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Volution of Sino–US Bilateral Economic Relations under Trade Frictions

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Abstract

This paper analyzes the evolution of China–US economic relations from complementarity to competition, with a primary focus on the 2017-2023 trade friction period. Methodologically, it combines a targeted literature synthesis with descriptive evidence on the pre-friction trade landscape (2002-2016) and a multi-indicator framework spanning 2007–2023. At the macro level, a four-dimension competitiveness system—GCSI, GCWI, GCOI, and GCTI—captures shifts in strengths, weaknesses, opportunities, and threats. At the industry level, three sectors—high-tech manufacturing (HTM), strategic resource industries (SRI), and modern services (MSI)—are evaluated via the Import Input Dependency Index (IIDI) and the Industrial Position Transfer Index (IPTI) to track dependence and positional dynamics in global value chains (GVCs). Results indicate a clear turning point in 2018–2020: China's competitiveness strengthened (higher GCSI, higher GCOI, lower GCWI) alongside rising external threats (higher GCTI), while the US remained relatively stable with marginal declines and elevated threat signals. The US exhibits consistently higher IIDI across all sectors—especially a pronounced rise in MSI—whereas China's HTM/MSI dependence declined and then stabilized. IPTI points to greater US dynamism in GVC repositioning and greater stability for China. Consistent with prior research, tariff shocks transmit through price pass-through, general-equilibrium reallocations, and GVC linkages, reducing welfare and straining exposed local labor markets, while catalyzing regionalization, diversification and nearshoring.

Keywords

China-US trade frictions, Global value chains, Competitiveness, Industrial dependence, Supply chain resilience

1. Introduction

1.1. Research background and significance

The China-US trade relationship has evolved from a complementary partnership to a complex competitive dynamic over the past four decades, with the most significant transformation occurring during the 2017-2023 period marked by comprehensive trade friction. The historical trajectory encompasses three distinct phases: the initial cooperative phase (1979-2001) characterized by China's reform and opening-up policies; the integration phase (2001-2016) following China's WTO accession with accelerated bilateral trade flows; and the current competitive phase (2017-2023) marked by reciprocal tariffs, technology restrictions, and broader economic decoupling efforts. This evolution represents a unique case study of how economic interdependence can coexist with strategic competition, challenging traditional theories of international trade and cooperation while providing crucial insights for understanding great power economic relations in the 21st century.

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The study of China-US trade relations evolution holds profound theoretical and practical significance. From a theoretical perspective, this research contributes to understanding the dynamics of global value chains, international production networks, and the complex interplay between economic interests, national security concerns, and geopolitical considerations. It addresses important questions about the role of international institutions in managing great power economic relations and reveals both the strengths and limitations of existing international economic governance mechanisms. From a practical standpoint, this research has significant implications for policymakers, business leaders, and investors, providing essential insights for developing effective policy responses, strategic planning, and risk assessment in an increasingly complex global economic environment.

The evolution of China-US trade relations has profound implications for the global economic landscape, affecting multiple dimensions of international economic governance and development. The trade friction has significantly disrupted global trade patterns and supply chains, forcing companies to reconsider their global sourcing strategies and accelerating technological innovation and automation. It has exposed limitations in existing international economic governance mechanisms, particularly the WTO's dispute settlement system, while creating pressure for institutional reform and the development of alternative economic governance frameworks. The restructuring of global supply chains has created both challenges and opportunities for other economies, particularly in Asia and Europe, with significant implications for global economic growth, technological development, and financial market stability. Understanding this evolution is essential for addressing the broader challenges and opportunities facing the global economy in the 21st century.

1.2. Literature Review

Recent scholarship on the China–US trade conflict first foregrounds tariff pass-through and aggregate welfare effects. Using high-frequency import and price data, Amiti, Redding, and Weinstein (2019) [1] show that post-2018 tariffs largely translated into higher domestic prices borne by U.S. consumers and importers, yielding net welfare losses. In a quantitative general-equilibrium setting, Fajgelbaum, Goldberg, Kennedy, and Khandelwal (2020) [2] document sizable efficiency costs from the return to protectionism, with tariff revenue insufficient to offset welfare declines. Complementing these findings, Itakura (2020) [3] employs a multi-region CGE model to trace how bilateral tariff escalations propagate through production networks to depress output, trade volumes, and welfare in both economies.

