



Trade Wars and Disrupted Global Commodity Chains

Hallmarks of the Breakdown of the U.S. World Order and a New Era of Competition and Conflict?

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Abstract

The literatures on global commodity chains and global value chains rest on an unquestioned assumption: the continual expansion of globalization. The Trump Administration's trade wars challenged this foundational assumption and even today the new Biden regime also hints at the shift away from global supply chains. We find that the prior administration's efforts caused continued disruption of long-established commodity chains in steel, aluminum, automobiles, and other manufactured products. Flows of raw materials, intermediate products and components, and finished goods now confront higher costs. Firms continue efforts to restructure commodity chains in ways that will require the disarticulation of some nodes and the creation of new nodes. We claim that these trade wars and breakdown of global commodity chains (GCCs) may in fact mark the start of the breakdown of the U.S.-led world order. This shift harkens the onset of a new era of economic and geopolitical conflict. A key question: has this disruption of old patterns and rise of new ones continued in the post-Trump era? Does the familiar pattern of globalization continue – or is competition, contestation and disarticulation leading to sectoral economic changes that drive larger patterns of economic ascent, dominance, and decline in the world economy?

Keywords: Globalization, Trade Wars, Global Commodity Chains, GCCs, Trump Administration, Biden Administration



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Is the world pattern of globalization resilient, despite the recent patterns of major political turmoil and planet-wide pandemic? Or has the rise of despotic, populist nationalist leaders like Donald Trump (and others)—and his apparent reaction to international trade and support for anti-global backlash against new emerging economic powers like China—the bellwether of a fundamental shift in the United States and the current world order? How do current American leaders like Joseph Biden fit in to all this? We set the stage for this paper by reviewing the way the recent news articles frame this issue and introducing readers to the critical role that global commodity chains (GCCs) play as the lasting business, trade, and transportation web underlying the contemporary world-economy. Then we will examine how the GCCs of extraction and processing of steel, aluminum, and liquefied natural gas have evolved and consolidated in the past few decades. Finally, the paper concludes with some short precis of these patterns and attempts to decipher how they help us understand globalization in today's world-economy.

In January 2020 (in the final year of the Trump presidency), *Bloomberg News* asked a question that would have seemed absurd only a few years ago: “Have we reached peak globalization?” The story begins with the statement:

The last decade has been a sharp rebuke to the idea of a more integrated, and increasingly frictionless, global economy. Borders, nationalism, tariffs, and even trade wars are back in fashion. So we asked economists, business leaders, and other experts whether this reversal is permanent or whether a new era of globalization can take hold. (Bloomberg News 2020)

As we consider this now in 2023, we need to interpret how this is impacted by the new leadership around the world, including the rise of President Joseph Biden in the United States.

Some analysts interviewed strongly disagreed with the potential of peak globalization, such as the Chief Economist of Allianz SE who responded:

there are at least three reasons to believe that globalization is still vibrant and may even make a comeback. First, the record amount of liquidity, coupled with “the paytech revolution”—for example, digital currencies and e-payments—mean that cash will continue to travel the world much faster than shipments, hence supporting financial globalization further. Second, services, contrary to the manufacturing sector, continue to expand globally, in spite of zealous regulators... Last, if one were to use cross-border data and information flows as a proxy for globalization, it would look like a renaissance, not the chronicles of a death foretold. (Bloomberg News 2020)

Others, however, expressed strong doubts about the future of globalization. Dani Rodrik, professor of international political economy at Harvard and now a vocal skeptic of globalization and its consequences, noted that it produces

consequences (that) are now familiar: anti-globalization backlash at home and trade war abroad... A complete collapse of economic globalization seems unlikely. But we will have to settle for a thinner model of globalization that leaves nations room for rebuilding domestic social contracts. (*Bloomberg News* 2020)

In the United States, a great deal of anti-globalist nationalism is directed at China. The election of Donald Trump fundamentally shifted U.S. government policy toward China, particularly in terms of trade relations. Trump was elected, at least in part, based on a campaign stressing economic nationalism to “Make America Great Again.” This “America First” focus fit well with Donald Trump’s past and personality, which reflected his affinity with other right-wing populist/nationalist politicians around the world. He was influenced in these views by his close advisor, Stephen Bannon, who told the *South China Morning Post* that “Wall Street ‘corporatists’... had been working together with China’s ruling elites to preserve ‘an unfair system’ and hurt the interests of American workers” (Mai May 23, 2019).

Trump was also influenced by one of his favorite former business professors, Peter Navarro (at the time a faculty member at the UCI Merage Business School). Navarro wrote an (in)famous book in 2011 called *Death By China: Confronting the Dragon—a Global Call to Action* (co-authored by Gene Autry). This book—which, interestingly, was turned into a short documentary movie version in 2012—is a polemic diatribe and the lead author speaks no Chinese and has spent almost no time in that country. James McGregor, an American author/journalist/businessperson who has lived in China for decades, quoted in an essay titled, “Trump’s Top China Expert Isn’t a China Expert,” notes that Navarro’s work can best be described as “cartoonish caricature of China” and he has “close to zero credibility with people who know the country” (Chan 2017). Trump was impressed with *Death By China* (presumably he watched the movie) and made Navarro a top 2016 campaign aide on economic policy, later appointing him an official White House trade advisor.

