore, both sides are aware that if the U.S. and China reach economic-parity, the Chinese would have the economic power to pursue a similar level of military investment as the United States. Which increases the chances that an economic and political struggle could escalate into armed-conflict. Additionally, because measuring the power of a nation is an imprecise science, there is considerable strategic ambiguity as to the capabilities of two nations as they approach power-parity. This makes it possible that either the U.S. or China could overestimate their own abilities and conclude that they could succeed in a conflict.

If China begins to eclipse the U.S., the chances of conflict would increase dramatically. Hegemonic power theory predicts that as China eclipses the U.S., there are two potential avenues for conflict. Firstly, the U.S. could seek to quash China's rise, while it still perceives itself to be strong enough to do so. The U.S. could attempt this course of action, by sanctioning and isolating China politically and economically, or through military force. Alternatively, as China grows in power, the Chinese Communist Party could grow increasingly confident in its ability to push the U.S. out of its way and establish a new, Chinese lead, world order. China could then potentially respond to U.S. containment efforts with aggression, possibly sparking an economic and or military conflict. The onshoring of manufacturing from China to the U.S. and the ongoing decoupling of the two countries' economies, could exacerbate tensions and increase the potential for conflict.

Currently, the American and Chinese economies are deeply intermeshed. Most Americans own hundreds of products manufactured in China, and millions of Chinese are employed by American based multi-national companies, such as Apple, Nike, and Coca-Cola, as well as their sub-contractors. The integrated nature of the U.S. and Chinese economies creates barriers to conflict. For instance, the U.S.-China trade war negatively impacted the economies of both nations, because both sides lost the economic gains that are predicted by the Heckscher-Ohlin and Ricardian comparative advantage models of trade (Carvalho et al., 2019). However, as the U.S. onshores production and re-routes supply chains through nations other than China, the potential losses from conflict decrease. If Americans did not buy so many Chinese products, it would be cheaper for the U.S. to antagonize and impose tariffs on China, and vice-versa.

Chapter 4: Understanding the Supply Chain Crisis

What is a Supply Chain Crisis Anyway?

In the previous chapters, this paper has argued that the U.S.-China Trade War and the Covid-19 pandemic have triggered a supply crisis that will reorient the U.S.-China bilateral relationship. The 'supply chain crisis' has also been a topic of major concern in the news media and the culture writ-large, appearing in everything from the writings of Nobel Prize winning economist Paul Krugman, to cable news stories decrying that imported toys might not make it to the shelves in time for Christmas, to conversations around the dinner table. All of this discussion of the 'supply chain crisis' raises the obvious question: what exactly is a supply chain crisis?

For the purposes of this paper, a supply chain crisis is a type of market failure, in which the markets for goods and shipping services fail to clear efficiently. The demand for goods and shipping exceeds the supply of goods and shipping services, resulting in price increases, shortages, and lines. According to basic macroeconomic theory, an increase in relative demand for goods and shipping services should result in temporarily higher prices. These higher prices result in higher profits for manufacturers and shippers, which should in-turn encourage manufacturers and logistics companies to increase supply, until the market reaches an efficient equilibrium. Under normal conditions, supply chain crises should be easily resolved by free market forces. However, if exogenous factors, like a global pandemic, constrain the ability of shippers to increase supply, then for as long as demand exceeds supply, those companies would be expected to reap windfall profits, while their customers endure high prices, lines, and shortages. If supply cannot keep pace with demand, suppliers would be expected to charge prices well in excess of their marginal costs, enabling them to turn the gap between supply and demand into pure profits.

In theory, a supply chain crisis occurs in three phases, as shown in *Figure 4.1*. First, the shipping market is in an efficient equilibrium state (Point A in *Figure 4.1*), where the supply of shipping services meets the demand for shipping services, and customers pay the efficient market price P_1. Then, because of an exogenous shock, the demand for shipping services increases, indicated in *Figure 4.1* by the demand curve shifting to the right. In the absence of supply constraints, the quantity of shipping services provided would increase to Q_2, and the price to P_3, creating a new equilibrium at Point C. However, if the supply of shipping services cannot be increased proportionally to demand, then the price of shipping will increase, while the quantity of shipping provided remains constant, or only increases slowly, resulting in customers paying the much higher and less efficient price P_2 (Point B in *Figure 4.1*). Eventually, the increase in demand will subside, in which case the market will revert to equilibrium at Point A, or the constraint on supply will be resolved, and the market will reach equilibrium point C. However, for the duration of the supply chain crisis, the market will be at point B, where the demand for shipping services exceeds the supply and the price of shipping services is relatively high. During the crisis, the shipping companies will reap windfall profits equal to the difference between the market price and the efficient price (windfall profits = $P_2 – P_1$). The more severe the crisis, the greater the difference between P_1 and P_2, the greater the windfall profits earned by firms in the shipping industry.

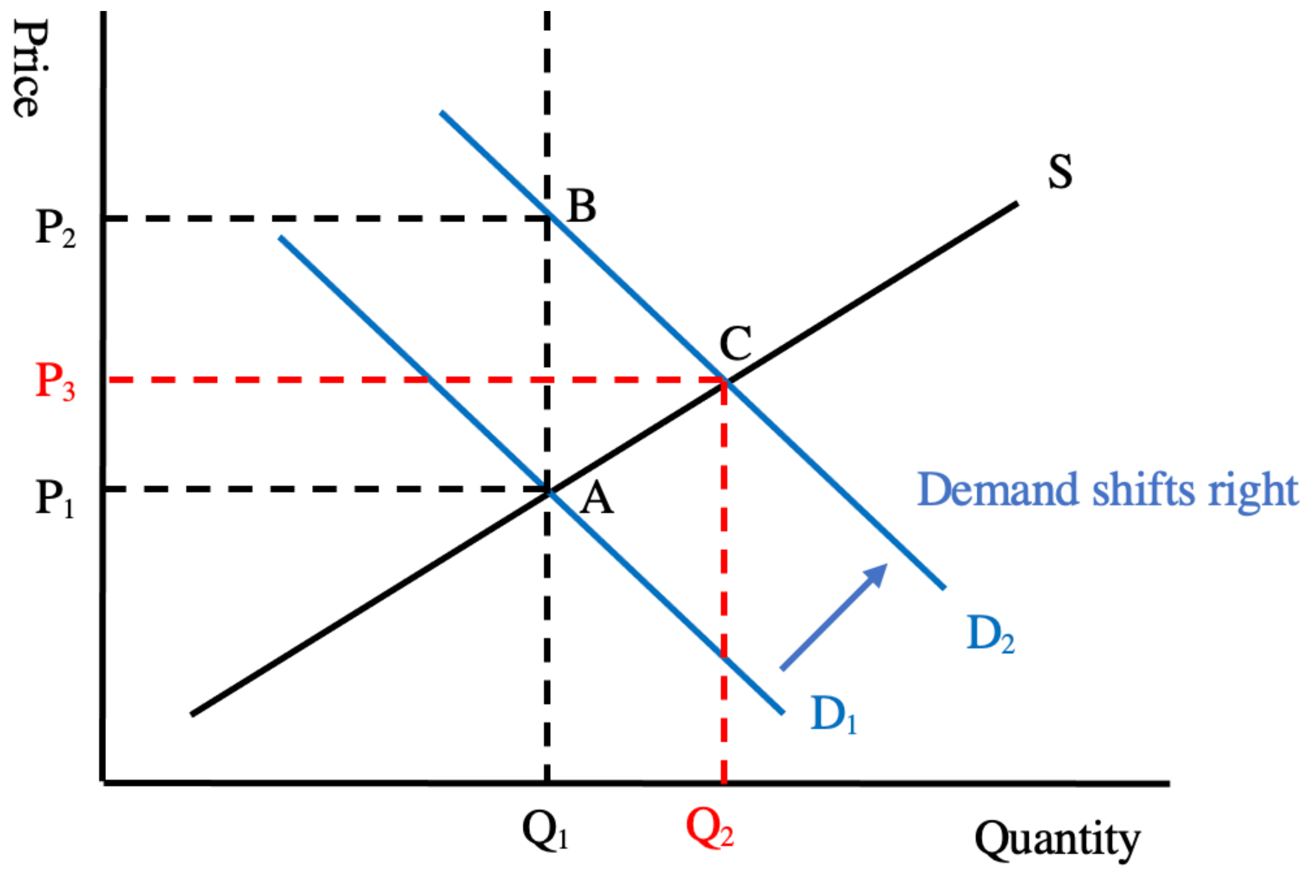


Figure 4.1: Demand for Shipping Shifts to the Right

The Supply Chain Crisis

Now that we have defined what a supply chain crisis is, the obvious follow-up question would be: is the world actually experiencing a supply chain crisis, and if so, how would we know? There are no demand and supply curves in the real economy, they only exist in the realm of economic theory. Profits, however, are real. Therefore, the gap between supply and demand for shipping and manufacturing can be measured by examining the profits of shippers and manufacturers. If there is in fact an ongoing supply chain crisis, it should result in huge profits for shippers and manufacturers. However, if manufacturers have been expanding capacity, shortening supply chains, and paying higher shipping prices, this would absorb much of the profits and limit price increases. Shipping however, is an industry with relatively inelastic supply; it is extremely expensive and time-consuming to create new ocean-liners, train tracks, and planes, and nearly all existing shipping infrastructure is already operating at near-max capacity. Thus, if the supply chain crisis is real, we would expect to see major increases in the profitability of shippers and logistics companies.

