July 8, 2022

USITC Inv. No. 332-591
PUBLIC DOCUMENT

The Honorable Lisa R. Barton
Secretary to the Commission
U.S. International Trade Commission
500 E. Street, SW
Washington, DC 20436

Re: ***Economic Impact of Section 232 and 301 Tariffs on U.S. Industries:*** Prehearing Brief

Dear Secretary Barton:

On behalf of Nucor Corporation, we hereby submit the enclosed prehearing brief in the above-captioned investigation regarding the economic impact of the Section 232 and Section 301 tariffs on U.S. industries.[1]

Please do not hesitate to contact the undersigned with any questions that you may have.

Respectfully submitted,

/s/ Alan H. Price
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1 *Economic Impact of Section 232 and 301 Tariffs on U.S. Industries*, 87 Fed. Reg. 28,035 (Int'l Trade Comm'n May 10, 2022) (notice of inv. and scheduling of a public hearing).

PUBLIC DOCUMENT

BEFORE THE
U.S. INTERNATIONAL TRADE COMMISSION

INVESTIGATION NO. 332-591: ECONOMIC IMPACT OF SECTION 232 AND 301 TARIFFS ON U.S. INDUSTRIES

PREHEARING BRIEF

NUCOR CORPORATION

I. INTRODUCTION

Nucor Corporation ("Nucor") is the largest steel producer and largest steel recycler in the United States. Nucor employs approximately 30,000 teammates at facilities around the country in both upstream and downstream segments of the steel industry. Nucor manufactures a full range of flat, long, and structural steel mill products, exclusively in electric arc furnaces ("EAF") that use recycled steel scrap as their primary feed stock. These facilities are among the most energy efficient and environmentally friendly steel mills in the world. Nucor's downstream operations include manufacturing of sheet and pipe piling, metal building systems, rebar fabrication, and others. Nucor is thus not only the country's largest steelmaker, it is also a significant steel consumer. It is deeply familiar with the economic impact of the Section 232 and Section 301 trade actions on all portions of the U.S. steel industry. Both actions were necessary when taken, both have been overwhelmingly beneficial for the steel industry without inflicting pain on steel consumers or the U.S. economy more broadly, and both remain necessary today.

II. THE SECTION 232 RESPONSE WAS NECESSARY FOR U.S. NATIONAL SECURITY

The steel industry is vital to U.S. national defense and critical infrastructure. Steel is an essential material for construction of roads, bridges, and other transportation networks. It is also used in an array of national defense applications, from armor plating in tanks, Humvees, and armored personnel carriers, to the hulls of submarines and battleships. As the United States transitions to a low-carbon energy grid, greater volumes of steel will be needed to build out renewable energy infrastructure, from wind towers and solar arrays, to the new transmission infrastructure that will be needed to connect renewable energy installations to centers of power demand. The domestic steel industry must be capable of supplying material for these applications not only in peacetime, but also in times of crisis, when demand may surge beyond the industry's typical production levels. The industry's ability to maintain sufficient capacity for specialized national defense applications depends on its performance in the broader commercial market.[2]

When the Department of Commerce ("Commerce") initiated its Section 232 investigation of steel imports in 2017, the U.S. steel industry was in a state of crisis. The open U.S. market had become a dumping ground for the world's heavily subsidized excess steel production. In the 2004-2008 period leading up to the global financial crisis, the domestic steel industry averaged more than 106 million tons per year of production, at capacity utilization rates of nearly 88%.[3] After the financial crisis, however, the industry never returned to this baseline, even as the rest of the economy recovered. Instead, imports disproportionately captured the benefits of the recovery in U.S. demand. From 2010 to 2017, import volumes increased by more than 13 million metric tons ("mt"),[4] to nearly 35 million mt, far outpacing the recovery in U.S. consumption. Because of this import surge, domestic capacity utilization remained well below 80% in the runup to the Section 232 response, as shown by the table below.[5]

2 See U.S. Dep't Commerce, Bureau of Industry and Security, *The Effect of Imports of Steel on the National Security* (Jan. 11, 2018) at 25, ("Steel Imports Report") available at https://www.commerce.gov/sites/default/files/the_effect_of_imports_of_steel_on_the_national_security_-_with_redactions_-_20180111.pdf.

3 *See* American Iron and Steel Institute Industry Data, attached as **Exhibit 1**.