Navarro’s position is that China is trying to “take over the world” via unfair trade practices, currency manipulation, and degradation of labor and the environment; not to mention some nefarious military maneuvering to establish global supremacy. Scholars reading Navarro’s work will quickly recognize it as the work of an ideologically-driven fabulist. Unfortunately, this screed seems to be partially responsible for U.S. foreign policy toward China, particularly the Trump tariffs and trade restrictions, which, in fact, eventually “bled over” to many other countries, perhaps—with some irony—creating some degree of existential threat to the entire neoliberal global trading order. The global COVID-19 pandemic—and Trump’s repeated references to “the China virus” and his claims that his administration’s spring 2020 travel bans on incoming visitors from China and later Europe “saved millions of lives”—simply reinforces fears that global economic integration was “broken” and may never be the same. In this paper, we seek to contribute to the developing debate on what the Trump Administration did and did not accomplish of its America First agenda, particularly in relation to China, its most frequent target of criticism. Malkin (2022) assesses China’s ability to challenge U.S. structural power, focusing on productive power particularly in terms of global value chains and intellectual property rights. We focus here on the materiality of key GCCs as fundamental to China’s challenge to the United States and the weaknesses of the Trump Administration’s efforts to respond to China’s ascent as a rising economic power.

While it is clear that Donald Trump fomented the virulent anti-Chinese policies and rhetoric, it is interesting to see how President Biden in his recent 2023 State of the Union address also remained focused on military and economic competition with China (with critiques of that country's spy balloons, as well as recommending investments here in the United States to bring back manufacturing and to "make sure the supply chain for America begins in America"). It is not clear that Biden and other Democrats are as hostile toward China and globalization as his predecessor—but there is evidence of an eagerness to consider "helping workers" by returning to regionalized supply chains and engaging with new ideas about "deglobalization."

Not surprisingly, there is an element of "blowback" in these nationalist trade policies. Another analyst interviewed by Bloomberg noted that

several recent studies show that the new tariffs burden U.S. consumers and companies... introduced labor market shocks that harm U.S. workers... The success of globalization will hinge on how well national economic policies respond to its downsides with adequate income redistribution, social insurance, and public investment. (Bloomberg News 2020)

At this time, before the coronavirus crisis became fully manifest, the same writer argued that "at the moment, it certainly looks like we might have reached peak globalization. Deglobalization and the fracturing of global economic integration is probably one of the dominant themes for certainly this coming year and maybe for years to come" (Bloomberg News 2020).

These assessments raise critical questions about the consequences of globalization for states, firms, and workers. Support for globalization has been a fundamental pillar of U.S. hegemony in the post-World War II period. Throughout the second half of the twentieth century and the early twenty-first century, U.S. trade policy focused on greater binational, multinational, and global openness to cross-border trade and investment. U.S.-led efforts formed the Bretton Woods consensus, GATT, and the WTO that progressively globalized the capitalist world-economy. In this process, U.S. transnational corporations created increasingly lengthy GCCs across the borders of multiple states. Connecting into GCCs linking a growing number of locations and populations was sometimes contested by states, labor organizations, and social movement organizations, but globalization appeared inexorable.

In an earlier paper (Sowers, Ciccantell, and Smith 2014) we examined firstly, transportation involving many types of manufactured goods which changed in the past 50 years via containerization which propelled a new "logistics revolution," and secondly the novel movements of oil and gas in gigantic tankers leading to dramatic shifts in extraction and raw material delivery. These crucial commodity chains created possibilities and challenges for labor organizing and political dynamics to disrupt capital. That article identified the "stakes" in these GCCs (for workers and corporations) that stem from the capital intensity and global integration of each critical commodity chain (Sowers, Ciccantell, and Smith 2014).

With the electoral campaign and victory of Donald Trump in 2016, a funny thing happened to U.S.-based TNCs and their GCCs. Campaign pledges to "renegotiate bad trade deals" and "stop

China ripping off the United States” to appeal to U.S. working class voters led to the imposition of tariffs and restrictions on imports into the United States not just from China, but also from long-time allies in the EU, Canada, and Mexico. Import tariffs and restrictions and the often-heated rhetoric over trade lead to the disruption of GCCs and threatened the business models of firms in a wide range of industries.

Similarly, the large and continually growing literatures on GCCs and global value chains in sociology, geography and business developed in the past three decades rest on an unquestioned assumption: the continual expansion of globalization (see, e.g., Gereffi and Korzeniewicz 1994; Ponte, Gereffi, and Raj-Reichert 2019). The Trump Administration's trade wars with China and a variety of other countries challenged this foundational assumption. Long-established commodity chains in steel, aluminum, automobiles, and other manufactured products were disrupted; flows of raw materials, intermediate products and components, and finished goods confronted increased costs from tariffs and regulatory barriers; and firms began to seek to restructure commodity chains in ways that required the disarticulation of some nodes and the creation of new ones. The Trump Administration argued that these trade wars were part of an “America First” economic agenda; in this paper, we claim that they may, in fact, mark the breakdown of the U.S.-led world order underlying U.S. economic strength and hegemony. We also see that even post-Trump under the Biden Administration, there is some continuity in some of the conflict, competition and disarticulation—though we remain unconvinced that global supply chains or globalization are as far dismantled as many now believe.

