

Kyle Maloney

Professor Xu

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### **China, International Trade, and the WTO**

Today, China is widely regarded as an emerging global superpower. However, just 50 years ago China's GDP per capita was lower than that of countries like Afghanistan, Bangladesh, Chad, Sierra Leone, Togo, and Uganda (World Bank). Likewise, exports made up less than 5% of China's economy (OECD). After a series of reforms known as 'Reform and Opening-up' in the late 1970s and early 80s, China's economy began to grow, as did their trade volume. Growth was slow but constant for the first couple decades, but then after China established permanent normal trade relations with the United States in 2000, followed by China's entry into the World Trade Organization (WTO) in 2001, China's economy and trade volume began to grow rapidly. After two decades, China is a global manufacturing superpower and the world's second largest economy in nominal terms, and largest by purchasing power parity (PPP). In this paper I will be examining how during the time period of 2000-2010 China's normalization of trade relations with its largest trading partner, the US, and China's entry into the WTO has bolstered the economy of China we know today, as well as offering a comparative perspective on Sino-US trade.

First, it is important to establish a context of the political, economic, and trade relationships between China and the US before delving into the specific time frame of 2000-2010 and why it was an important decade for China economically. In 1949, the People's Republic of China was established under Mao Zedong, where a series of policies such as land reform, farm

quotas, and industrialization produced little in terms of international trade and GDP per capita growth (Figure 1). Policies under the Great Leap Forward and the Cultural Revolution led to multiple recessions, represented in years where there were decreases in GDP per capita (Figure 1). While these policies lasted from the 1950s into the 1970s, concurrently, diplomatic relations between the United States and the People's Republic of China did develop over the course of the 1970s, when US President Richard Nixon visited China, and US President Jimmy Carter normalized relations with China fully. After Mao's death and Deng Xiaoping's economic reforms in the early 1980s, China's economy began to grow more steadily in per capita terms (Figure 2). Where we see GDP per capita grew from 194.8 in 1980 to 873.3 in 1999 (348% increase) versus from 89.5 in 1960 to 184.0 in 1979 (117% increase) in the two decades prior. However, while growth was large throughout the 1980s, it was also often volatile. Going into the 1990s, for eight consecutive years after 1992, China's economy stabilized and slowed in growth; by the end of the 1990s, China's economy was growing at a decreasing growth rate. However, if we look at the GDP per capita growth rate in the following 2000s in comparison to the 1990s, we see a reversal of this trend for eight years, until the 2008 global financial crisis (Figure 3). In fact, the 2000s were the longest period of sustained increases in China's GDP growth rate in recorded history. As for what could have potentially caused this resurgence in China's GDP growth rate, the normalization of trade relations between the US and China and China's joining of the WTO in 2001 appears to correlate strongly with China's resurgence in its GDP growth rate. I will be examining how China's normalization of trade relations with the US and joining of the WTO affected both China's overall economic growth as well as the Sino-US trade relationship between 2000-2010.

While the 1980s and 90s were good decades for sustained economic growth in China, we can see from China's overall annual GDP that the major economy that China is today really grew the most in the 2000s (Figure 4). This correlates directly in the explosion of Chinese trade as a percentage of the economy since the 2000s. Looking at China's trade throughout the decades, we see that for several decades, China's trade as a percentage of GDP remained below 10% of the economy. Trade accounted for 3.73% of the Chinese economy in 1977 and 10 years later in 1987 was at 10.4% of GDP. In 1997 trade accounted for 19.5% of China's economy. By 2007, it had ballooned to 35.4% of the economy (Figure 5). What is important to note here is that the majority of the trade growth occurred in the 2000s, correlating to China's exponential growth in GDP during that time. Furthermore, as we measure trade as a percentage of GDP, as trade grew more rapidly after 2001 until the 2008 financial crisis, we can say that trade outpaced an already exponential GDP growth (Figure 5). This indicates that there is a strong correlation between the political and economic reforms of entering the WTO and normalizing trade relations with the US in the beginning of the 2000s and China's transformative rapid economic growth.

China's trade relationship with the US is vital to understanding the economic growth of the 2000s. By the turn of the century, China and the US had reached a trade volume of 100 billion in US imports from China, and 16 billion in US exports to China. Just 10 years later, in 2010, US imports from China increased to 364 billion and 91 billion in US exports to China (Figure 6). We can see a direct rapid increase starting in the year 2001 which also coincides with China's increased GDP growth and the increase in exports as a percentage of China's economy in Figures 4 & 5 respectively. This appears to suggest that the US is responsible for bolstering and capturing China's trade growth. However, if we take the data on China's GDP and compare it to its volume of exports to the US we find an interesting result of the US only ever receiving

less than 15% of China's GDP in exports over the last few decades. In fact, in our time frame of 2000-2010, we can see that for the first half of the decade, the US increased their share of exports in China's GDP but this is marked by decline in the latter half of the decade and beyond (Figure 7). This suggests that there is no correlation between China's ability to trade and engagement with the US, despite rapid growth after joining the WTO and normalizing trade relations with the US. Moreover, it suggests that by joining the WTO China also grew rapidly due to other large trading partners as well.