4 Herein, "mt" refers to metric tons, while "tons" refers to short tons.

5 American Iron and Steel Institute Industry Data, attached as **Exhibit 1**.

<u>U.S. Steel Industry Monthly Capacity Utilization</u>

Source: American Iron and Steel Institute

Surging import volumes began to erode U.S. production capabilities. After production gradually recovered to a post-financial crisis peak of 97.8 million tons in 2012, domestic producers shed nearly 8 million tons of production and more than 8 million tons of capacity over the next five years, with surging imports displacing domestic production.[6] By 2017, the industry was operating at a utilization rate of approximately 74 percent, nearly 14 percentage points below its pre-financial-crisis average.[7] Low utilization rates were accompanied by deteriorating financial performance. Industry-wide net income was negative in five of the nine years from 2009 to 2017.[8]

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6 *Id.*

7 *Id.*

8 *Id.*

The industry's average profit margin over this period was -0.16 percent.[9] Moreover, from 2015 to 2017, asset depreciation exceeded new investment by a cumulative $915 million, meaning that the industry was divesting instead of investing.[10] Put simply, the industry was in a tailspin.

The primary cause of these adverse conditions was chronic excess capacity in global markets, which increased rapidly in the wake of the global financial crisis. According to the Organisation for Economic Co-operation and Development ("OECD") Steel Committee, global crude steel production capacity exceeded production by approximately 600 million mt as of 2017.[11] Worldwide, the industry was operating at around 74% capacity utilization, driving long-term declines in prices.[12] Heavily subsidized production in the rest of the world thus pummeled U.S. producers over the course of a decade, forcing the domestic industry to repeatedly petition for relief under the U.S. trade remedy laws. These laws are the primary way for the industry to defend itself against specific types of unfair trade in specific products by specific countries, and they remain vital to maintaining healthy conditions in the U.S. market. But given the severity of the excess capacity crisis, the breadth and extent of foreign government support and intervention, and the speed with which heavily subsidized producers can build new capacity in third countries, targeted antidumping and countervailing duty petitions alone could not keep pace. Nor are these petitions designed to achieve broader national security objectives related to supply chain resilience in critical industries or combating climate change. The Section 232 response's comprehensive

9 *Id*.

10 American Iron and Steel Institute, *Annual Statistical Report (2020)*, at Table 4.

11 OECD Steel Committee, *Steel Market Developments*, 84th Session (Mar. 5, 2018) at 8, attached as **Exhibit 2**.

12 *Id*.

approach closed gaps that foreign steel industries exploited, solidifying the domestic steel industry's ability to begin recovering and reinvesting.

III. THE SECTION 232 RESPONSE HAS BEEN EFFECTIVE

In combination with antidumping and countervailing duty orders, the Section 232 response has contributed to a stable market environment in which U.S. steel producers have been able to begin recovering and reinvesting. The response has helped to reduce the volume of excess global steel production targeted at the U.S. market through gaps in trade remedy orders. In 2017, steel imports reached approximately 34.7 million mt and accounted for around 27 percent of U.S. consumption.[13] Following a series of antidumping and countervailing duty orders in 2016 and 2017, and the Section 232 response on March 8, 2018, import volumes began to decline. By 2019, prior to the outbreak of COVID-19, U.S. steel imports had fallen to approximately 25.4 million mt.[14] In 2021, following the broader economic recovery, U.S. steel imports remained significantly below pre-232 levels, at 28.6 million mt.[15]

Without cutting off the U.S. market from overseas sources or competition, the Section 232 measures, in combination with trade remedy orders, have contributed to a meaningful reduction in excess import supply and thus to a stabilization of market-based pricing. This has allowed domestic steel producers to return to more sustainable financial footing and make necessary investments towards a cleaner and more efficient future for the industry. According to one recent analysis, the Section 232 response furthered market improvements that "{make} it possible for

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13 U.S. Dep't Commerce, *U.S. Steel Import Monitor, U.S. Imports of Steel Mill Products (For Domestic Consumption) Annual Data (Census Data Only)* (accessed June 22, 2022) available at https://www.trade.gov/data-visualization/us-steel-import-monitor.

14 *Id*.

15 *Id*.

U.S. producers to achieve economically viable financial margins and stabilize expectations of market conditions enough to entice reinvestment in new production capacity."[16]

From a low of approximately 86.5 million tons in 2016, U.S. steel production increased to 96.7 million tons in 2019, prior to COVID-19, and to nearly 95 million tons after the recovery in 2021.[17] Capacity utilization increased along with production, to 79.8 percent in 2019 and 81.6 percent in 2021.[18] After operating at a loss in five out of nine years leading up to the Section 232 response, the industry has returned to more stable profitability.[19] Greater market stability and improved financial performance have allowed the industry to begin reinvesting. As of 2021, U.S. steel companies had announced plans to invest around $15.8 billion in new or upgraded steelmaking facilities, creating more than 3,000 high-wage U.S. jobs in the process.[20] Another $5.9 billion has been invested in facility acquisitions to further efficiency-enhancing industry restructuring.[21] According to AISI, the industry has invested approximately $22 billion in new, expanded, or restarted production since March 2018, when the Section 232 measures were implemented.[22]

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16 Adam S. Hersh, *Revoking Tariffs Would Not Tame Inflation But it Would Leave our Supply Chains Even More Vulnerable to Disruption*, Economic Policy Institute (June 21, 2022), attached as **Exhibit 3**.