To be clear: in this paper we are not suggesting an “end to globalization” or global capitalism. The latter, in particular, shows itself to be extremely resilient over the past five hundred years or so. But as both Immanuel Wallerstein and Giovanni Arrighi point out, part of the *longue durée* of the world-economy are cycles of accumulation and the waxing and waning of great power hegemony. Perhaps the most masterful and detailed discussion of this appears in Arrighi's *The Long Twentieth Century* (1994), including a graphic depiction of the four long secular cycles (corresponding to hegemonic rise and fall): U.S.-dominated *Pax Americana* is “the long twentieth century” with an undefined “terminal crisis” in this twenty-first century. Wallerstein also grappled with U.S. hegemonic decline and how to understand it in one of his final books, *The Decline of American Power* (2003), and his last published essay, “U.S. Weakness and the Struggle for Hegemony” (2019). Using Arrighi's terminology, here we see Donald Trump's efforts as U.S. leader as the harbinger of the “terminal crisis” of U.S. hegemony bringing that long twentieth century to an end, signaling the beginning of a new, and still undefined, global order (see Parnreiter 2018). China's ability to replace the U.S. as global hegemon remains a matter of debate (see, e.g., Hung 2015; Malkin 2022, among many others), but China's new industrial policy and Belt and Road Initiative are strategies intended to strengthen China in economic and geopolitical competition with the U.S. by driving spatial, political and GCC restructuring to benefit China's economic ascent (Mayer and Zhang 2021). Indeed, one obvious result is that China is now the dominant exporter of rare earth metals, raw materials commodities, and other critical goods into today's European Union (Amichi et al. 2023). While the debate is hardly settled, it becomes very

obvious that, in at least some ways, China's increasing dominance of various types of trade (in this case those of critical raw materials) to the richest nations is now challenging U.S. hegemony.

In this essay, we build on earlier work on raw materialist lengthened GCCs and the role of competition, contestation, and disarticulation to examine the sectoral economic changes that drive larger patterns of economic ascent, dominance, and decline. It is possible to briefly discuss how other rising powers—like Japan in the late twentieth century or China in this one—attempted to become sources for key GCCs, such as those for rare metals and raw materials. Japan was ultimately unsuccessful, while China is trying to compete today. We examine the impacts of the Trump Administration's economic and trade policies on a variety of critical and generative sectors of the U.S. and global economies and the consequences of the decline of these GCCs for the future of economic and geopolitical conflict, as well as discussing more recent efforts by the Biden Administration.

Literature Review: Approaches to Analyzing GCCs and Their Role in the World Economy

Here we attempt to assess the current conjuncture using an analysis of GCCs developed in earlier work. The raw materialist lengthened GCC model emerges from the GCCs model (Hopkins and Wallerstein 1986; Gereffi and Korzeniewicz 1994; Bair 2005, 2009) and new historical materialism (Bunker and Ciccantell 2005, 2007), or “raw materialism.” As we have previously developed (Sowers, Ciccantell, and Smith 2014), this approach uses a wider lens than the standard GCC approach in its focus on primary products, bringing the extractive and transport elements of GCCs into the analysis and thereby lengthening the commodity chains under investigation. Examining lengthened commodity chains allows for a more holistic assessment of the natural, material, and social characteristics across wide spans of industries and time (Sowers, Ciccantell, and Smith 2014; Ciccantell and Smith 2009).

The raw materialist model focuses on the material process of economic ascent in the capitalist world-economy. The key problem for rapidly growing economies over the past five centuries was obtaining raw materials in large and increasing volumes to supply their continued economic development with the existing hegemon and other rising economies. Economies of scale offer opportunities to reduce costs and create competitive advantages, but raw materials depletion and increasing distance create diseconomies of space—increasing costs due to the need to bring raw materials from ever more distant extractive peripheries to the consuming regions (Bunker and Ciccantell 2005).

The relative decline of U.S. power in the global economy since the early 1970s is widely acknowledged as first Japan and then China ascended to challenge U.S. economic dominance. Japan's economic ascent after World War II depended on U.S. support to counter the Soviet Union and its allies in the Cold War by rebuilding Japan's economy. The U.S. State Department assisted Japanese firms in accessing coal and other natural materials in the late 1940s and 1950s. The U.S. Occupation government helped the Japanese state create a new model of state-sector-firm relations in steel and other industries mediated by the Ministry of International Trade and Industry. U.S.

firms provided technology for steel, shipbuilding, and other generative sectors. By the late 1960s and early 1970s, Japanese steel, shipbuilding, aluminum, automobile, and electronics industries had developed economies of scale in importing raw materials and production facilities that made them world leaders, displacing their counterparts in the United States, a pattern of assistance from the existing hegemon aiding its own decline by investing in and supporting a rapidly ascending economy. However, the Japanese state and its leading industries were unable to maintain the dynamic tension that drove this ascent by the 1980s and 1990s as rising energy costs, financial speculation, bureaucratic ossification, and the rise of a new ascendant competitor, China, resulted in long term stagnation (Bunker and Ciccantell 2007; Ciccantell 2009).

The most important change in the economic and geopolitical structures of the capitalist world-economy in the past half century is the rapid ascent of China (Arrighi 1994, 2007; Bunker and Ciccantell 2007). China utilized a global system of raw materials supply created by Japan during its economic ascent via a variety of innovations in technology and social organization of steel production, ocean shipping, and natural materials supply agreements. Japanese steel firms helped Chinese firms build new larger scale steel mills on the coast of China to use these global raw materials supply networks and huge bulk carriers, soon outcompeting Japanese steel in global markets. This pattern of Japanese assistance to Chinese firms was repeated in other industries as well as Japanese firms sought lower cost labor for GCCs, fostering Chinese economic ascent just as the United States had done for Japan (Bunker and Ciccantell 2007; Ciccantell 2009).