Looking at the China's largest trading partners in our main time frame of from 2000 to 2010, we see that at the beginning of the decade the US accounted for 24.7% of China's exports value, followed by Hong Kong at 20.3%, Japan at 13.9%, Germany at 4.9% and South Korea at 3.4%. By 2010, this had shifted to the US at 19.4%, Hong Kong at 11%, Japan at 8.0%, Germany at 5.4% and South Korea at 3.8%. Graphing this decade, we see that China's entry into the WTO has no discernible effect on a perceived increasing role of the US on China's exports. Therefore, while it is true that China's trade volume increased rapidly during this decade, the relationship between China and its five largest trading partners has appeared to not have increased and perhaps weakened upon its entry to the WTO, as China's exports to its major trading partners remained either constant or decreased as a percentage of total exports throughout this time (Figure 8). This indicates that China's entry into the WTO perhaps correlates better with growing trade between other emerging market economies, as it could be useful to measure China's growth in trade with these countries over the course of the decade. Nevertheless, for the scope of this paper, we can determine that while in absolute terms China's rapid growth in the 2000s both in raw GDP and per capita terms, as well as a surge in exports as a percentage of the economy itself, undoubtedly increased the volume of trade between the US and China's other major trade

partners. However, in terms of increasing the overall role of these partners on China's exports, there appears to be no correlation and therefore no causation between China and normalization of US trade relations and entry into the WTO as a form of larger economic entanglement between China and the US. However, as I will explain next, there are specific areas of trade and trade policies that have shifted the type of exports China has been engaging in with the US and other major trading partner countries.

When we look at what a country produces, usually (save for subsidies and quotas) the largest export area in a country intuitively appears to have a comparative advantage. However, because of the volume of exports, what also matters is the ratio of imports to exports to gauge the comparative advantage. Looking at China over the course of 2000-2010, we see that China appears to have a pretty strong comparative advantage in machines over other industries such as vegetable products or precious metals etc. In fact, China's machine exports started to outgrow its other sectors steadily throughout the 10 year period and continues to do so to this day (Figure 9). We can see that in the last few years, machines made up over a trillion dollars in export value. Furthermore, sectors like textiles and metals also made modest gains in sector growth. This suggests that while these sectors may not be as large as machines due to consumption habits, there can still be a comparative advantage if their own ratio to imports in their sectors is large. This is what we can expect intuitively from a sector like textiles, where it is known that China has a large textile industry and therefore most likely has a comparative advantage in textiles, explaining why textiles may be China's second largest export market after machines. Next, I will delve into how these comparative advantages play out in terms of China's policies and trade relationships with its largest trade partners.

Looking at the data on China and the US trade patterns from 2000-2010, we see that in 2000 the US appeared to have a mild comparative advantage in machine manufacturing and specifically in the main sub-areas mechanical appliances (partial indicator) over electrical machinery (partial indicator). The US exports to China were 19% electrical machinery and 21.1% mechanical appliances for a total of 40.1% of US exports to China being in the sector of machines. Meanwhile, China's exports were 20.3% electrical machinery and 14.8% mechanical appliances for a total value of exports being 35.1% machines (OEC). After 10 years, the US comparative advantage in machine manufacturing appears to have decreased while China developed this comparative advantage. By 2010, mechanical appliances made up 24.8% of Chinese exports to the US, while electrical machinery made up 24.3% of exports. Combined, these two sub-areas accounted for 49.1%, or nearly half of, Chinese exports to the US being in the sector of machinery. On the US side, exports to China in mechanical appliances shrunk to 13.7% while electrical machinery shrunk to 13.5% for a total of machinery being 27.2% of US exports to China. It is clear from the 13% relative reduction in machinery exports from the US to China, and the 14% relative increase machinery exports from China to the US, that China developed a comparative advantage in machinery during this 10 year period, even as volume for machinery exports increased in both countries due to a large increase in trade over this 10 year period (OEC). Interestingly, while the United States' slim advantage in machinery exports appeared to disappear over this 10 year period, the US did appear to develop a comparative advantage elsewhere.

Looking at US exports to China in 2000 versus 2010, we can see that there appears to be a large percentage increase in US exports in the sector of vegetable products. Specifically, the sub-area oil seeds (partial indicator) grew from 5.7% of US exports to China in 2000 to 12.1% of

exports in 2010. By 2010, oil seeds accounted for the 3rd largest sub area of US exports to China. This suggests that while the US may have lost its slim advantage in machinery exports from 2000, the US developed a vegetable product exports comparative advantage over China, especially since vegetable products remained around 1% of Chinese exports to the US over the 10 year time frame. It is also important to note that over this period the United States' trade deficit in China grew from 72.4 billion US\$ in 2000 to 256.1 billion US\$ by 2010. Therefore, it is important to be comparing percentages over raw value as China outpaces machinery manufacturing in 2000 despite the US having a larger share of exports being in machinery (OEC). From this caveat, we can use economic trade models to understand this relationship further.