The Case of Cargo Containers

Consider the case of ocean freight carriers, who operate the world's cargo ships and are arguably the most important player in global supply chains. In 2021, publicly traded ocean freight carriers experienced record revenue and profit growth, driven by record high prices for shipping. According to data from Sea-Intelligence, a global marketplace for ocean freight, publicly traded global shipping companies earned more than twice as much money in the first three quarters of 2021 than in the entire decade from 2010-2020 (Dayden, 2022) (Sea-Intelligence, 2021). Because of exogenous supply chain shocks, shipping companies made more money in the last three months than in any other pre-pandemic year (Sea-Intelligence, 2021). In other words, the supply chain crisis is real, and the windfall profits earned by shipping companies are astronomical.

As shown, in *Figure 4.2,* the 2021 ocean freight profits for each of the world's seven largest publicly traded logistics companies, were extreme outliers. *Figure 4.2*, tracks the gross earnings before interests and taxes (EBIT) per twenty-foot-container or equivalent unit (TEU) earned by major logistics companies in Quarter 3 from each of the last ten years (Sea-Intelligence, 2021). EBIT per TEU is, essentially, a direct measure of the difference between the marginal cost of shipping an additional container of freight and the real-world price. Over the last ten years, EBIT per TEU has typically been close to zero, indicating that the marginal cost of shipping an additional container roughly equaled the marginal benefit and that the market was clearing efficiently. In 2021 however, EBIT per TEU skyrockets, indicating that the demand for space in shipping container units greatly exceeds the supply and that ocean freight carriers are reaping windfall profits. Quarter 3 of 2021, is the latest time period for which there is reliable data on EBIT, however, there is no reason, other than the ordinary decline in demand that occurs after the end of the holidays season, to expect that it has substantially decreased since. The conclusion is obvious, shipping markets are not clearing efficiently. There is in fact a supply chain crisis, and we can measure it.

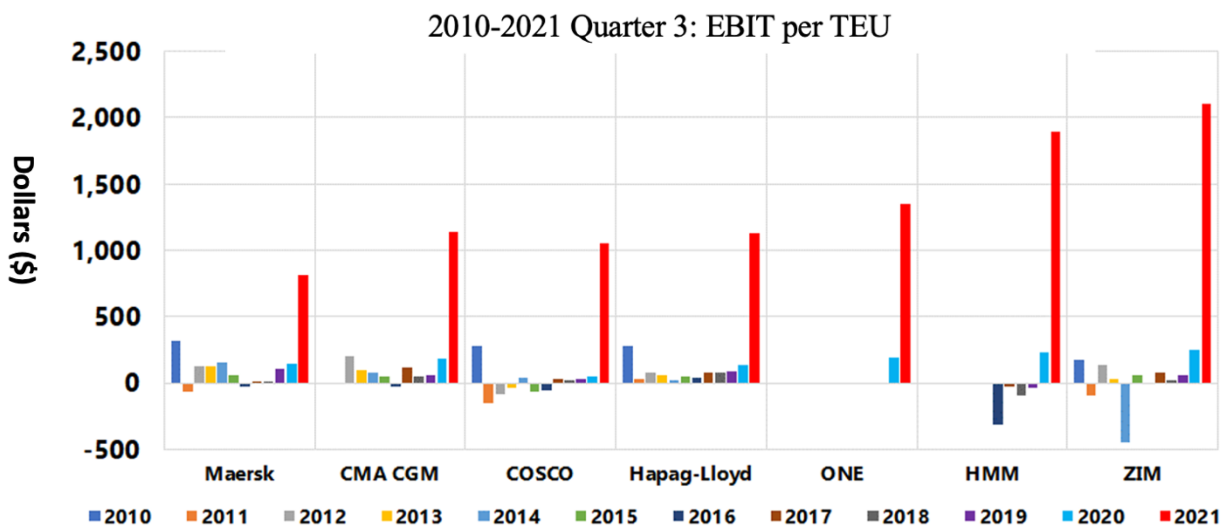


Figure 4.2: Profit per Container Shipped by Largest Global Ocean Freight Carriers (Sea-Intelligence, 2021)

The scale in *Figure 4.2* increases linearly, and because it only examines quarter 3, does not need to be seasonally adjusted; profits really were orders of magnitude greater in quarter 3 of 2021 than at any time in the past decade. Of the publicly traded ocean freight companies, Maersk experienced the lowest rate of year over year revenue growth in 2021, a still quite impressive 83.9%. While Wan Hai, a Taiwanese shipping company not large enough to be pictured in *Figure 4.2*, lead the industry with 274.1% year over year revenue growth (Sea-Intelligence, 2021). During all quarters, from 2010-2020, the combined earnings (EBIT) of all publicly traded shipping companies was $37.86 billion. In just quarter 3 of 2021, the combined EBIT of all publicly traded shipping companies was nearly identical, $37.24 billion (Sea-Intelligence, 2021). The publicly traded shipping companies made a decade's worth of profits in only 90 days. In August of 2021, Maersk, which again, experienced the slowest rate of growth of the publicly traded ocean container shipping companies, revised its expected annual profits figure from an initial estimate of $4.5 billion, at the beginning of the year, to $14.5 billion (Bryant, 2021). This indicates that Maersk is reaping approximately $10 billion in windfall profits, as a result of the supply chain crisis. Because the supply of cargo containers has not decreased, this incredible change in the profitability of shipping ocean cargo containers between 2019 and 2021 could only have been caused by a massive increase in the demand for shipping services.

A Crisis Driven by Demand

The increase in shipping prices in 2021 was not caused by a decrease in the supply of shipping services, but rather by a series of exogenous shocks that shifted the preferences of American consumers away from services and towards manufactured goods. The supply of shipping services has actually expanded recently, although at a far slower rate than the increase in demand. In 2021, the number of cargo containers processed at American ports was higher than ever. In October of 2021, the Biden administration announced that the twin ports of Los Angeles and Long Beach, which are the largest in the Western hemisphere and process a combined 40% of the U.S.'s imported cargo each year, would operate 24/7 (White House, 2021).

The massive ports sprawl across 12 square miles and process the vast majority of U.S. imports from Asia, a plurality of which are sourced from China (Karlamangla, 2021).

The ports of Long Beach and Los Angeles were respectively processing 20% and 30% more cargo per month in October of 2021 than in October of 2020. The Port of Los Angeles ultimately processed 10.7 million TEU's in 2021, shattering its previous single year record by more than 13% (Port of Los Angeles, 2022). However, according to the White House, E-commerce sales were 39% higher in the 1st quarter of 2021 than in the 1st quarter of 2020 (White House, 2021). This resulted in wait times for container ships that were double the pre-pandemic average (White House, 2021). The capacity of the supply chain simply could not expand as rapidly as American's demand for goods imported from Asia. This constraint on the supply of shipping services enabled the global ocean freight carriers, who face almost no threat from competition, to sell their services at prices well above their marginal costs. The ultimate results were lines, shortages, exorbitantly high shipping rates, and record windfall profits for the owners of the world's cargo ships.

Chapter 5: Effects of Exogenous Shocks on U.S. Manufacturing

Research Methodology

Because the Covid-19 pandemic and the U.S.-China trade war are concurrent phenomenon, it is difficult to determine which is the cause of specific changes in the U.S. macroeconomy. As such, for the purposes of data analysis, this paper will treat the ongoing disruptions and changes wrought by the pandemic and the trade war as a series of exogenous shocks that changed policy and consumer preferences and reorganized the global supply chain, and will not make efforts to distinguish between the two.