At the micro level, distributional and regional adjustment margins are salient. Benguria and Saffie (2020) [4] exploit differential local exposure to tariff shocks and find adverse effects on employment and earnings in more exposed U.S. labor markets, highlighting short-run adjustment frictions and spatial heterogeneity. Beyond the bilateral lens, Raei, Stavrev, and Wingender (2016) [5] provide an analytical and empirical framework linking trade tensions to spillovers via global value chains, clarifying how shocks to core hubs (such as the U.S. and China) transmit to third economies through intermediate input linkages and demand reallocation.

Acomplementary literature emphasizes supply-chain reconfiguration and risk governance under elevated geopolitical uncertainty. Antràs (2020) [6] argues that trade tensions—amplified by pandemic disruptions—accelerate regionalization, supplier diversification, and partial reshoring to mitigate concentration risk. Systematizing the risk–resilience trade-off, Baldwin and Freeman (2022) [7] catalog tools such as redundancy, multi-sourcing, nearshoring, monitoring, and inventory buffers, noting an emerging policy–corporate shift from pure efficiency toward robustness. Taken together, these studies converge on a coherent mechanism: tariff shocks transmit through prices, general-equilibrium reallocations, and GVC linkages to reduce welfare, strain local labor markets, and catalyze global supply-chain restructuring.

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2. Analysis on the Development Background of Sino-US Trade Relations(2002-2016)

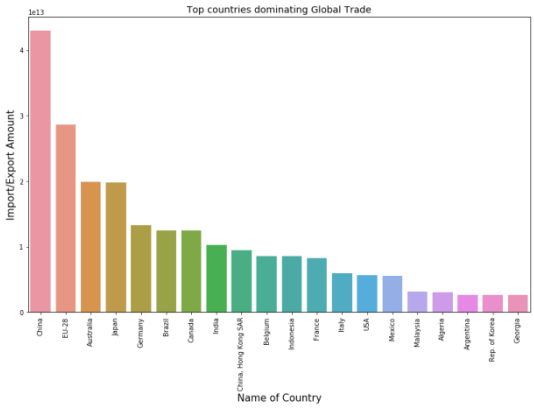

Figure 1: Top countries dominating Global Trade

Figure 1 shows the dominant countries in global trade. The height of the bar chart in the figure represents the relative importance of countries in global trade. China occupies a prominent position in the map, which shows that it has an important influence global trade. In addition, the 28 EU countries show a high trade volume, reflecting their key roles in the global supply chain.

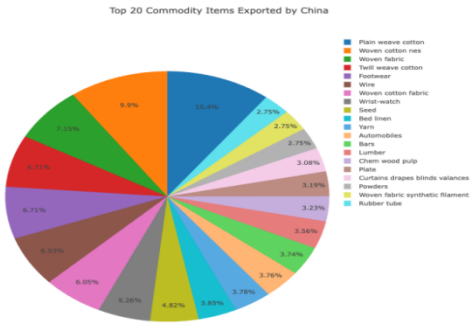

Figure 2: Top 20 Commodity Items Exported by China

Figure 2 shows the top 20 commodities exported by China. It can be seen that textiles (such as plain cotton cloth and woven cotton net) occupy a large proportion, which shows that China plays an important role in the global textile market. In addition, high-tech products such as electronic products and mechanical equipment also occupy a significant share, showing China's competitiveness in the global high-tech manufacturing industry.

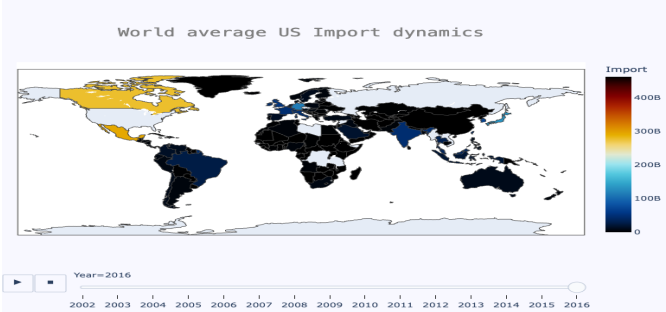

Figure 3: World average US import dynamics-2016

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Figure 3 shows the US imports from all over the world in 2016. It can be observed that the United States and North America (especially Mexico and Canada) import a large amount, which is consistent with the influence of the North American Free Trade Agreement (NAFTA).