It is unlikely that in the above mentioned scenario that the US and China would be engaging in a Ricardian-like model. This is because the Ricardian model assumes that labor is the only factor of production and labor can move across sectors easily. Likewise, because the US and China both produced machinery and the US developed a comparative advantage in oil seeds (likely unskilled labor), it is unlikely that a model can be broken down into a model of unskilled versus skilled labor when comparing the US and China. Furthermore, it is likely given that the US and China are not operating under a Ricardian model, we could view this trade relationship in a Heckscher–Ohlin model. To start, the initial conditions of the model require us to identify which country possesses which factor intensity. It is likely from the relationship above that machines are the relatively labor intensive good and vegetable products are the relatively capital intensive good. This may seem counterintuitive, but when we take into account that very few people in the US work in the agricultural industry compared to China, and the overall population per land (capital) is dramatically lower. Hereafter, as it may be more common to use farm

machinery in the US than in China, we begin to see why vegetable products are probably not a relatively capital intensive good. Likewise, while undoubtedly there is most likely some portion of capital intensity and skilled labor involved in machine production, the 10% over all shift towards machine production in China most likely indicates that at least some portion of machines requires labor intensive jobs given China's lower educational level and larger labor force. This is also highlighted by the fact that Foreign Direct Investment (FDI) into China ballooned from 42 billion in 2000 to 243 billion in 2010 (World Bank). Intuitively, we know that the US is a capital abundant country, while China is a more labor abundant country, it therefore suggests that the rapid growth of FDI into China would be towards labor intensive sectors as the hurdle to have a comparative advantage in capital would be hard to overcome, giving more insight into the unlikelihood of being in a Ricardian model.

Furthermore, it is important to remember that this time frame of 2000-2010 is before more complex products like smartphones began to be circulated globally, and also the US still exports a significant (albeit lower) amount of machines to China, perhaps indicating that capital intensive machines like cars and airplanes (10% of US exports to China in 2010) have not shifted to China, while labor intensive machines have. Moreover, at this time many of China's machine manufacturing most likely involved repetitive assembly tasks, and while undoubtedly this required more capital than sectors like textiles. Ultimately, it appears that given the large inverse relationship between machine trade and vegetable trade during this time period, a Heckscher-Ohlin model seems to fit better than a Ricardian type model, even if vegetable products and machine products are both more capital intensive than other sectors like textiles, given that, we can assume for the purposes of this model that vegetables may still be more relatively capital intensive than machines. This actually fits into the Leontief paradox of the



Heckscher-Ohlin model which notes that the US exports labor intensive goods despite being a capital abundant country. This is most likely because agriculture is traditionally seen as a labor intensive good, but given the high productivity of US labor, and mechanized agriculture, it can be perhaps treated as more capital intensive good than in other countries where every agricultural product is picked by hand. Next, I will go into some potential policy reasons as to why this relationship has developed.

One major policy reason as to why China and the US began to specialize in machines and vegetable products in the 2000s respectively is that China's tariff rate dropped dramatically during this period. Looking at the tariff rate on primary goods (non-manufactured) from 1992 to 2018, we can see a shift from more relative autarky to liberalization of free trade. This decrease started in the 1990s from a tariff rate in the 30% range and plateaus to a lower rate of less than 10% by the early 2000s (Figure 10). This is in direct correlation to China's entry to the WTO, as reduction in tariffs are a requirement for most member countries of the WTO. Therefore, China's reduction in primary products may have led directly to the United States' comparative advantage and increase in vegetable products to China as local producers had now more foreign competition in terms of pricing. Likewise, over the same time frame, we can see that tariffs on manufactured goods also decreased dramatically in preparation for joining the WTO, where in 1992 the tariff rate was over 40% and by the mid 2000s it had dropped to less than 10% (Figure 11). This shift from relative autarky in the 1990s to liberalization of free trade by the 2000s helps explain the specialization of trade we see in the above scenario as well as the massive growth in GDP since the 21st century.

In conclusion, we have determined that China's entry into the WTO and normalization of trade relations with the US played a large role in the rapid economic growth of the country