The data used in this analysis was collected using the following methods. Firstly, all manufacturing data was collected from the Federal Reserve Bank of St. Louis's publicly available Federal Reserve Economic Database (FRED). Secondly, all data was indexed for comparison purposes (Quarter 1 of 2012 = 100). Thirdly, all data used in this analysis is quarterly; data that was collected monthly was converted to quarterly by taking the average (mean) index value of the months in each quarter. Additionally, all data was collected from quarter 1 of 2012 to quarter 3 of 2021, with the exception of the Gross Domestic Product Retail data, for which quarter 3 of 2021 was not yet available. All regression analysis will be calculated with Gretl, a free econometrics software. The level of significance for all regressions is a p-value of 5% (alpha =.05). The following data was collected from FRED and coded for regression analysis in Gretl software using the following abbreviations:

MANEMP: All Employees, Manufacturing

PPIINDUSTRY: Producer Price Index by Industry, Total Manufacturing Industries

IPMAN: Industrial Production (NAICS)

PPISEMICON: Producer Price Index by Industry: Semiconductor and Other Electronic Component Manufacturing

OUTPUT: Manufacturing Sector: Output for All Employed Persons

AWHAEMAN: Average Weekly Hours of All Employees Manufacturing

CAPUSE: Capacity Utilization: Manufacturing (NAICS)

GDPTRADE: Gross Domestic Product Retail Trade (NAICS 44-45) in the United States

JOBSOPEN: Job Openings: Manufacturing

An additional variable, MANHOURS, was created from the AWHAEMAN data and the MANEMP data. MANHOURS = (AWHEMAN)(MANEMP)/100. MANHOURS is a measure of the average total number of hours worked in the manufacturing sector each quarter, indexed so that Quarter 1 of 2012 = 100.

Each of the datasets included is an important economic indicator in the manufacturing and trade sectors. MANEMP tracks the total number of people employed in the manufacturing sector in each seasonally adjusted quarter. PPIINDUSTRY tracks the average sale price of all U.S. produced manufactured goods in each quarter; it is not seasonally adjusted. IPMAN tracks total industrial production per seasonally adjusted quarter. PPISEMICON tracks the average sale price of all U.S. produced computer chips in each quarter; it is not seasonally adjusted. OUTPUT tracks total manufacturing sector output per seasonally adjusted quarter. AWHAEMAN tracks the average weekly number of hours worked by employees in the manufacturing sector per seasonally adjusted quarter. CAPUSE tracks the total utilization of manufacturing capacity in the U.S. per seasonally adjusted quarter. GDPTRADE tracks the total dollar value of all U.S. manufactured trade goods per quarter, it is seasonally adjusted at an annual rate. JOBSOPEN tracks the number of job openings in the manufacturing sector per seasonally adjusted quarter. Lastly, MANHOURS tracks the total number of hours worked in the manufacturing sector per seasonally adjusted quarter.

Data Analysis

Figure 5.1 is a graph of each of the economic indicators from Quarter 1 of 2012 to Quarter 3 of 2021. The graph in *Figure 5.1* is largely dominated by the increase in job openings in the manufacturing sector from 2020 to 2021. The high number of job openings after the recession indicates that the manufacturing sector has been attempting to add employees after pandemic closures caused large layoffs in the Spring of 2020. This increase may be partially the result of a strong labor market, however it does also indicate that American manufacturing firms are seeking to add more employees in order to onshore manufacturing.

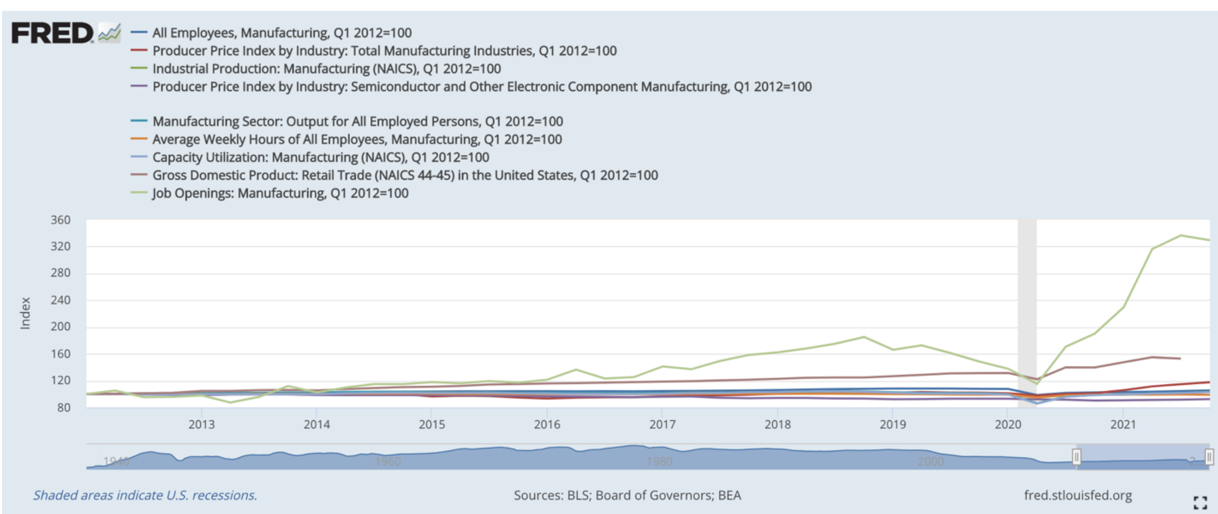


Figure 5.1: Graph of All Economic Indicator Data

(U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

Figure 5.2 is a graph of all of the economic indicators except for Job Openings, which should provide a clearer picture of activity in the manufacturing sector. Most apparent in *Figure 5.2,* is the large increase in the Gross Domestic Product Retail Trade index. The value of all manufactured trade goods manufactured in the U.S. increases steadily from 2012-2019, takes a sharp dip in 2020, and then rises rapidly in 2021. The Producer Price Index for Manufacturing also rises in 2021, indicating that the sale prices of U.S. manufactured goods increased, possibly due to a higher rate of inflation. Capacity utilization drops sharply in the 1st quarter of 2021, likely as a result of pandemic related factory closures.

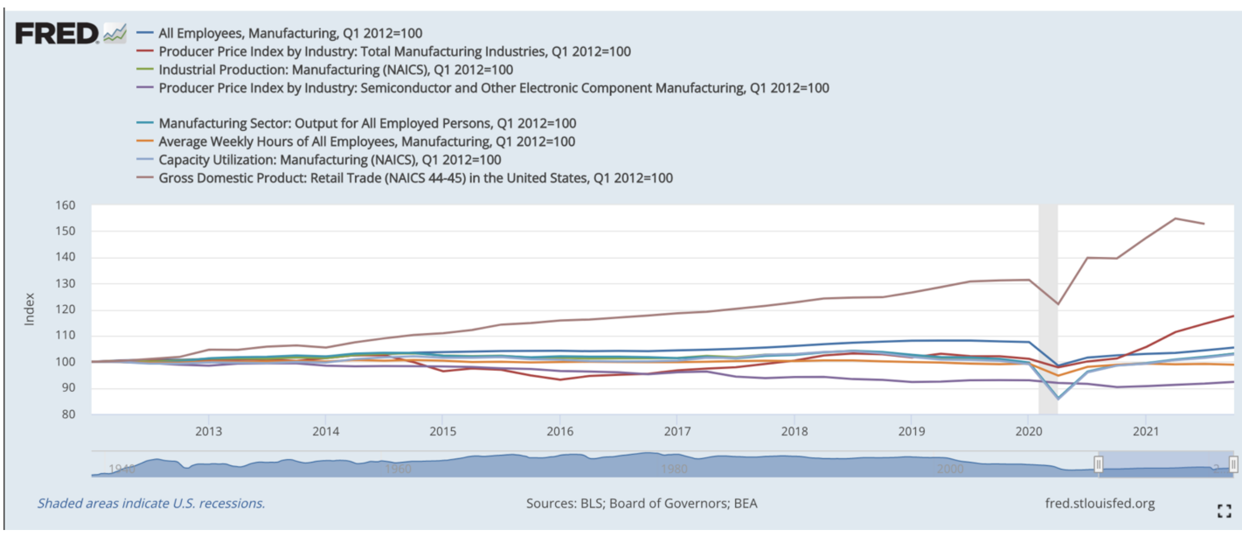


Figure 5.2: Graph of All Economic Indicator Data Except for Job Openings (U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