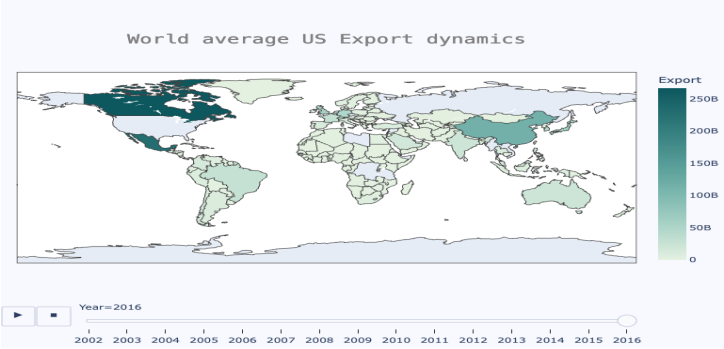

Figure 4: World average US export dynamics-2016

Figure 4 shows the export dynamics of the United States to all parts of the world in 2016. Similar to Figure 3, the depth of color represents the export volume. American exports to North America (Canadian and Mexican), Europe and Asia (China) are relatively large, which reflects the extensive influence of the United States in global trade. In particular, exports to Canada and Mexico are closely related to NAFTA.

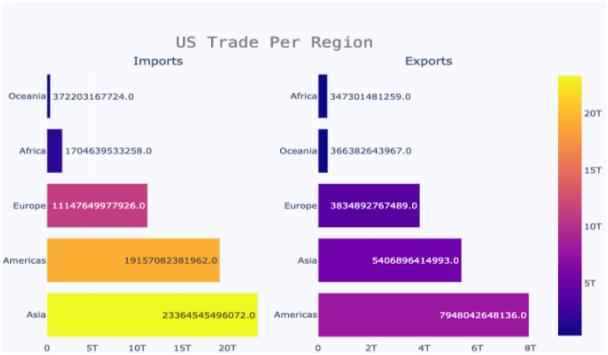

Figure 5: US Trade Per Region

Figure 5 shows the import and export volume of the United States from different regions respectively. The left histogram shows the and the right histogram shows the . It can be seen that Asia is the largest trading of the United States, and Asia occupies the largest share of both imports and exports. In addition, Europe and America are also important trading partners of the United States.

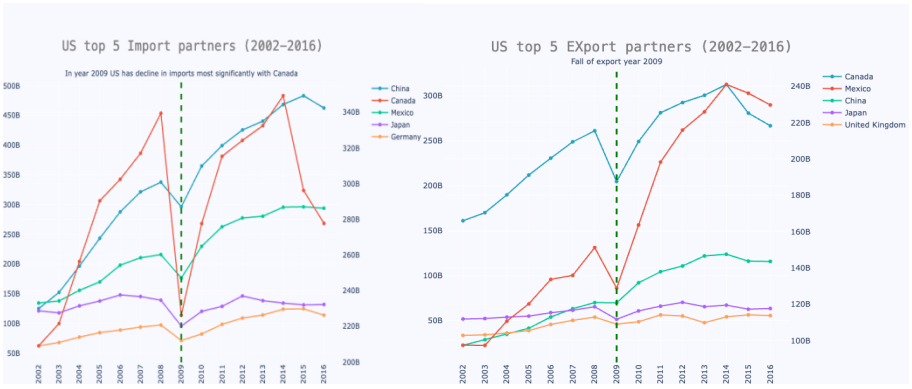

Figure 6: US top 5 Import/Export partners (2002-2016)

Figure 6 shows the changes in the import and export relationship between the United States and the top five trading partners from 2002 to 2016. These charts reveal the dependence of the United States in global trade, and the results are consistent with the above analysis.

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3. SWOT Analysis of Sino-American Industrial Competitiveness(2017-2023)

By examining the comprehensive data across four dimensions - GCSI (Global Competitiveness Strength Index), GCWI (Global Competitiveness Weakness Index), GCOI (Global Competitiveness Opportunity Index), and GCTI (Global Competitiveness Threat Index) - we can clearly observe the evolutionary trajectory of both countries' competitive landscape.The results are shown in Figure 7.

GCSI (Global Competitive Supply Index): A standardized indicator of supply output capability.

GCWI (Global Competitive Weakness Index): A standardized indicator of supply input dependence.

GCOI (Global Competitive Output Index): A standardized indicator of production output capability.

GCTI (Global Competitive Threat Index): A standardized indicator of production input dependency.