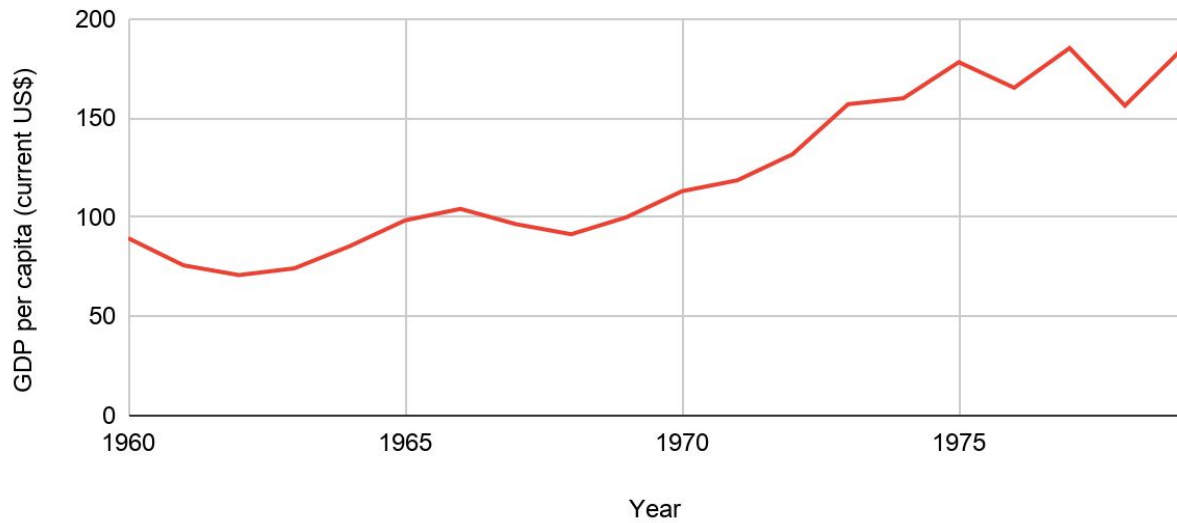
during the time frame of 2000-2010. First we noted that China's GDP per capita remained relatively low in the decades before their entry into the WTO (Figure 1, Figure 2). Likewise, in the years following the entry into the WTO, we saw that the economic growth rate continued to increase every year, in the longest sustained cycle in modern Chinese history, until the 2008 global financial crisis (Figure 3). This coincided with the growth of China from just a 1 trillion dollar economy to a nearly 15 trillion dollar economy two decades later (Figure 4). We can attribute a portion of this growth to liberalization of trade by reductions in tariff rates for both primary (Figure 10) and manufactured (Figure 11) by previously noting the explosive increase in trade as a percentage of China's economy (Figure 5). Meanwhile, we also showed that while China's entry into the WTO greatly increased the volume of trade with both the US (Figure 6) and other major trading partners, it had no discernible effect on increasing the percentage of trade between China and its largest trading partners (Figure 8). Rather surprisingly, China's exports to the US as a percentage of GDP declined after 2005 (Figure 7). However despite the decline not only did trade in absolute terms with the US increase, we can show that specialization of trade occurred when tariff reductions occurred. What had been relatively even exports and imports of machines between the US and China in 2000, had shifted to China exporting significantly more machines to the US, while the US produced more capital intensive goods such as vegetables and transportation. This counterintuitiveness, we postulated, could be explained by not viewing the trade relationship through a Ricardian-like lens as capital undoubtedly played a large role in China's trade relationships. Likewise, the Leontief paradox as China began to produce the submarket labor intensive machines, while US specialization occurred in the submarket of transportation and the sector of agriculture, which in the US (a highly labor productive country) is more capital intensive than agriculture in other lower labor

productive countries like China. All this is to say that it helps explain why perhaps China plays such a large role in the Global Value chain for personal electronics, yet the United States still is a larger car manufacturer and food exporter than China is due to the differences in capital versus labor compared output. Moreover, I think further studies on this matter might be able to look at sector by sector wages to better understand and prescribe more concrete data to the foundations of the Heckscher–Ohlin model we developed and explain why the factors of production are specialized the way they are. However, it is undoubtedly clear that the reduction in tariffs and increases in FDI lead the Chinese economy to grow rapidly in the years following the entry into the WTO, whether there were externalities for workers remains to be seen.

### Figures and Graphs:

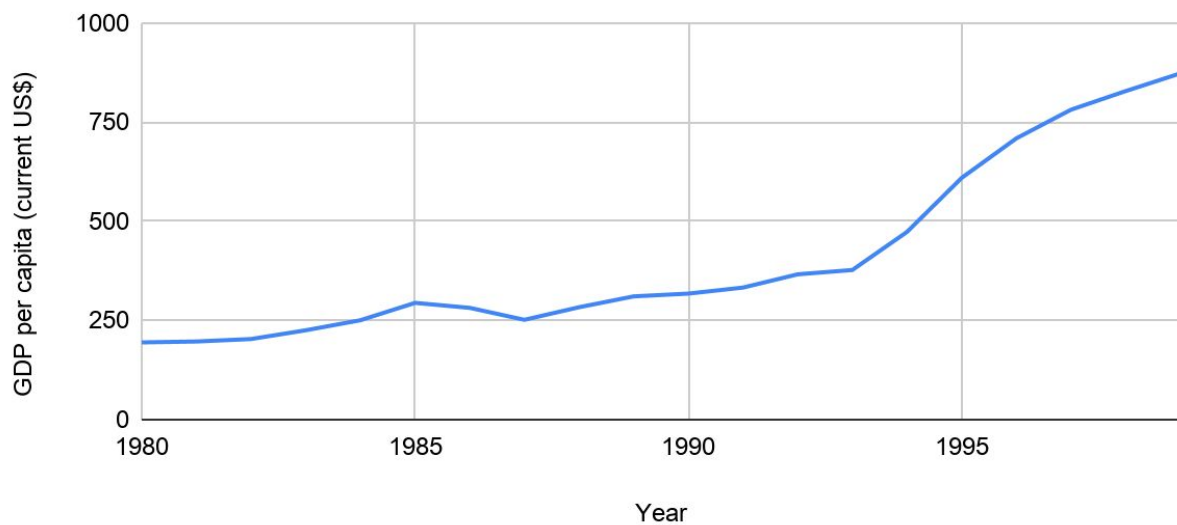
**Figure 1: China's GDP per capita (current US\$) vs. Year (1960-1979)**

Source: World Bank, GDP per capita (current US\$) - China Indicator.