Figure 5.3 is a graph of the Producer Price Index for the semiconductor industry from 2016-2022. Most apparently, the price of semiconductors declines steadily over time, but then begins moving upwards in late 2020. The cost of manufacturing American semiconductors likely did not increase substantially during this time. However, the supply chain crisis greatly increased the costs and wait times for importing semiconductors. Because imported and domestically manufactured semiconductor are sold in the same market, the American manufacturers were able to demand a higher price for their computer chips and other manufactured electronic goods during 2021 and 2022. Much of the U.S. manufacturing sector is driven by high tech manufacturing, which requires lots of semiconductors as a source material. American car manufacturers, for example, have struggled to source microchips for their vehicles in recent years and have been paying record prices for relatively low-tech microchips. According to CNBC, the computer chip shortage is expected to have cost the American automotive industry $210 billion in revenue in 2021 (Wayland, 2021). The low supply and high price of semiconductors is likely one of the most important factors constraining the growth of the U.S. manufacturing industry.

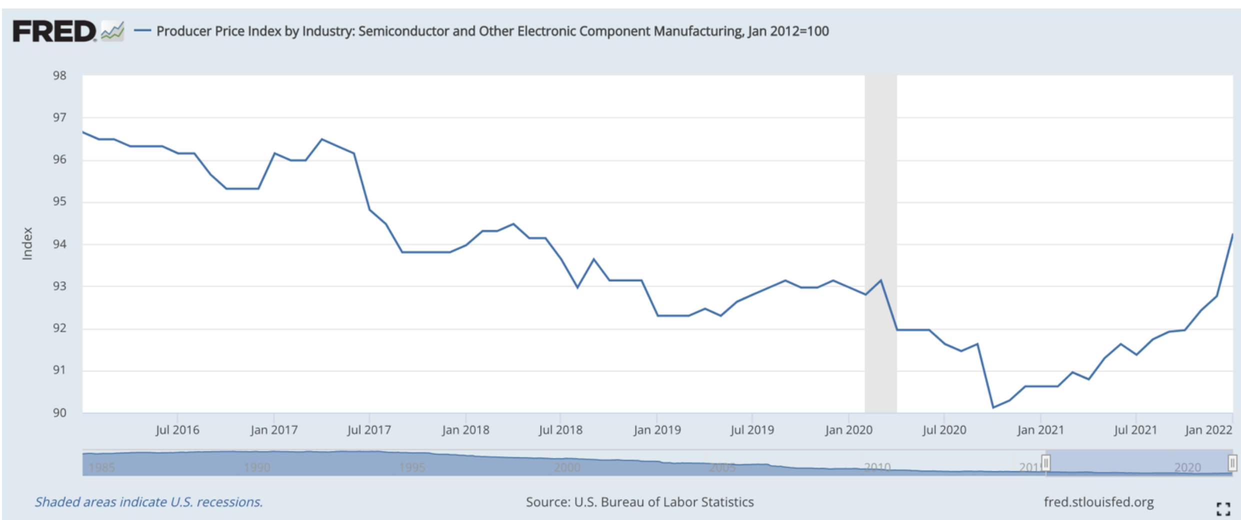


Figure 5.3: Price of Semiconductors/Computer Chips 2016-2022

(U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

The summary statistics for each of the economic indicator variables included in the regression analysis are listed in Table 5.1. Because the variables are indexed so that the 2012 quarter 1 value is equal to 100, the means and medians of most of the data points are near 100. JOBSOPEN was the only variable with a mean and median that was significantly different from

100, this is because the number of job openings in the manufacturing sector was above the 2012 level for the entire 2012-2021 period.

Table 5.1: Summary Statistics of Regression Variables

Indicator	Mean	Median	S.D.	Min	Max
MANEMP	103.9	104.1	2.501	98.52	108.1
PPIINDUSTRY	100.8	100.5	4.875	93.11	117.5
IPMAN	101.1	101.4	2.870	85.94	104.2
PPISEMICON	95.54	95.95	3.038	90.29	100.2
OUTPUT	101.2	101.9	2.887	86.08	104.2
AWHAEMAN	99.70	99.92	0.9865	86.08	100.7
CAPUSE	100.4	100.7	2.844	85.67	104.1
GDPTRADE	119.4	117.7	14.09	100.0	154.8
JOBSOPEN	148.9	130.8	60.40	87.39	336.6
MANHOUR	103.6	104.0	2.929	93.28	108.0

Regression Analysis

In Chapter 2, this paper argued that increasing manufacturing sector employment was a policy goal of the Trump Administration in launching the U.S.-China trade war. However, total manufacturing employment actually decreased during President Trump's term in office (U.S. Bureau of Labor Statistics, 2021). I will now run a regression, with robust standard errors, of several of the industry indicator variables on MANEMP, the variable for total manufacturing employment, to see which variables correlated with MANEMP from 2012-2021. Model 1 contains the readout from an ordinary least squares regression.

Model 1: OLS, using observations 2012:1-2021:3 (T = 39)
Dependent variable: MANEMP
HAC standard errors, bandwidth 2 (Bartlett kernel)

	coefficient	std. error	t-ratio	p-value
const	123.212	26.6432	4.625	6.28e-05 ***
PPISEMICON	−0.918026	0.185595	−4.946	2.50e-05 ***
PPIINDUSTRY	−0.00669499	0.0767412	−0.08724	0.9310
IPMAN	0.156376	0.709210	0.2205	0.8269
OUTPUT	0.256723	0.388203	0.6613	0.5133
CAPUSE	0.310972	0.394297	0.7887	0.4363
GDPTRADE	−0.00269116	0.0913277	−0.02947	0.9767
JOBSOPEN	−0.0247287	0.0207530	−1.192	0.2425

Mean dependent var	103.8530	S.D. dependent var	2.521268
Sum squared resid	46.03164	S.E. of regression	1.218561
R-squared	0.809439	Adjusted R-squared	0.766409
F(7, 31)	26.38666	P-value(F)	2.26e-11
Log-likelihood	−58.57106	Akaike criterion	133.1421
Schwarz criterion	146.4506	Hannan-Quinn	137.9171
rho	0.651371	Durbin-Watson	0.702593

As shown in Model 1, the adjusted R-squared value of the Model 1 regression is .766, indicating that approximately 76.6% of the variation in total manufacturing employment is explained by the seven variables in the regression. The only non-constant variable with a statistically significant correlation with MANEMP is PPISEMICON, the variable for the semiconductor/computer chip price index. The coefficient on PPISEMICON is −0.918026, which means that a −0.918026 point decrease in the PPISEMICON index is correlated with a 1 point increase in the MANEMP index. Model 1 has serious limitations, because the data set is in a time-series, the results of the regression are potentially affected by 1st order auto-correlation.

The relationship between employment in the manufacturing sector and the price of semiconductors, a vital source component in American manufacturing, merits further consideration.

In order to account for the auto-correlation, I will now run a Prais-Winston Regression for 1st order auto-correlation, with robust standard errors on MANEMP. However, Model 2 will exclude the variable PPIINDUSTRY from the regression. PPISEMICON is a factor in PPIINDUSTRY, so it is best to remove it in order to isolate PPISEMICON, in order to further explore the relationship between MANEMP and PPISEMICON.

Model 2: Prais-Winsten, using observations 2012:1-2021:3 (T = 39)
Dependent variable: MANEMP
rho = 0.970001

	coefficient	std. error	t-ratio	p-value	
const	53.7498	17.0613	3.150	0.0035	***
PPISEMICON	−0.0381129	0.173358	−0.2199	0.8274	
IPMAN	1.33696	0.991813	1.348	0.1871	
OUTPUT	−0.267831	0.588337	−0.4552	0.6520	
CAPUSE	−0.509730	0.577400	−0.8828	0.3839	
GDPTRADE	−0.0251591	0.0500213	−0.5030	0.6184	
JOBSOPEN	−0.00397922	0.00720991	−0.5519	0.5848	

Statistics based on the rho-differenced data:

Sum squared resid	12.90040	S.E. of regression	0.634931
R-squared	0.960716	Adjusted R-squared	0.953350
F(6, 32)	212.3472	P-value(F)	2.46e-24
rho	0.453893	Durbin-Watson	1.049806

As shown in Model 2, none of the regressor variables have a statistically significant correlation with MANEMP. This is likely because manufacturing employment, aside from a dip during pandemic-related factory closures, has not changed much in recent years, as shown in

Figure 2.2. Manufacturing employment does not appear to have experienced strong effects from the exogenous shocks to the macroeconomy.