The raw materialist lengthened GCC model begins analysis by focusing on material extraction and processing, and on the transport and communications technologies that link the multiple nodes of the chain from its raw materials sources through industrial processing to consumption and eventually waste disposal. This approach contrasts sharply with most work in the GCCs' tradition that focus on industrial production and consumption and pay little attention to the upstream parts of commodity chains (Ciccantell and Smith 2009). Focusing on longer chains provides a lens to examine spatially-based disarticulations (Bair and Werner 2011) and contestations over extraction, processing, transport, consumption, and waste disposal across these chains. This approach highlights the role of contestation and resistance to the construction and reproduction of a particular commodity chain in particular places (Sowers, Ciccantell, and Smith 2014), while also providing the opportunity to uncover the roles of geographic and spatial articulations in the global economy more broadly (Sowers, Ciccantell, and Smith 2014).

Overall, this raw materialist lengthened GCCs approach provides an integrated approach to examine the impacts of particular commodity chains both in specific times and places and as the constitutive elements of long-term change in the capitalist world-economy. Moreover, this model allows us to examine potential and actual cases of contestation and resistance in different chains in a wide range of times and places.

Our analytic approach follows a long tradition in world-systems theory of making multiple comparisons across time and space in an evolving global system (see, e.g., Wallerstein 1974; Chase-Dunn 1989; Arrighi 1994; Bunker and Ciccantell 2005). The GCC approach is often utilized to make comparisons between parts of the same commodity chain in different nations and between

different commodity chains (see, e.g., the case studies in Gereffi and Korzeniewicz 1994). We follow this approach, while focusing particular attention on the upstream stages of these GCCs and on their role in the long-term evolution of the capitalist world-economy, including their roles in economic and geopolitical competitions. Our analytic strategy also includes making multiple comparisons within one commodity chain over time, and between different commodity chains in different industries to examine processes of social and environmental change (Ciccantell and Smith 2009).

We argue that we must start by studying lengthened commodity chains to ground these networks in particular places, times, and natural environments. This grounding will then allow us to make comparisons of apparently dissimilar chains. Our first step is to focus on particular nodes in these webs to examine the developmental, socioeconomic, and environmental consequences of incorporation, and then to examine these lengthened networks as constitutive of the evolution of the capitalist world-economy driving long term change.

This emphasizes long term historical change as a whole and in particular places and times, and it allows making comparisons within the broader world-economy and over time comparisons across commodity chains. It also emphasizes the evolution of globalization and of particular GCCs over the past century, as well as showing how they shape the long-term processes of economic and geopolitical conflict.

The paper will now turn to the analysis of critical GCCs over the past century to understand the impacts of the Trump Administration's trade wars and their role in the breakdown of the U.S.-led world order, the maintenance of these policies by the Biden Administration, and the onset of a period of economic and geopolitical conflict. In the sections that follow, we analyze commodity chains in historically critical and generative sectors of the U.S. economy. We document the ways in which recent political administrations' policies have forced disruptions, disarticulations, and restructuring of these long-established commodity chains built during times of expansive globalization and how that speaks to the future of conflict and hegemonic decline for the United States and the world.

Steel: From U.S. Dominance to Poster Child of a Trade War

Steel built the ascendant U.S. economy of the late 1800s and early 1900s and the U.S. hegemonic political economy of the mid-twentieth century. This building was both physical and as a central generative sector that drove economic ascent, a basis of the broader U.S. political economy (Bunker and Ciccantell 2005). The United States caught up to the UK economy that first developed the modern steel industry, then surpassed it and the other largest ascendant economy of the time, Germany (Bunker and Ciccantell 2005). Following the massive destruction of World War II and rapid growth in the United States to supply the Allied war effort, the United States became the world's dominant steel producer in the late 1940s and early 1950s (Warrian 2016). U.S. steel production peaked in the late 1960s and early 1970s, and U.S. imports tripled since the mid-1970s. U.S. steel employment was around 550,000 in the 1950s, but then fell steadily due to increases in

productivity and technological innovation during the 1960s and early 1970s (USGS data; Warrian 2016). However, employment fell by half between 1975 and 1985 (from 433,800 to 208,000) and continued to fall, reaching 125,000 in 2022 (USGS data).

Table 1 Steel: U.S. Production and Employment; World, Japan, and China Production

Year	U.S. Production	U.S. Employment	World Production	Japan Production	China Production
1900	9.24	na	na		
1910	23.7	na	na		
1920	37.8	na	na		
1930	36.4	na	na		
1940	78.0	na	na		
1950	87.8	556	189.0	4.8	0.55
1960	90.1	460	346.0	24.4	20.3
1970	119.0	na	594.0	102.9	20.0
1980	101.0	433 (1975)	716.0	122.8	40.9
1990	89.7	208 (1985)	771.0	110.0	66.1
2000	102.0	151	850.0	106.0	129.0
2005	94.9	122	1140	112.0	353.0
2010	80.5	137	1430	110.0	637.0
2015	78.8	152	1610	105.1	803.8
2020	72.7	138	1790	67.0	1060.0
2022	82.0	125	1900	97.0	990.0

Production: millions of tons per year

Employment: thousands of workers

Source: U.S. Geological Survey [usgs.gov](https://www.usgs.gov)

U.S. primary metal industry employment (a combination mainly of the steel and aluminum industries) shows a similar pattern of declining employment, as Figure 1 shows.

World steel production grew steadily over the last century, but underwent dramatic locational shifts. Japanese steel production increased rapidly in the 1950s and 1960s as Japanese steel companies became technological leaders in the world industry (Bunker and Ciccantell 2005, 2007; Warrian 2016). However, Japanese steel production peaked in the late 1970s and early 1980s and was stagnant for the past 30 years (USGS data; Wilson 2013; Warrian 2016). In contrast, world steel production more than doubled between 2000 and 2022 (USGS data), with most of that growth coming from China. Chinese steel production rose from 129 million tons in 2000 to 990 million tons in 2022, now producing more than half of the world's total steel production of 1.9 billion tons (USGS data). The Chinese steel industry and Chinese steel firms now dominate the world (Wilson

2013; Warrian 2016), while the U.S. steel industry now produces only 82 million tons, less than one tenth of China's production (USGS data).