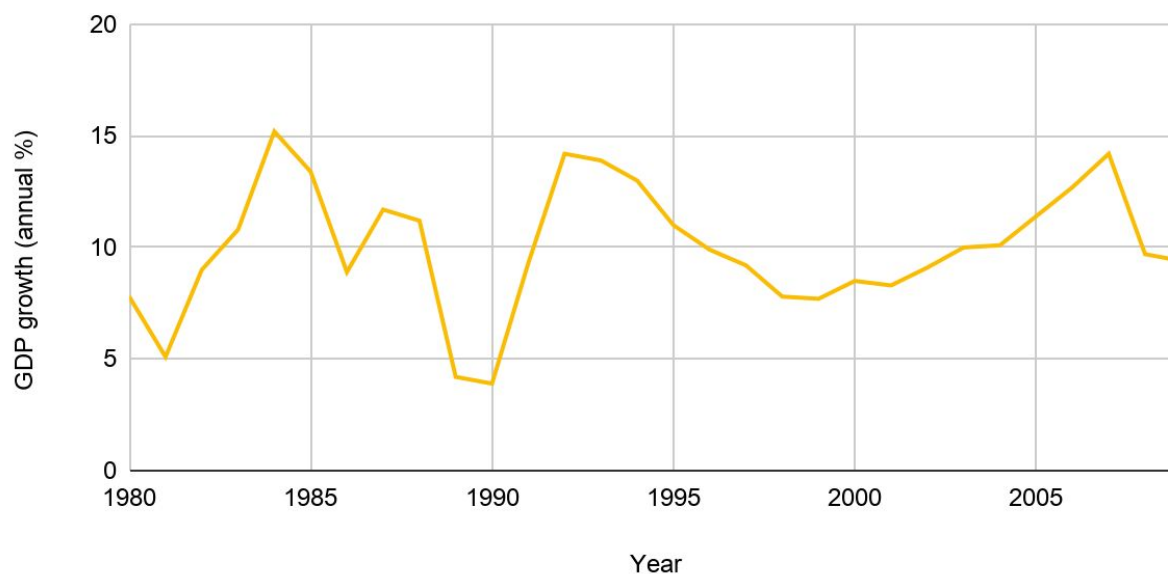
**Figure 2: China's GDP per capita (current US\$) vs. Year (1980-1999)**

Source: World Bank, GDP per capita (current US\$) - China Indicator.

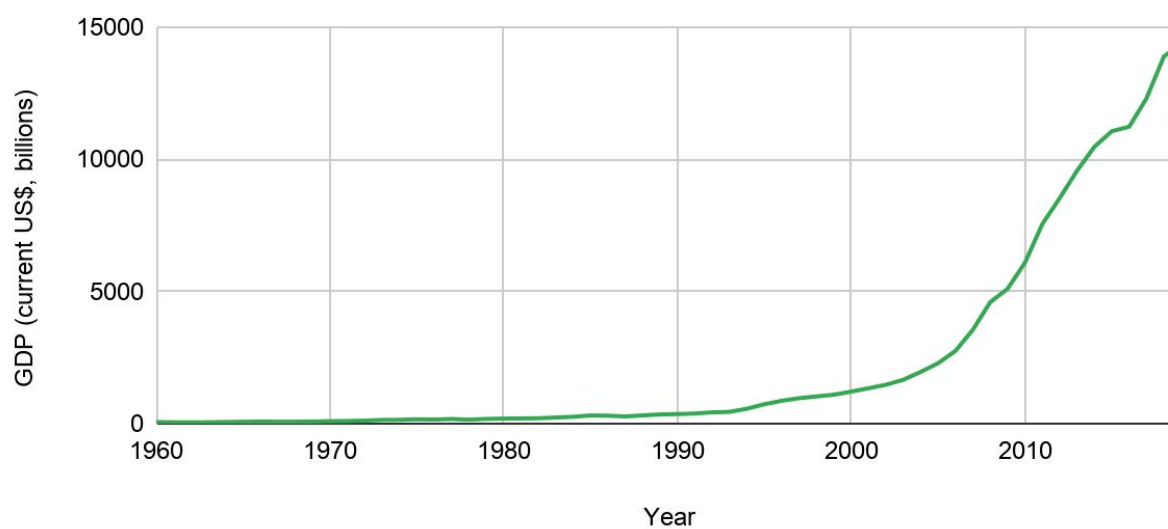


**Figure 3: China's GDP growth (annual %) vs. Year (1980-2009)**

Source: World Bank, GDP growth (annual %) - China Indicator.

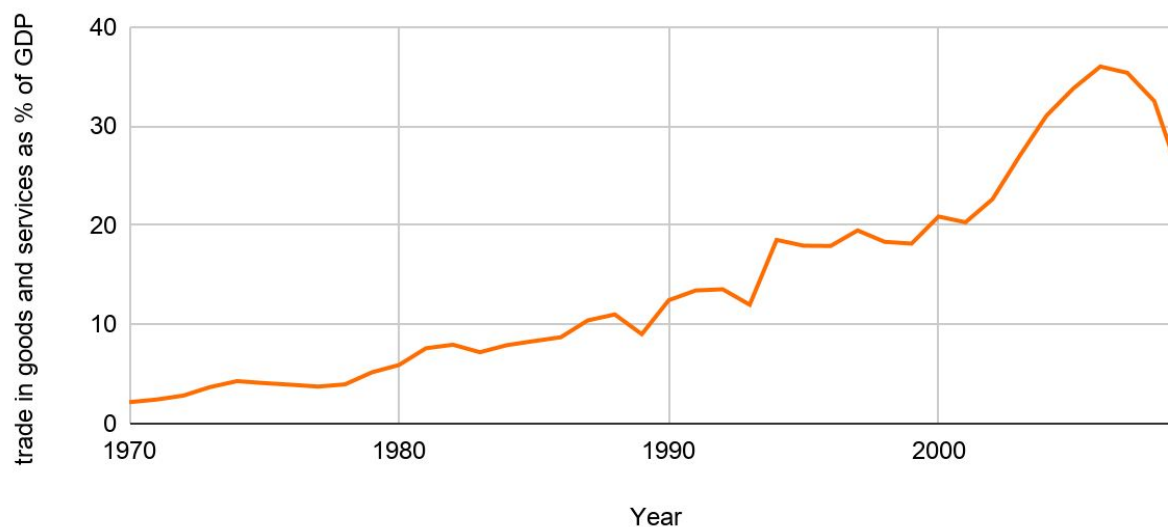
**Figure 4: China's GDP (Current US\$, billions) vs. Year (1960-2019)**