The most interesting aspect of the dataset is the increase in the value of U.S. manufactured trade goods (GDPTRADE). I will now run an ordinary least squares regression on GDPTRADE, in Model 3.

Model 3: OLS, using observations 2012:1-2021:3 (T = 39)
Dependent variable: GDPTRADE
HAC standard errors, bandwidth 2 (Bartlett kernel)

	coefficient	std. error	t-ratio	p-value
const	394.133	55.3368	7.122	5.28e-08 ***
PPISEMICON	−2.70759	0.494807	−5.472	5.55e-06 ***
PPIINDUSTRY	−0.232874	0.192472	−1.210	0.2355
IPMAN	0.673796	2.25477	0.2988	0.7671
OUTPUT	0.797079	1.49731	0.5323	0.5983
CAPUSE	−1.46442	1.04590	−1.400	0.1714
JOBSOPEN	0.145843	0.0210924	6.914	9.38e-08 ***
MANHOUR	−0.147956	0.621940	−0.2379	0.8135

Mean dependent var	119.3683	S.D. dependent var	14.08563
Sum squared resid	305.9096	S.E. of regression	3.141346
R-squared	0.959425	Adjusted R-squared	0.950263
F(7, 31)	382.4661	P-value(F)	2.93e-28
Log-likelihood	−95.50330	Akaike criterion	207.0066
Schwarz criterion	220.3151	Hannan-Quinn	211.7816
rho	0.282709	Durbin-Watson	1.430352

As shown in Model 3, the Adjusted R-Squared value is 0.95, meaning that 95% of the variation in GDPTRADE is explained by the variation in the regressor variables. The coefficient on PPISEMICON is −2.70759, which indicates that a 1 point increase in the PPISEMICON is correlated with a 2.7 point decrease in the GDPTRADE. The p-value for PPISEMICON, is 5.55e-06, which is well below the alpha =.05 level of significance. The coefficient on JOBSOPEN is 0.145843, meaning that a 1 point increase in the JOBSOPEN index is correlated with a .145 point increase in GDPTRADE. The p-value for JOBSOPEN, is 9.38e-08, which is well below the alpha =.05 level of significance. The relationship between GDPTRADE, JOBSOPEN, and PPISEMICON merits further evaluation.

In Model 4, I will run an ordinary least squares, Prais-Winsten, regression with robust standard errors of PPISEMICON and JOBSOPEN on GDPTRADE.

Model 4: Prais-Winsten, using observations 2012:1-2021:3 (T = 39)
Dependent variable: GDPTRADE
rho = 0.50097

	coefficient	std. error	t-ratio	p-value
const	322.417	35.3531	9.120	6.86e-11 ***
PPISEMICON	−2.33024	0.352201	−6.616	1.05e-07 ***
JOBSOPEN	0.136127	0.0168718	8.068	1.38e-09 ***

Statistics based on the rho-differenced data:

Sum squared resid	267.6810	S.E. of regression	2.726826
R-squared	0.964510	Adjusted R-squared	0.962539
F(2, 36)	175.7536	P-value(F)	2.66e-19
rho	−0.103982	Durbin-Watson	2.145232

The adjusted R-squared of Model 4 is 0.962539, meaning that 96.2% of the variation in GDPTRADE is explained by the variation in PPISEMICON and JOBSOPEN. The adjusted R-squared value in Model 4 is greater than the adjusted R-squared value in Model 3, because adjusted R-squared is lower when extraneous variables are included. The difference in the R-squared values between the two models indicates that PPISEMICON and JOBSOPEN are the most important variables in the regression. Equation 1, constructed from the Model 4 regression, is a model of the value of U.S. manufactured trade goods, from 2012-2021.

Equation 5.1:

$$\widehat{GDPTRADE} = 322.417 - (2.33024)(PPISEMMICON) + (.136127)(JOBSOPEN)$$

Equation 5.1 describes the relationship between the price of semiconductors and job openings in the manufacturing sector and the total value of all U.S. manufactured trade goods. The high adjusted R-squared value and low P-values from the Model 4 regression indicate that this model is accurate. I will now examine the residuals and scatter plots of the data in Model 4 in order to evaluate Equation 5.1.

Figure 5.4 is a plot of the residuals, the difference between the predicted and actual values, for Model 4. The grouping of residuals appears to be largely random and centered around zero. There does appear to be some funneling, with the residuals tending to be smaller for lower values of GDPTRADE and larger for higher values. This grouping of the residuals is likely a result of the rapid changes that occurred as a result of exogenous shocks to the economy. As shown in *Figure 5.2,* GDPTRADE is largely stable from 2012-2019, but changes rapidly during 2020 and 2021, the period for which it had the highest average value.

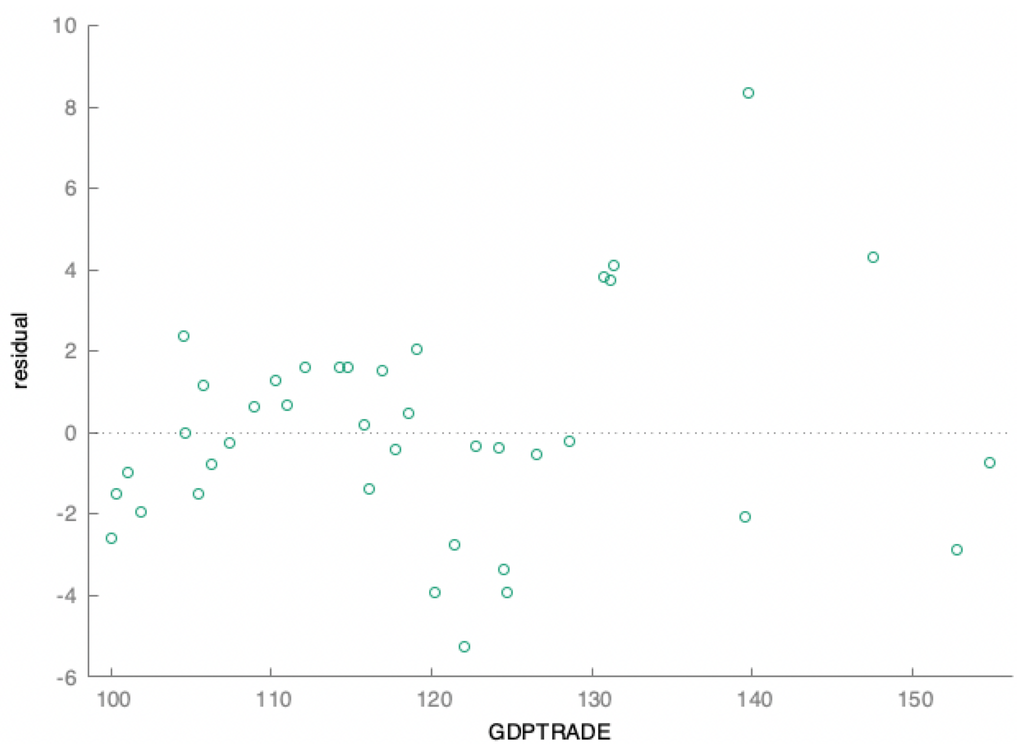


Figure 5.4: Model 4 Residual Plot

Although the residual plot in *Figure 5.4* is not completely random, there is nothing that leads to me to believe the model in Equation 1 is invalid. I am however, concerned that the model may lose some explaining power from 2020-2021, the years that are most relevant to this paper. I will now plot GDPTRADE vs. PPISEMICON on an x-y scatter plot with least squares fit in *Figure 5.5* and GDPTRADE vs. JOBSOPEN on an x-y scatter plot with least squares fit in *Figure 5.6* in order to ensure that linear estimation is an appropriate method of regression analysis for the data.