Figure 1: U.S. Primary Metals Employment, 1990-2022



Source: *bls.gov*

In terms of industry structure, U.S. Steel Corporation created a near-monopoly in the U.S. market in the late 1800s and early 1900s, with only one significant domestic competitor, Bethlehem Steel, allowed to survive to avoid charges of U.S. Steel being a monopoly. U.S. Steel became too comfortable and backward-looking in its management and investments in the middle of the twentieth century, resulting in poor investment decisions and a rapid loss of competitiveness relative to newer steel mills in Japan, Europe, and later South Korea (Bunker and Ciccantell 2005, 2007; Warrian 2016). This loss of competitiveness, increasing global trade from more competitive producers in Japan and other countries, and globalization rendered much of the U.S. steel industry uncompetitive and led to rapid increases in steel imports (Warrian 2016).

The U.S. Commerce Department (2018) report on steel imports identifies many steel mill closures and declines in employment in that industry, totaling more than 25 percent of U.S. basic oxygen furnace steel capacity. The economic ascent of China and resulting high prices for steel around the world helped revive the U.S. steel industry to a limited extent, as did the shift to more efficient mini-mill production and investments in newer technology in the United States (Warrian 2016); but the majority of employment in the steel sector relocated to China (Wilson 2013), with relatively few steel jobs left in the United States, despite the Trump administration's rhetoric. One analysis noted that steel mills can increase or decrease production without significant changes in labor demands, with the result that “in the first year of Trump's steel tariffs...the U.S. industry's biggest players are enjoying increasing demand and revenue but adding few of the jobs promised during the campaign” (Deaux 2019: 17). Production increases, however, are not being attributed solely to the tariffs: “U.S. Steel reopened two blast furnaces last year. The company said the

decision was more broadly due to ‘market conditions and customer demand,’ including the impact of tariffs” (Deaux 2019: 17).

The Commerce Department (2018) report on the steel industry found that:

- A. Steel Is Important to U.S. National Security;
- B. Imports in Such Quantities as are Presently Found Adversely Impact the Economic Welfare of the U.S. Steel Industry;
- C. Displacement of Domestic Steel by Excessive Quantities of Imports has the Serious Effect of Weakening our Internal Economy; (and)
- D. Global Excess Steel Capacity is a Circumstance that Contributes to the Weakening of the Domestic Economy.

Given these findings, the report recommended:

due to the threat... the Secretary recommends that the President take immediate action by adjusting the level of these imports through quotas or tariffs. The quotas or tariffs imposed should be sufficient, even after any exceptions (if granted), to enable U.S. steel producers to operate at an 80 percent or better average capacity utilization rate. (U.S. Commerce Department 2018: 7)

The 25 percent tariff on steel imports subsequently imposed by the Trump Administration were calculated to protect the domestic steel industry, but actually did little to change the dominant global position of the Chinese steel industry and the marginal position of the U.S. industry. The U.S. steel industry remains a marginal, high cost producer whose firms are able to serve local markets or those requiring purchases of U.S. materials for government-funded infrastructure, but are otherwise noncompetitive with much larger scale, lower cost mills in China, even after the cost of ocean transport is included in the final price. This is the quintessential example of newer ascendant economies building larger scale, lower cost facilities to support their rapid growth (e.g., massive building of factories, offices, housing, high speed rail networks, and other infrastructure in China over the last 20 years), rendering facilities and industries in the existing hegemon and older core powers uncompetitive.

Aluminum: From a U.S.-led Pioneer of Globalization to a Decimated Trade War Supplicant

In the early 1900s, a global oligopoly of six firms developed that controlled the industry until near the end of the twentieth century. The creation of the oligopolistic structure of the aluminum industry in its early years resulted from control over aluminum smelting patents by Alcoa in North America and by Alusuisse and Pechiney in Europe. These firms used this “first mover advantage” to gain control over the best bauxite deposits and hydroelectric sites (Barham 1994) and to keep out competitors (cf. Wallace 1937; Carr 1952; Smith 1988; Barham 1994). These firms and their customers developed a variety of uses for aluminum, most notably in transportation, munitions, and consumer goods. These uses made the strategic value of aluminum clear to governments in

Europe, resulting in government support for national aluminum companies; these core states promoted import-substitution industrialization (ISI) to guarantee access to aluminum. ISI development strategies emerged in Brazil and other peripheral and semiperipheral nations during the two world wars and the Great Depression because of the disrupted contacts with the rest of the world economy (Teitel and Thoumi 1986). Since the early 1900s, the major aluminum firms sought new markets for production from increasingly large-scale plants and raw materials from other nations, leading these firms to strategize in terms of global sourcing and marketing strategies. The aluminum majors pioneered globalization, combining intrafirm trade and transnational investment strategies to meet these needs (Ciccantell 2000).

A new phase of globalization began with the end of World War II and the ensuing process of decolonization. The independence of former colonial areas in the late 1940s and the major economic expansions in long-independent areas of the periphery made available bauxite deposits, hydroelectric sites, and new markets for both the major firms and new entrants in the industry. During the post-World War II period, however, state efforts to promote economic development through ISI shaped firms' strategies and opportunities to access these resources (Ciccantell 2000). Capital-intensive and technologically sophisticated aluminum smelting and semi-finished and finished goods production developed in a number of peripheral and semiperipheral nations (Ciccantell 2000). The efforts of the six aluminum majors to control the costs and risks of globalization and to accommodate ISI strategies led to increased reliance on joint ventures in the 1950s (Stuckey 1983).