Source: World Bank, GDP (current US\$) - China Indicator.



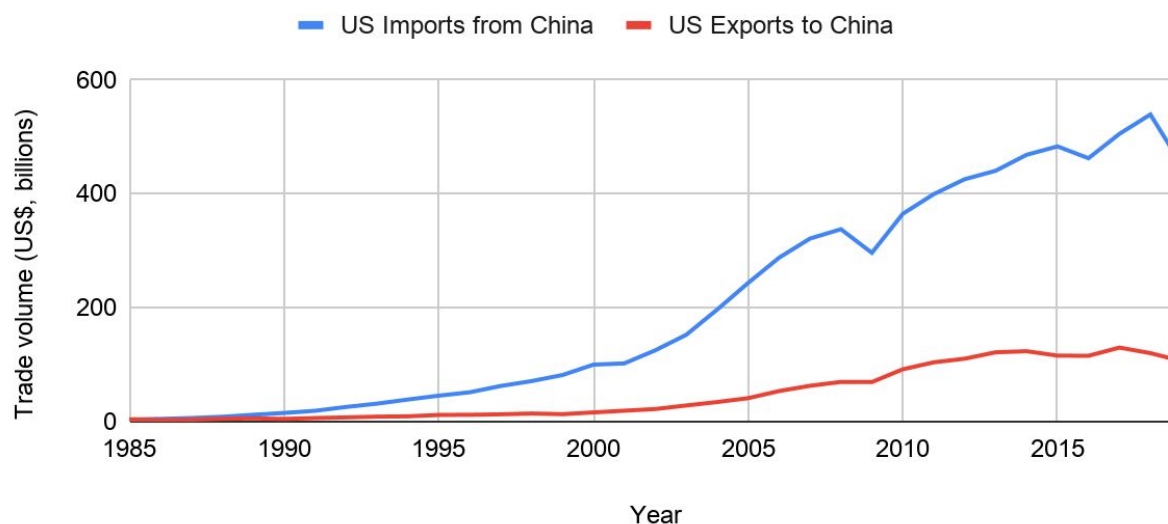
**Figure 5: China's trade in goods and services as % of GDP vs. Year (1970-2009)**

Source: OECD, Trade in goods and services - China Indicator.



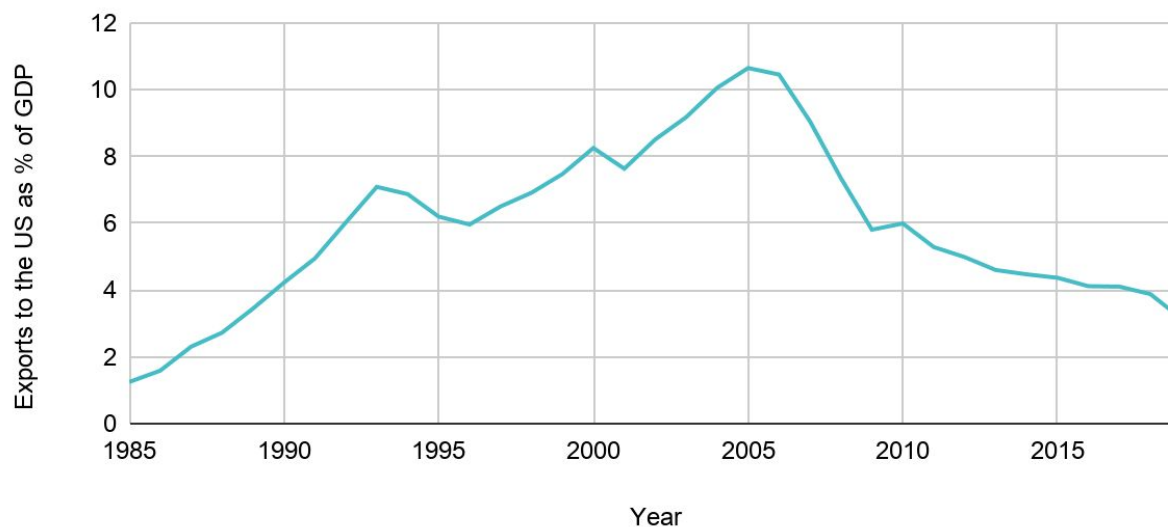
**Figure 6: US imports from China, and US exports to China (US\$, billions) vs Year (1985-2019)**

Source: United States Census Bureau, Trade in Goods with China Indicator.