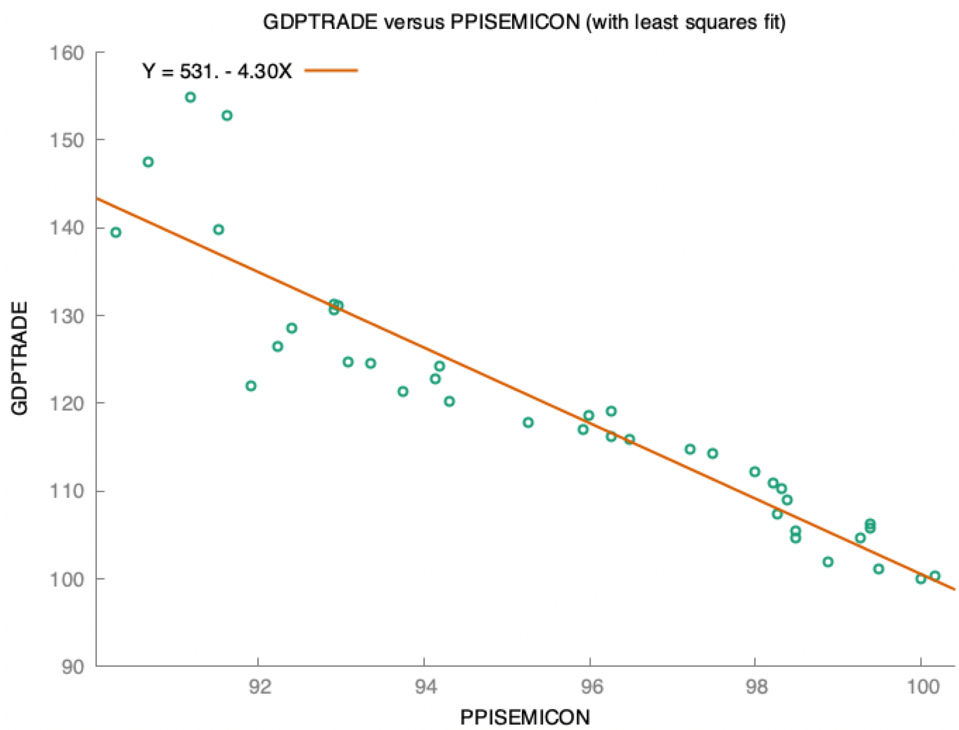


Figure 5.5: GDPTRADE vs. PPISEMICON x-y Scatter Plot

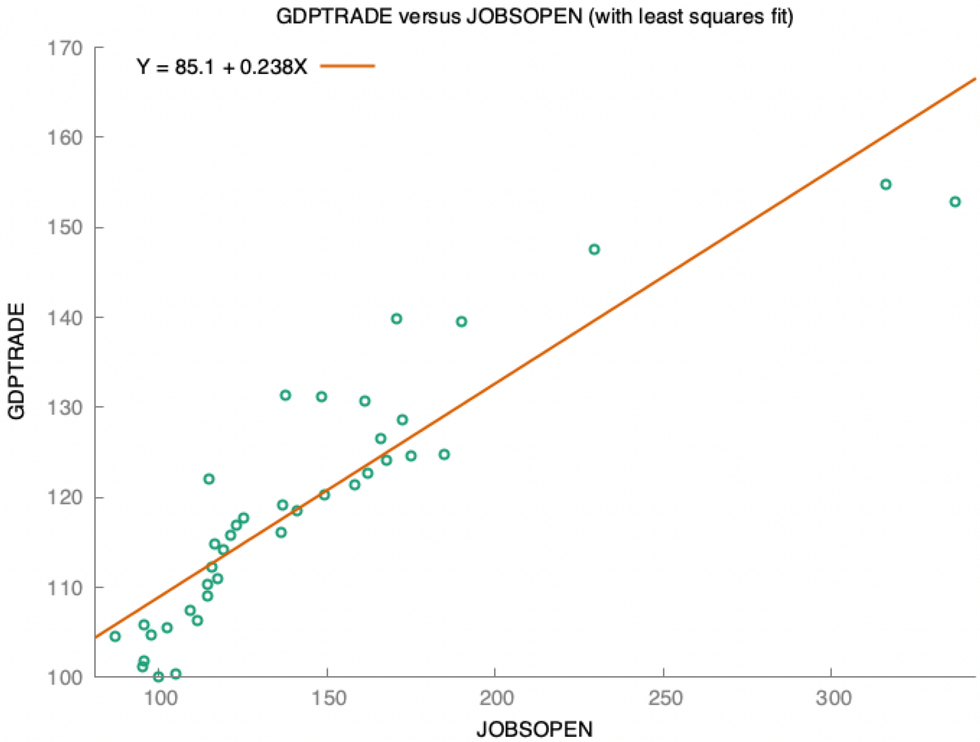


Figure 5.6: GDPTRADE vs. JOBSOPEN x-y Scatter Plot

As shown in *Figure 5.5*, there is a strong negative linear correlation between PPISEMICON and GDPTRADE. The data points exhibit a tight linear grouping around the least squares fit trend line, indicating that linear regression analysis is appropriate for modeling the relationship between PPISEMICON and GDPTRADE. *Figure 5.6* shows that there is a strong positive linear correlation between JOBSOPEN and GDPTRADE, indicating that linear regression analysis is appropriate for modeling the relationship between JOBSOPEN and GDPTRADE. Analysis of both the residuals and the linear fits of the variables from Model 4 indicates that Equation 5.1 is a valid model of the value of all U.S. manufactured trade goods from 2012-2021. Table 5.2, is a 95% confidence interval for the coefficients in Model 4. Neither interval contains zero, which indicates that the standard error of the coefficients is not high enough to eliminate their predicative power. *Figure 5.7* is graph of GDPTRADE and $\widehat{GDPTRADE}$, the model of GDPTRADE predicted by Equation 1, from 2012-2021.

Table 5.2: 95% Confidence Interval of Model 4 Coefficients

VARIABLE	COEFFICIENT	95% CONFIDENCE INTERVAL
const	322.417	(250.718, 394.116)
PPISEMICON	-2.33024	(-3.04454, -1.61595)
JOBSOPEN	0.136127	(0.101909, 0.170345)

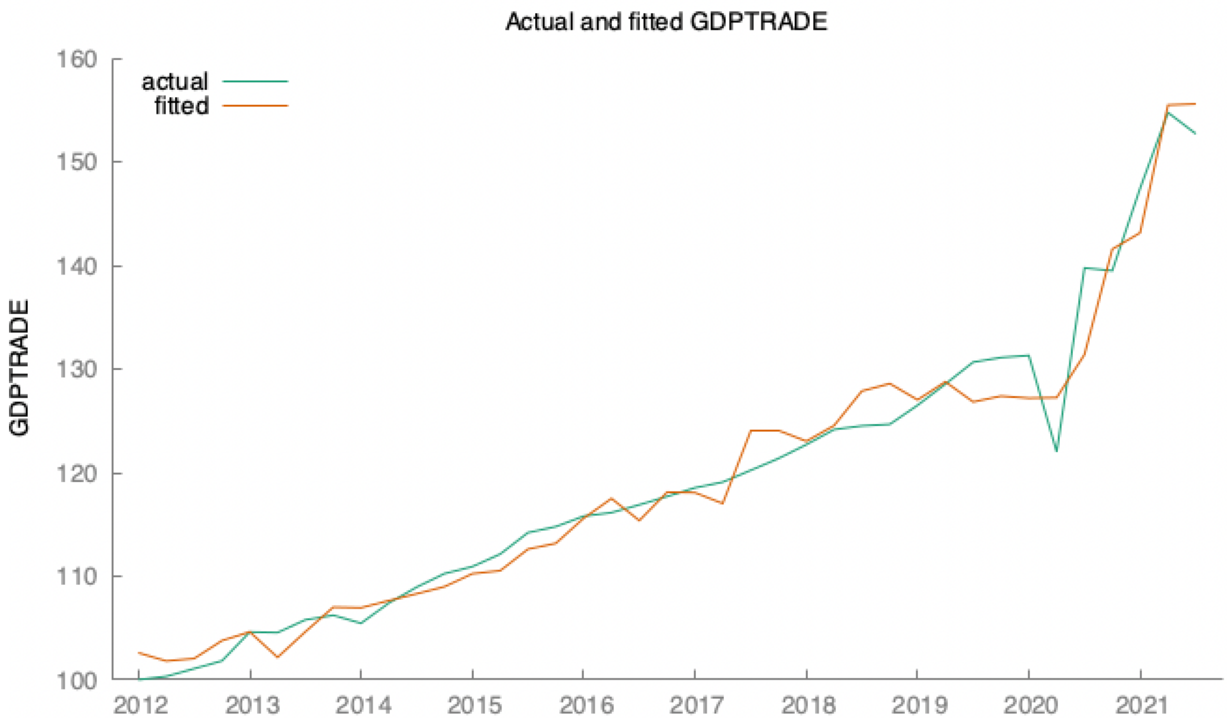


Figure 5.7: $\widehat{GDPTRADE}$ and GDPTRADE

Figure 5.7 shows that the model of GDPTRADE in Equation 5.1 accurately and precisely explains the variation in GDPTRADE from 2012-2021. As expected, the model is less accurate when the variation in actual GDPTRADE was the highest, from 2019-2021. However, *Figure 5.7* clearly shows that Equation 1 explains the variation in GDPTRADE from 2012-2021.