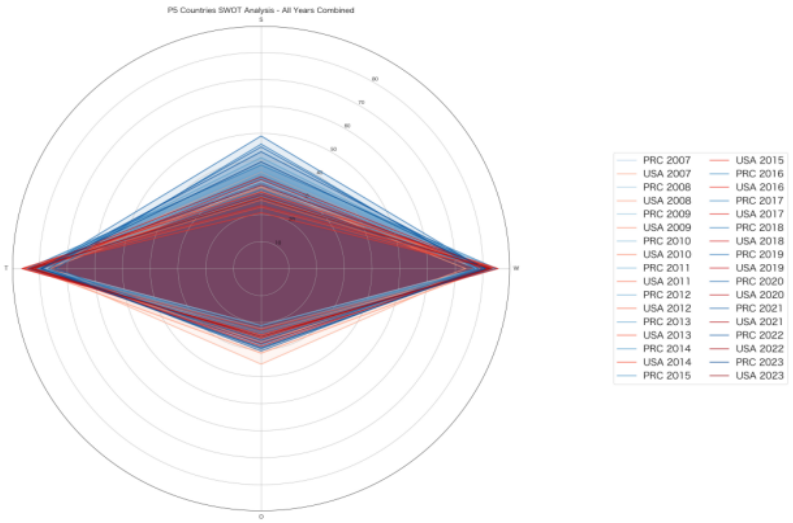

Figure 7: SWOT visualization

From an overall trend perspective,

Between 2007 and 2023, the Global Competitiveness Weakness Index (GCWI) and related indicators reveal both stability and divergence in the trajectories of China and the United States. China's GCWI generally remained at relatively high levels, highlighting persistent gaps in industrial foundations, technological accumulation, and innovation capacity. However, a marked decline between 2018 and 2020 signaled significant progress in reducing structural weaknesses, largely through targeted innovation and industrial upgrading policies. In contrast, the U.S. maintained a low and stable GCWI, reflecting strong fundamentals in established sectors, though a slight upward trend in recent years suggests emerging challenges in frontier technologies.

The Global Competitiveness Opportunity Index (GCOI) underscores differing approaches to seizing development opportunities. China's GCOI displayed a steady upward trajectory with pronounced growth during 2018–2020, reflecting reforms, innovation-driven strategies, and initiatives such as the Belt and Road. By contrast, the U.S. index remained comparatively stable but showed an overall decline, likely linked to difficulties in adapting industrial structures and policies amid globalization pressures.

The Global Competitiveness Threat Index (GCTI) highlights the external challenges each country faced. China's GCTI remained relatively high, with sharp increases during 2018–2020, capturing intensifying risks from trade frictions, technological blockades, and geopolitical

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tensions. Meanwhile, the U.S. GCTI stayed low and stable but exhibited a modest upward trend, suggesting mounting challenges in sustaining global leadership.

The period 2018–2020 was a decisive turning point. China's indices shifted markedly: GCWI declined, GCOI rose sharply, GCTI increased, and the overall Global Competitiveness Strength Index (GCSI) strengthened significantly. These changes were closely tied to China's responses to U.S. trade frictions, including expanded innovation investment, industrial transformation, and deeper reform. The U.S., by contrast, experienced relative stagnation, with its GCSI showing slight declines, GCWI edging upward, GCOI decreasing, and GCTI increasing, reflecting industrial hollowing-out, declining innovation momentum, and competitive pressure from emerging economies.

Overall, the 2007–2023 evolution of indices demonstrates China's transition from follower to competitor, with continuous improvement in global competitiveness through reform, innovation, and structural upgrading. The U.S., while retaining advantages in traditional domains, faces rising pressure from China in emerging industries.

From a SWOT perspective, China's strengths lie in its vast market, complete industrial chain, and strong manufacturing base, complemented by sustained policy support. Weaknesses persist in innovation quality, global brand influence, and international discourse power. Opportunities emerge from technological revolutions, globalization, and major national initiatives, while threats stem from external uncertainties and strategic competition. The U.S. maintains strengths in innovation, finance, and resources but faces weaknesses in industrial hollowing-out and social polarization. Its opportunities remain rooted in technological frontiers and institutional dominance, though it confronts threats from rising emerging economies, domestic political divisions, and reform pressures in global governance.