**Figure 7: China's exports to US as percentage of GDP vs Year (1985-2019)**

Source: USCB, Trade in Goods with China Indicator; WB, GDP (current US\$) - China Indicator.



**Figure 8: Percent of China's Exports (Destinations) vs Year (2000-2010)**

Source: OEC, Yearly Exports - China Indicator.

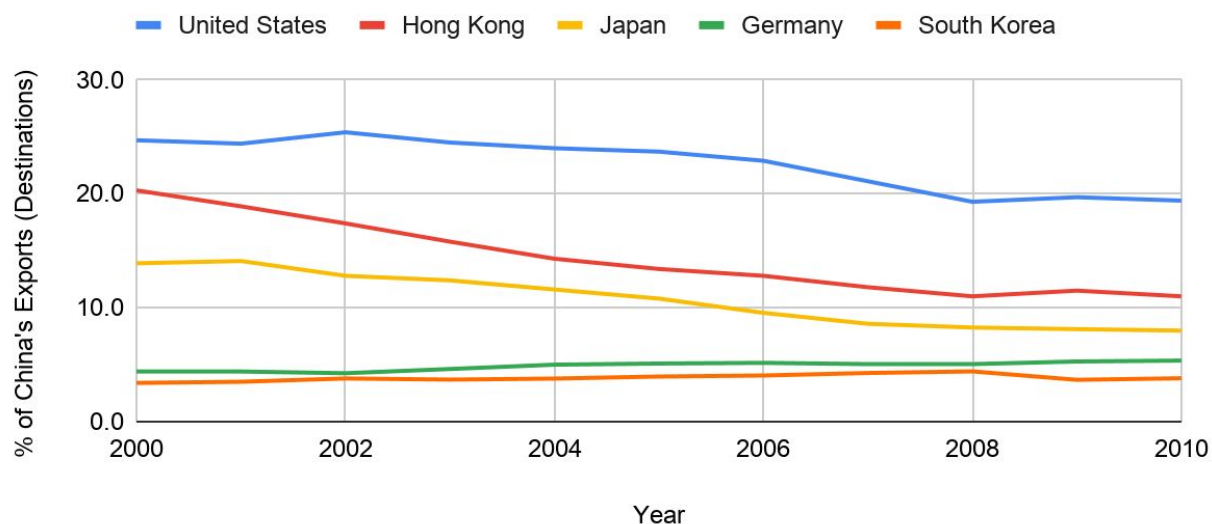
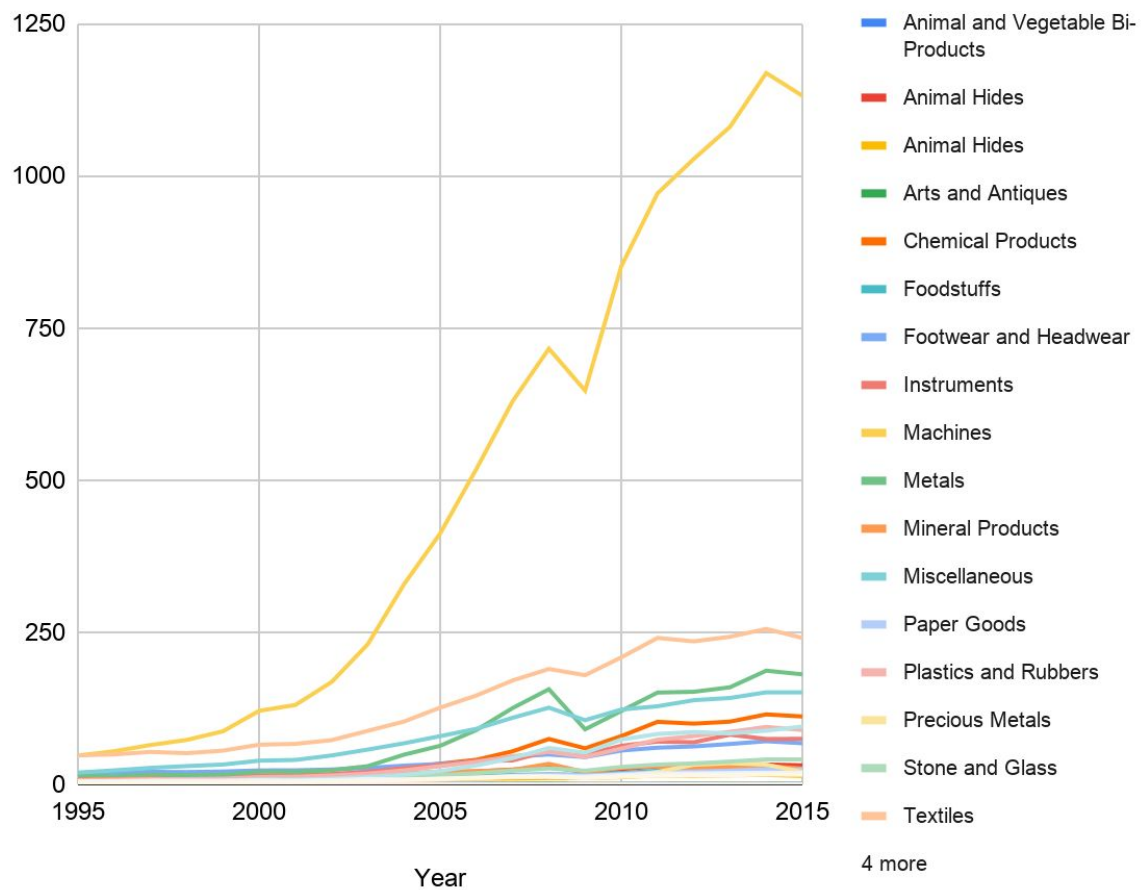