During the 1980s and 1990s, joint ventures became a critical strategy for many firms and a hallmark of globalization. These joint ventures gave major companies added strength in the direct competition with chief rivals—the other majors—via cost savings from sharing the burden of the increasing scale of investment in bauxite mines, alumina refineries, and aluminum smelters. Moreover, these joint ventures reduced the risks of making large investments in the periphery and semiperiphery. The most important long-term result of the majors' joint venture strategy was a sharp reduction in the companies' control over the industry (Ciccantell 2000).

A new phase of globalization began in the early 1970s as peripheral and semiperipheral states' development strategies shifted to export promotion via ELI (Export Led Industrialization) policies (Barrett and Chin 1987; Gereffi 1992; Lee 1997; Cason and White 1998). These states continued to play large direct and indirect economic roles, but the goals shifted from supplying domestic markets to exporting to world markets to earn hard currency revenues, repaying foreign debts, and increasing domestic productivity by exposing firms to highly competitive world markets (Deyo 1987). Japanese joint ventures in aluminum smelting projects with state-owned firms in Brazil, Venezuela, and Indonesia pioneered extensive use of a joint venture structure in which the firms from core nations held only a minority ownership share. These projects both helped to create excess capacity in aluminum smelting and dramatically increased the role of non-core state-owned firms in the industry (Ciccantell 2000).

Another phase of globalization emerged in the mid-1980s, combining the intensification of the processes of the third phase with a broad trend toward reducing trade barriers both globally

and regionally. State development strategies shifted toward neoliberal economic restructuring. The key was privatization and economic restructuring that created tremendous investment opportunities for transnational raw materials firms (Ciccantell 2000). Aluminum prices became extremely unstable. A severe boom and bust cycle replaced stability and predictability of returns, hallmarks of the industry during its first 90 years. The aluminum majors' oligopoly collapsed (Ciccantell 2000). Due to the shift of economic development strategies, many states sold massive investments in bauxite mining, alumina refining, aluminum smelting, and many other industries to domestic and foreign firms at steeply discounted prices. The aluminum majors' loss of control over production, investment, and prices reduced aluminum firms' profits, with the aluminum majors bringing in historically low earnings or even losing money regularly (Ciccantell 2000). A new, unstable structure of the industry emerged from this environmental and competitive turbulence, with mergers and acquisitions and bankruptcies increasing in frequency.

This gloomy situation in the late 1990s and early 2000s for firms and states was dramatically transformed by the rapid economic ascent of China. The rise of China by the early 2000s marks yet another new phase of aluminum globalization. China's ascent fostered a shift in state development strategies to neo-extractivism since China's ascent drove rapid increases in demand and prices for raw materials exported to feed China's growth. In the aluminum industry, as in the steel, iron ore, coal, petroleum, and many other industries, China's ascent created new opportunities for firms and states to export raw materials to China, but also created formidable new competitors in the form of state-owned and private Chinese firms that rapidly became leaders in many industries. China is now the world's largest producer, consumer, and exporter of aluminum and steel and the global leader in a wide range of raw material-based industries (Ciccantell 2000; Ciccantell and Patten 2016; Gellert and Ciccantell 2020).

For firms and states involved in raw material-based industries, China's ascent led to a rapid restructuring of strategies and operations. Mining firms typically targeted the Chinese market as the key to any mine development and marketing plans in the 2000s and 2010s. For firms competing with China's world's largest steel, aluminum, and other metals processing industries, however, China is a formidable competitor that undercuts their prices in global markets. These firms sought government tariff protection from low-cost Chinese imports, including the tariffs imposed by the Trump Administration on steel and aluminum. Intense competition from Chinese exports and a high degree of global excess capacity in aluminum smelting drove down prices and intensified the unstable environment of the world aluminum industry in the 2000s and 2010s.

For states that use raw material-based industries as a basis for ISI and ELI in earlier phases of globalization, China's ascent and dominance of world production and export markets also created a formidable competitor and increased risks and instability. Steel mills, copper smelters, and other industrial deepening efforts in many countries cannot compete with lower cost Chinese imports; this is also increasingly the case in the aluminum smelting industry. For countries exporting raw materials with only limited or no processing, however, the Chinese market created high demand and high prices that make exporting raw or minimally processed materials very

profitable, particularly under terms negotiated between these governments and the Chinese government.

Table 2 Aluminum: U.S. Production, Employment and Import Dependence; World and China Production

Year	U.S. Production	U.S. Employment	U.S. Import Dependence	World Production	China Production
1900	2.3	na	na	6.8	
1910	16.1	na	na	45.0	
1920	62.6	na	na	125.0	
1930	103.9	na	na	272.0	
1940	187.1	na	na	787.0	
1950	651.9	na	na	1490	
1960	1827	na	na	4490	
1970	3607	25.3	0	9650	
1980	4654	27.2	0	15,400	
1990	4048	77.9	0	19,300	850
2000	3668	77.8	27	24,300	2800
2005	2481	43.2	41	31,900	7800
2010	1726	29.2	14	41,800	16,200
2015	1587	31.0	41	57,500	31,400
2020	1012	30.1	39	65,100	37,100
2022	860	28.0	54	69,000	40,000

Production: thousands of tons per year

Employment: thousands of workers

Import Dependence: Percent

Source: U.S. Geological Survey [usgs.gov](https://www.usgs.gov)

As the table above shows, U.S. primary aluminum production reached a peak in the 1980s and later declined dramatically (from over 4 million tons in 1990 to only 860,000 tons in 2022, USGS data) as most U.S. aluminum smelters closed and the industry experienced three decades of restructuring and downsizing. As one industry representative noted in 2018, “nine of 15 U.S. aluminum smelters have closed in the past four years...(blaming) their demise on a surge of Chinese production and the fact that they face high power costs and have never been modernized” (Freeman 2018: 2). Secondary (recycled) aluminum production grew, as have aluminum imports (in 1990, the United States imported 1.3 million tons of aluminum, but in 2021 imported 5.5 million tons, USGS data). U.S. aluminum employment fell by more than half over the same period.