Results

Based upon this analysis, I conclude that Equation 5.1 is a valid model of the value of the production of the U.S. manufacturing sector from quarter 1 of 2012 to quarter 2 of 2021. There is however, no evidence to indicate that the model is valid outside of this time period nor that it will have any predictive power in the future. Equation 5.1 does reveal important information about the status of the U.S. manufacturing sector during the supply chain crisis. Based upon the extremely low p-values of the regressors ($p<.01$) and the high adjusted R-squared value (R-squared = 0.96) of Model 4, I conclude that Model 4 is a valid model of the variation in GDPTRADE form 2012-2021. I was unable to find any statistically significant correlations between manufacturing employment and other indicator variables in the manufacturing sector. This is likely because most of the change in manufacturing employment from 2012-2021 occurred during the pandemic-related closures in Spring of 2020, and is possibly an indication that advances in automation technology are reducing the role and importance of labor in American manufacturing.

Chapter 6: A Tale of Two Economies

Semiconductor Shortages and Job Openings

In Chapter 5, Equation 5.1 used the Producer Price Index for the Semiconductor and Other Electronic Component Manufacturing Industry and an index of the number of job openings in the manufacturing sector to model Gross Domestic Product Retail Trade in the United States. The price of computer chips and the number of job openings in the manufacturing sector appear to have a strong linear relationship with the value of all U.S. retail trade goods. This is because these two variables account for the two most significant effects of the exogenous supply chain shocks and the supply chain crisis they caused. The U.S. manufacturing sector from 2020-2021, was a tale of two economies. On the one hand, the U.S. manufacturing sector was wracked by supply chain problems, increases in the prices of vital source components, and rapid changes in consumer preferences, which constrained GDP growth. On the other hand, the U.S. economy was running hot due to a series of strong stimulus packages, and the manufacturing industry was desperately seeking new employees to meet skyrocketing consumer demand.

The Case of Semiconductors

One of the most significant effects of the supply chain crisis was the worldwide shortage of semiconductors it caused. Semiconductors, also called computer chips, are a vital source component in advanced electronic manufacturing. Modern cars, appliances, and electronic devices all contain computer chips, sometimes hundreds of them (Waylen, 2021). In March of 2021, just as the supply chain crisis was becoming serious, Renesas Electronics, a major

Japanese semiconductor manufacturer, announced that its highly advanced computer chip manufacturing plant in Naka, Japan was on fire. The plant was ultimately destroyed by the blaze (Keilon, 2021). Between the supply chain crisis increasing the costs and wait times for shipping, pandemic-related closures of Chinese and Taiwanese semiconductor factories, and a major loss in manufacturing capacity, the global supply of semiconductors was drastically reduced (Wu et al., 2021).

The effects of the semiconductor shortage were felt most acutely in the automobile manufacturing sector (Wu et al., 2021). Modern cars require dozens or hundreds of computer chips, and American car manufacturers struggled to source those chips. The inability of automotive makers to source computer chips ultimately resulted in shortages of new cars and in price increases, as shown in *Figure 6.1*.

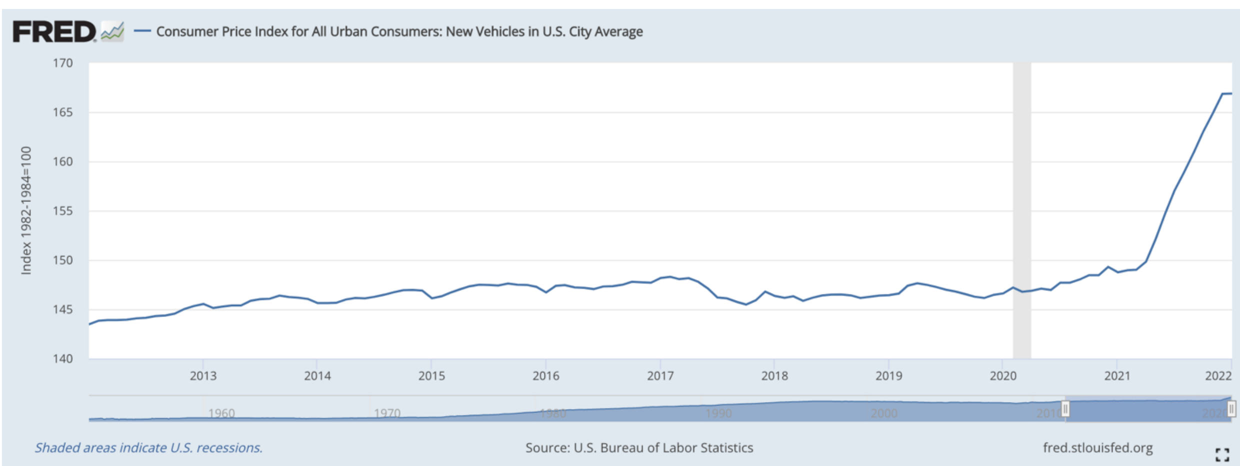


Figure 6.1: Price of New Cars Increases in 2021

(U.S. Bureau of Labor Statistics, 2021) from St. Louis Federal Reserve Economic Database

Computer chip shortages, which were one of the most acute supply chain problems, limited the growth of the U.S. manufacturing sector in 2021. As such, the Producer Price Index for the Semiconductor and Other Electronic Component Manufacturing Industry, accurately models the constraining forces in the post-pandemic economy. The computer chip shortage effectively acted as a brake on the growth of the U.S. manufacturing sector.

The Case of Job Openings in the Manufacturing Sector

If the price index for semiconductors modeled the brakes in the U.S. manufacturing sector, then the index for job openings in the manufacturing sector modeled the gas. As shown in *Figure 6.2,* the U.S. emerged from the Covid-19 pandemic-related recession with a roaring economy. The U.S. had strong GDP growth and hiring in 2021 (U.S. Bureau of Economic Analysis, 2021). The manufacturing sector rode upward on the rising tide of the nation's macroeconomy. The index for the number of job openings in the manufacturing sector is effectively a leading-indicator for hiring, which has been incredibly strong in the U.S. in 2021. The large number of job openings in the manufacturing sector is a sign that U.S. manufacturers are attempting to increase their manufacturing capacity, possibly in response to an increasingly unstable global supply chain, but also in response to higher demand for manufactured goods. By including the index for job openings, Equation 5.1 is able to track the explosive growth that occurred in the U.S. in 2021.