Figure 9: China's Exports' Value by Sector (US\$, billions) vs Year (1995-2015)

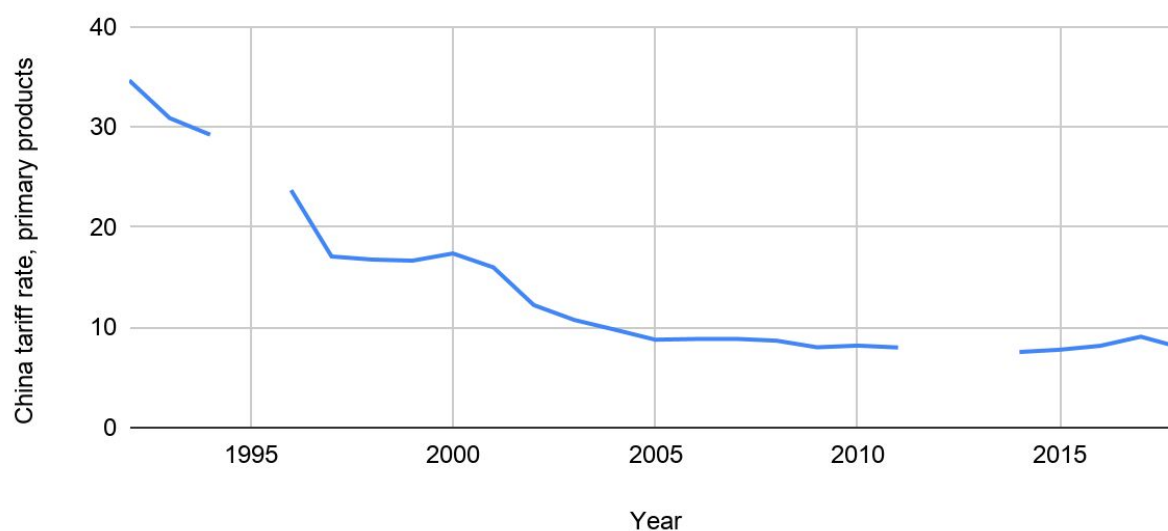
Source: OEC, Bilateral Trade by Products - United States / China Indicator





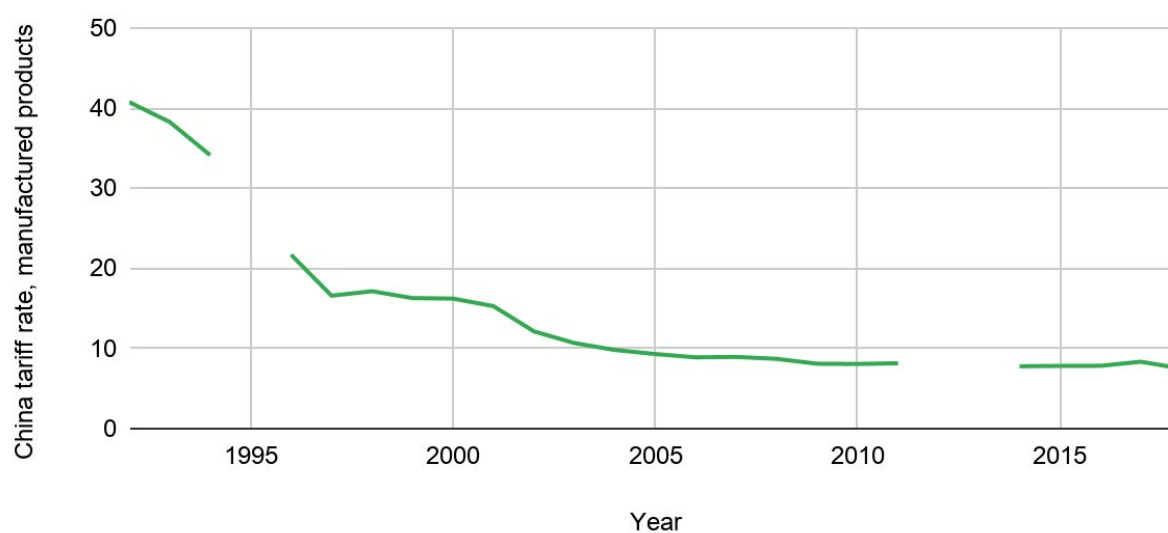
**Figure 10: China's tariff rate, primary products, simple mean vs. Year (1992-2018)**

Source: World Bank, tariff rate, applied, simple mean, primary products (%) - China Indicator.



**Figure 11: China's tariff rate, manufactured products, simple mean vs. Year (1992-2018)**

Source: World Bank, tariff rate, applied, simple mean, manufactured products (%) - China Indicator.



**Non-figure References:**

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