In contrast, global aluminum production rose from 19.3 million tons in 1990 to 69.0 million tons in 2022, again almost entirely due to the growth of Chinese aluminum production from

850,000 tons to 40 million tons in 2022, more than half of global production (USGS data). Again, U.S. tariffs can do little to reduce Chinese dominance or the marginalization of the U.S. aluminum industry.

The Re-Peripheralization of the United States: Liquefied Natural Gas

The liquefied natural gas (LNG) industry began as a way to make use of natural gas resources in socially remote regions and of natural gas associated with oil production but being flared or reinjected into the geologic formation. In a fundamental sense, this natural gas was transformed from a waste product into LNG that could be moved thousands of miles to market, redefining it into a valuable raw material. The newest large scale LNG exporter, the United States, entered the industry based on another redefinition: the extraction of natural gas and oil previously economically and technologically inaccessible because they were contained in shale formations and could not easily be removed. Hydraulic fracturing (fracking) and new drilling technologies transformed this useless rock into immense reserves of natural gas and oil that drove down prices with excess production and fomented a search for new markets around the world. The global LNG industry and particularly its emerging U.S. component are based on redefining nature via technology and investment in LNG and fracking. This new raw material is reshaping economies, communities, industries, and ecosystems in the United States and in other parts of the world (Ciccantell 2020).

The natural, technologic, economic, and political dimensions of the rapidly growing LNG industry are the subjects of a growing body of literature (Turiani and Shearer 2007; Grigas 2017). Some consequences of the LNG industry are becoming apparent, including the movement toward the creation of a global natural gas market (Grigas 2017), the role of LNG exports from the United States in challenging Russian dominance over and geopolitical use of natural gas as a weapon (Rao 2012; Grigas 2017), and how fracked natural gas reduces U.S. energy costs for industry and consumers, supporting U.S. economic growth and the reshoring of some industries (Rao 2012; Smil 2015; Kleinhenz and Associates 2019).

In the political realm, natural gas exports in the form of LNG took on a new economic and geopolitical identity that the Trump Administration labeled “freedom gas” and “molecules of U.S. freedom to be exported to the world” (Mufson 2019). Energy Secretary Rick Perry claimed “the United States is not just exporting energy, we're exporting freedom” (Mufson 2019). In a fundamental sense, this represented a key dimension of the “America First” policy orientation of the Trump Administration. This policy pushed U.S. efforts to delink from, or at least restructure, key elements of the U.S. role in the world-economy and geopolitics, including reduced dependence on traditional alliances and delinking from some GCCs, most notably the Middle East-based oil industry. This effort by the United States was only possible because of the restructuring of the oil and gas chain, with the United States recapturing its long-lost role as the world’s leading producer and potentially exporter of these critical commodities, creating a situation that the Trump Administration described as energy dominance, a framing that “invites those who feel aggrieved

under Obama administration regulatory policy and the multicultural identity politics of the left to renew their commitment to fossil fuels, American exceptionalism, and a restored social order and privilege” (Schneider and Peeples 2018: 1). U.S. government policy under Trump also sought to promote domestic extraction of a wide range of minerals to reduce import dependence and vulnerability to foreign competitors such as Russia and China (Eilperin 2017; *Reuters* 2018; Mamula and Bridges 2018). Put simply, without energy independence and growing leverage in global markets, the United States would remain vulnerable to resource nationalism in oil and gas producing regions and intimately involved in the seemingly endless wars in the Middle East. LNG can even be used as geopolitical weapon by the United States against Russia and its efforts to reshape economic and political relations in Europe, the Middle East, and Asia (Grigas 2017; Ciccantell 2020). In the wake of Russia’s 2022 invasion of Ukraine, U.S. exports of LNG became critical replacements for Russian gas in Western Europe.

The United States was clearly returning to its historical role of energy exporter, as it had been in the early decades of the oil industry (Yergin 1991; Grigas 2017). Grigas (2017) in her insightful book, *The New Geopolitics of Natural Gas*, interprets this history as a key to U.S. economic ascent and return to energy exports as an unquestioned economic and geopolitical positive change that will enhance the U.S. economy and global standing. This highly positive view needs to be tempered somewhat, and perhaps directly challenged, since it was not energy exports that were a key element of U.S. economic ascent, but instead the low cost of energy for domestic industrialization that helped drive ascent (Bunker and Ciccantell 2005). It also seems highly problematic today at a time when global climate change seems to be a rising global challenge, and there may be an imperative to reduce consumption of all fossil fuel worldwide (Ciccantell 2020).