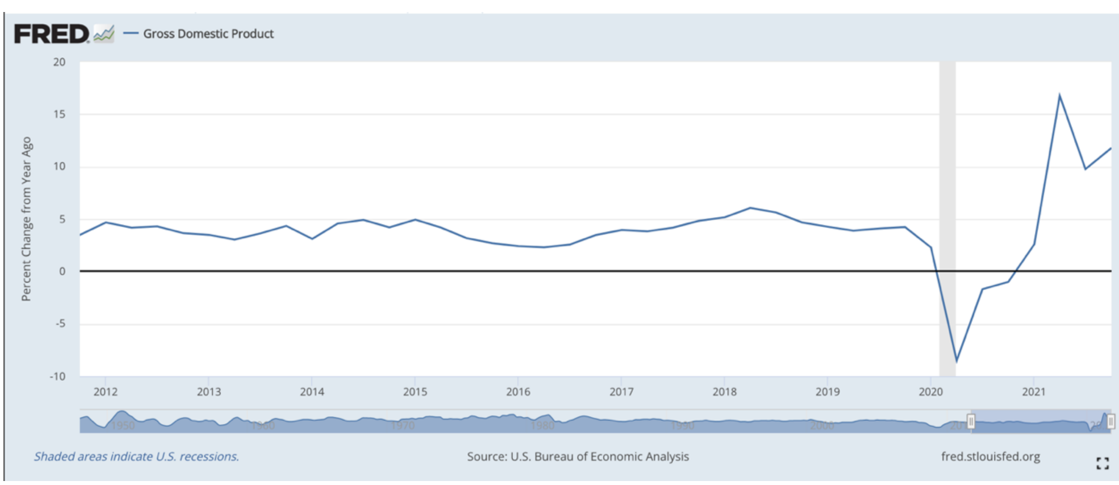


Figure 6.2: U.S. GDP Percent Change From One Year Ago

(U.S. Bureau of Economic Analysis, 2021) from St. Louis Federal Reserve Economic Database

Conclusion

The disruption wrought by the combined forces of President Trump's trade policy and the Covid-19 Pandemic, has reshaped the U.S.-China bilateral relationship and the future of American manufacturing. As a result of the pandemic, technological advancement, and U.S. policy decisions, the future of American manufacturing looks strong. However, the prospects for the return of American manufacturing jobs, the stated goal of the Trump administration's trade policies, are dim. Due to automation, a resurgence of American manufacturing will not produce strong job growth, or the kind of high wage middle-class jobs that the industry has been historically associated with. Labor intensive manufacturing will continue to be outsourced to China, while a growing share will be sourced from other low labor cost countries, such as Vietnam, Brazil, and India. However, this mixed policy victory has been achieved at the cost of tremendous economic losses, the sacrifice of human welfare, and the deterioration of the U.S.-China bilateral relationship. Furthermore, the Chinese Communist Party's adept policy response to the trade war, has left China well positioned to compete for global market share in the advanced manufacturing sector. The Trump Trade War was a clear policy failure, but it has provided America with an opportunity to greatly expand its advanced manufacturing capacity and to reimagine the U.S.-China bilateral relationship.

The supply chain crisis, which caused cargo delays and increased shipping and commodity prices, has increased the relative competitiveness of the U.S. manufacturing sector. The adoption of new technologies and the streamlining of operations that occurred during the Covid-19 shutdowns, have also made U.S. manufacturers more efficient. The increasing productivity of American manufacturers, coupled with the cost increases imposed on imports by the supply chain crisis and tariffs, is causing onshoring.

Consider the semiconductor industry, which, as described in Chapter 5 and Chapter 6, has acutely experienced the effects of the supply chain crisis. The high cost and limited availability of computer chips has stalled assembly lines and fueled inflation, but also incentivized microchip manufacturers to increase supply. Intel, the largest American semiconductor manufacturer, seized the opportunity, by investing $20 billion in constructing two new microchip factories in Arizona, with additional facilities planned in Ohio and in Germany (Clark, 2022). The Arizona factories are not projected to be operational until 2025, so they will not alleviate the immediate shortage of computer chips, however they represent a trend of firms investing in American advanced manufacturing. Although computer chips are a vital source component in American manufacturing, the U.S. produces only 12% of the world's supply, this investment by Intel could increase the U.S.'s global market share and reduce reliance on imported computer chips.

As shown in Chapter 2 and Chapter 5, the number of manufacturing jobs in the U.S. decreased during President Trump's term in office, while demand, manufacturing productivity, and output increased (U.S. Bureau of Labor Statistics, 2021). The return of manufacturing from overseas countries has not brought about the promised return of manufacturing jobs. While the onshoring of production, such as the creation of the new Intel factories in Arizona, will create some new jobs, these factories are highly automated and support only a small number of jobs, many in engineering and IT, as opposed to traditional blue-collar manufacturing jobs.

The U.S. has pursued a policy of antagonizing China and reopening the U.S. economy in the face of a supply chain crisis and a global pandemic. The Chinese Communist Party, by contrast, has responded to the Covid-19 pandemic with a zero-Covid policy, which has prioritized fighting the virus over keeping ports and factories open. This has resulted in vast differences in the effects of the crisis on both nations' economies and populations. The U.S. has reported more than 980,000 deaths from Covid-19, while China, which has a population four times the size of the U.S., has reported fewer than 5,000 deaths (New York Times, 2022). Conversely, the U.S. has quickly recovered from the pandemic induced recession, while China is still struggling with relatively low GDP growth. However, as argued in Chapter 3, the Chinese Communist Party is providing massive investment for technological innovation and advanced manufacturing, through President Xi's Made in China 2025 plan.

Policy Recommendations

The U.S. and China are positioned to compete for advanced manufacturing market share in the coming years. The U.S. has several advantages is this competition: a resurgent manufacturing sector, new technologies that enable the substitution of capital for labor, the world's largest domestic retail market and high global shipping costs to protect access that market, and a population that is either immune to, or largely content to ignore, Covid-19. However, a thorough understanding of the U.S.'s policy opportunities requires reckoning with America's disadvantages: high labor costs, relatively high rates of Covid-19 infections and deaths, barriers to trade created by tariffs, and a bureaucracy that impedes new construction. The U.S. could capitalize upon its position by enacting several policy changes.

Firstly, the U.S. must invest in manufacturing, infrastructure, and technological development, not only to counter Chinese spending, but also to grow the U.S. macroeconomy. In the previous century, U.S. government spending on technology lead to incredible innovations, producing everything from the internet and super computers, to ballpoint pens. Government infrastructure spending also produced the Interstate Highway System and the modern port of Los

Angeles. The government must ensure that much of the innovation of the coming decades occurs in the U.S., and the only way to do so, is to pay for it.

Secondly, in order to increase the efficiency of spending on infrastructure and manufacturing capacity, the U.S. must streamline the permitting and construction process. Over decades, the U.S.'s federalist system has produced a tangled mess of federal, state, and local regulation that stymies construction. This patchwork of environmental protection, historical preservation, and nimbyist laws (any of which, on their own, might be a reasonable policy) has inflicted a thousand tiny cuts on the nation's physical infrastructure. The U.S. Federal Government must step in and clarify and consolidate regulation governing the expansion of critical infrastructure and manufacturing capacity. This would increase the efficiency and decrease the cost of both public and private construction.

Thirdly, the U.S. must deescalate tensions with China and begin a bilateral process to lift the sanctions imposed during the U.S.-China Trade War. As argued in Chapter 1 and Chapter 2, the U.S.-China Trade War created barriers to trade, causing deadweight loss for both nations. The protectionist policies of the trade war are a lodestone on the neck of the American manufacturing industry, increasing the costs of vital source components and limiting access to the world's second largest market. These policies are also detrimental to the U.S.-China bilateral great power relationship. In order to improve relations and decrease the potential for future conflicts, the U.S. must attempt to reintegrate the U.S. and Chinese economies. However, the U.S. cannot repeat the policy mistakes of the past. American policy makers must be aware that increased economic interaction with China will not bring about its liberalization, but rather serve as a bulwark against future aggression.

Lastly, the U.S. should impose a windfall profits tax on firms that price gouged during the supply chain crisis, and direct the proceeds towards infrastructure spending and technological development. As argued in Chapter 4, logistics companies capitalized on the supply chain crisis by raising prices well in excess of marginal costs, creating massive profits. Because the U.S. government has access to years of cost and price data, it can easily determine if shipping companies earned windfall profits. The inelastic nature of the supply of shipping services makes it impossible for these firms to spend their windfall on increasing supply, so the excess profits serves no valuable economic functions and were paid by the U.S. public. As such, the government should recoup the public's money through a tax and spend it on a public good.

The realignment of the U.S.-China bilateral trade relationship provides U.S. policymakers with an opportunity to rethink the U.S.-China great power relationship. In the past, the U.S. has defined its relationship with China as one of ideological struggle, pitting capitalism and democracy against communism and dictatorship. This view can lead only to conflict. Instead, the U.S. must adopt a realist perspective, with the understanding that it cannot contain the rise of China nor prompt regime change in Beijing, the U.S. can instead focus on growing its own economy and navigating a world with an increasingly powerful China. The U.S. cannot close itself off from Chinese competition by imposing tariffs, nor can it meaningfully change Chinese policy through antagonization. Instead, the U.S. must engage in strategic competition with China, narrowly tailoring its policy goals to increase its own competitiveness, and more carefully considering the costs of aggressive policies, both to the U.S.-China relationship and to the U.S.'s global ambitions.

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