4. An analysis of industrial dependence between China and the United States(2007-2023)

There are three main industries selected: high-tech manufacturing (HTM), strategic resource industry (SRI) and modern service industry (MSI).The IIDI (Import Input Dependency Index) and IPTI (Industrial Position Transfer Index) are two important measurement indicators for global value chains. The IIDI indicator is calculated based on the ratio of TBP3 to (TBP1 + TBP3) multiplied by 100. This indicator reflects the degree of dependency of a country or region on imported intermediate inputs in a specific industry. A higher index value indicates a greater reliance on external inputs in that industry, while a lower value suggests stronger autonomy. The IPTI indicator is calculated by multiplying (TBP2 + TBP5) by 100. This indicator measures the trend of industrial position transfer of a country or region within the global value chain. A higher IPTI value indicates a strong potential for industrial transfer or significant changes in industrial position, while a lower IPTI value suggests relative stability in industrial position. The design of these two indicators fully considers the input-output relationships and industrial connections within the global value chain, effectively reflecting the dependency relationships and position changes of countries within the global value chain division system.

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Figure 8 Analysis of industrial dependence

4.1 High-Tech Manufacturing (HTM) Sector

The United States exhibits consistently higher international industrial dependency (IIDI) in high-tech manufacturing, starting at 17.5 in 2006 and peaking at 21–23.5 in 2013–2014 and 2021. This reflects its reliance on global supply chains and leadership in advanced technologies. In contrast, China's IIDI declined from 14.5 in 2006 to 6.5 in 2016, before stabilizing around 10.5 by 2022, indicating successful domestic supply chain development and reduced import reliance. Regarding industrial position transfer (IPTI), the U.S. maintains high values (4.2–7.2), reflecting dynamic repositioning and adaptability within global value chains. China's IPTI remains low, falling from 2.6 in 2006 to 0.7 in 2016, with slight recovery by 2022, suggesting relative stability and a more established role in high-tech manufacturing.

4.2 High-Tech Manufacturing (HTM) Sector

The United States exhibits consistently high levels of international industrial dependency (IIDI) in the strategic emerging industries (SRI) sector, ranging from 21 to 24 over the observed period, with notable peaks in 2008, 2012, and 2021. This sustained dependency underscores the U.S. role as a global leader in emerging technologies, characterized by extensive reliance on international supply chains and collaborative research networks. In contrast, China's IIDI in the SRI sector shows greater volatility, beginning at approximately 14 in 2006, declining to 9.5 in 2015, and subsequently rising to 16.8 in 2019 before stabilizing at 17 during 2021–2022. This trajectory reflects China's dual strategy: initially reducing dependency through domestic industrial development, followed by deeper integration into global supply chains as these industries matured.

Regarding industrial position transfer (IPTI), the U.S. records significantly higher values in SRI, rising from 2.3 in 2006 to a peak of 6.3 in 2018, before declining to 4.1 by 2022. This pattern illustrates the dynamic repositioning of the U.S. within global value chains, shaped by rapid innovation cycles. Conversely, China maintains consistently low IPTI values (0.4–0.9), reflecting stability in its industrial positioning, largely rooted in its role as a manufacturing hub.

The modern service industries (MSI) sector reveals the most pronounced divergence. China's IIDI declined steadily from 10.5 in 2006 to 4.7 in 2016, recovering modestly to 6.3 by 2022, indicating a shift from dependence on imported services to strengthened domestic capacities. The U.S., however, followed an opposite path, with IIDI rising from 4.8 in 2006 to 10 in 2018, stabilizing at 8.7 by 2022, highlighting growing integration with global service networks. In terms of IPTI, China's sharp decline from 0.68 in 2006 to 0.07 by 2019 signals a transition toward stability, while the U.S. increased from 0.2 in 2006 to 0.64 in 2017, maintaining high dynamism through 2022.

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5. Conclusion

The analysis reveals contrasting dependency patterns between China and the United States. The United States maintains higher IIDI values across all three sectors, indicating greater reliance on imported intermediate inputs. This pattern reflects the United States' position as a global technology and service leader that actively participates in international supply chains and collaborative networks.

China shows lower IIDI values, particularly in HTM and MSI sectors, indicating stronger domestic supply chain development and reduced dependency on external inputs. This pattern reflects China's successful industrial upgrading and domestic capability building over the past two decades.

The IPTI analysis reveals fundamental differences in industrial positioning strategies. The United States exhibits higher IPTI values across all sectors, indicating greater dynamism and adaptability in global value chains. This pattern reflects the United States' role as an innovation leader that frequently repositions itself in response to technological changes and market opportunities.

China shows lower IPTI values, indicating more stable industrial positions within global value chains. This stability reflects China's established role as a manufacturing and service hub with less frequent changes in industrial positioning.

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