However, the Trump Administration's tariffs on steel imports were a major concern for the oil and gas industry. Even before the tariffs were announced,

oil and gas trade associations quickly reiterated concerns over possible higher costs for pipeline steel. “We are urging the administration to avoid killing U.S. jobs through a steel tariff that impacts pipelines,” Association of Oil Pipe Lines Pres. Andrew J. Black said. (Snow 2018: 1)

In short, these tariffs are, ironically, a serious threat, essentially making U.S. “energy dominance” and the broader economic nationalist agenda possible in the oil and gas industry (Ciccantell 2020).

Moreover, the ongoing trade war with China raised concerns that U.S. LNG exports to China and the pace of developing new LNG export facilities will be slowed by the 10 percent tariff imposed by China in September 2018 (Gordon 2019) and then the 25 percent retaliatory tariffs the Chinese government imposed on U.S. LNG in June 2019 (Yep et al. 2019). This escalating U.S.-China trade war was already claiming a victim in one of the fastest-growing U.S. export industries, one that received significant support from the Trump Administration for its role as “freedom gas” and a major new export industry (Ciccantell 2020). Russia’s invasion of Ukraine, however, drives a refocusing of U.S. LNG exports toward Western Europe as part of the geopolitical conflict with

Russia, offering an economic justification (higher gas prices) and a geopolitical justification for rapidly expanding U.S. export capacity.

Conclusion: From Globalization and GCCs Dominated by the United States to Rising Economic and Geopolitical Competition

From the beginning, we wanted to begin with an introduction to how U.S. politics and the leadership of Trump as a populist “America First” leader led to rhetoric about trade wars and the attack on various global supply chains and commodity chains: indeed, his speeches and action reacted against some key patterns of international trade and in favor of anti-global backlash against China as a growing power. This led to emerging skepticism about the future (and continued vibrancy) of globalization—and questions about how it might fundamentally change. While Trump may not have understood China’s economic vitality and trade dominance, he did see the COVID-19 pandemic as “the China virus” and was determined to formulate policies and popular images that worked to undermine China’s ascent as the world’s new economic power. This onslaught also took aim at the new “logistics revolution” built on strong networks of fully adumbrated GCCs (see Sowers, Ciccantell, and Smith 2014), raising questions about new patterns in the twenty-first century of de-globalization. Today, with a very different president (Joseph Biden) we still see U.S. leadership that retains animus toward China and its control of old patterns of globalization—but now it is difficult to comprehend how that will challenge and disrupt worldwide manufacturing and trade.

In this paper, we examine the critical GCCs of steel, aluminum, and LNG to highlight how competition, contestation, and disarticulation lead to sectoral economic changes that drive larger patterns of economic ascent, dominance, and decline in the world-economy. Here, we briefly recap each GCC and discuss the overall lessons for the U.S. world order.

The steel industry provides an illustrative example of declining U.S. dominance giving way to economic and geopolitical competition. While the United States once dethroned both the UK and Germany to dominate steel production by the 1960–1970s, the United States’ role in this industry sharply declined even as world steel production rose and is now dominated by China. Concerns over Chinese steel production abound and are typified in the Commerce Department’s report suggesting curbing U.S. steel imports through new tariffs—tariffs that have remained in place under the Biden Administration, despite court challenges from importing firms that were ultimately rejected by the Supreme Court in March 2023 (Kruzel 2023).

In contrast, the aluminum industry has a long history of globalization that is also complicated by the rise of China. Control of the industry by the early global oligopoly gave way to a variety of semi-peripheral and peripheral nations entering the industry in the mid-1900s. The neoliberal wave of the 1980s produced excess capacity and unstable prices; and, similarly to the steel industry, U.S. aluminum production and employment are at historic lows. The impacts of Chinese competition led the Trump administration to place tariffs on aluminum imports, but the volatility of the industry remains and the tariffs remain in place.

Where LNG is concerned, former “waste” products were redefined as valuable, given new technologies that allowed formerly unreachable and unusable natural gas to be accessed. These techniques propelled the United States into a potential position of “energy independence,” where traditional alliances and longstanding GCCs could be less important, and where so-called “freedom gas” could reshape economic and political relations between the United States and the rest of the world. However, these same processes could also create a re-peripheralization of the United States, where domestic resources are used to support Chinese economic growth while leaving regions of the United States stripped of their resources; a concern that becomes more important when also considering the impacts of steel tariffs on LNG pipelines and retaliatory Chinese tariffs on U.S. LNG exports. Russia’s invasion of Ukraine changed the focus on U.S. LNG to supplying Western European allies formerly dependent on Russian pipeline gas imports. Despite these geopolitical considerations, reliance on fossil fuel may also be a big gamble as the world becomes more cognizant of the seriousness of the climate crisis.

Thus, despite the Trump Administration’s “America First” rhetoric and the Biden Administration’s continuance of nationalist economic policies, our analysis shows that the trade wars and breakdowns of GCCs are instead evidence of the breakdown of the U.S.-led world order that underlay U.S. economic strength and hegemony and signify the onset of a new era of economic and geopolitical conflict. China presents a serious challenge to U.S. hegemony, as Malkin (2022) and Mayer and Zhang (2021) argue, but it is not clear that this challenge will be successful, as Hung (2015) argues. Japan’s rapid economic ascent during the 1960s and 1970s presented a serious challenge to U.S. hegemony in key GCCs such as steel, aluminum, and automobiles (Bunker and Ciccantell 2007) but ultimately failed to fundamentally change geopolitics or the world economy. Each of the cases we present here follows its own unique trajectory, but ultimately all three are unified in that they demonstrate a decline of U.S. dominance and rising economic and geopolitical competition—or in other words, these cases collectively evidence the onset of the “terminal crisis” of Arrighi’s “long twentieth century” of American dominance.

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