17 American Iron and Steel Institute Industry Data, attached as **Exhibit 1**.

18 *Id*.

19 *Id*.

20 Adam S. Hersh and Robert E. Scott, *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*, Economic Policy Institute (Mar. 24, 2021) at 11, Appendix 1, attached as **Exhibit 4**.

21 *Id*.

22 Pre-Hearing Statement of Kevin M. Dempsey, American Iron and Steel Institute, Inv. No. 332-591 (July 8, 2022) at 6 ("AISI Prehearing Statement").

These broad improvements in the industry's competitive position and development prospects are vital components of the national security objectives that the U.S. Government articulated in implementing the response. As Commerce explained in its report to the President:

> U.S. steel producers would be unable to survive purely on defense or critical infrastructure steel needs. In the steel industry, it is commercial and industrial customer sales that generate the relatively steady production needed for manufacturing efficiency, and the revenue volume needed to sustain the business. Sales for critical infrastructure and defense applications are often less predictable, cyclical, and limited in volume.[23]

Steel production is a capital-intensive industry. Production for national security and critical infrastructure applications requires the same facilities, maintenance, and workforce expertise as production for common commercial applications. As a result, limiting production to the volumes required for national security and critical infrastructure applications would be financially unsustainable. This is especially true as the industry anticipates increasing investment costs related to decarbonization, and higher energy and raw material costs due to ongoing supply chain disruptions from the Russian invasion of Ukraine and COVID-19 volatility.

The national security benefits of the Section 232 response are not limited to ensuring stable and resilient domestic supply chains for critical steel materials. One of President Biden's first actions after taking office was to issue an *Executive Order on Tackling the Climate Crisis at Home and Abroad*.[24] That Order articulated a policy "that climate considerations shall be an essential element of United States foreign policy and national security."[25] The Section 232 measures advance these climate-related national security objectives as well.

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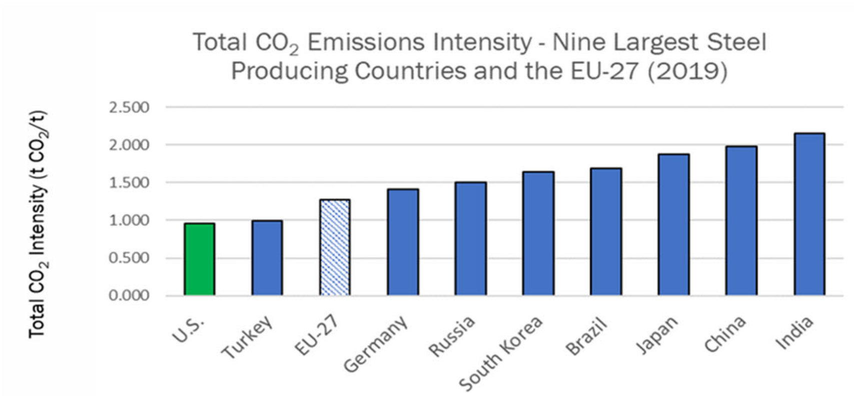
23 Steel Imports Report at 25.

24 *Tackling the Climate Crisis at Home and Abroad*, Exec. Order No. 14,008, 86 Fed. Reg. 7619 (Jan. 27, 2021).

25 *Id*.

The U.S. steel industry is one of the lowest-emission and most energy-efficient steel industries in the world. Approximately 70 percent of U.S. steel production occurs in EAF facilities.[26] In contrast, major sources of U.S. steel imports, including Brazil, China, Germany, Japan, Russia, and Korea rely overwhelmingly on higher-emission blast furnace production.[27] The average EAF mill in the United States generates approximately 600 kg of carbon dioxide per ton of steel produced, compared to 2,238 kg per ton for the average blast furnace worldwide.[28] Because of its higher share of EAF production, the U.S. steel industry has the lowest CO_2 intensity of the world's nine largest steel producing countries or regions.[29]



Adapted from: Hasanbeigi, "Steel Climate Impact: An International Benchmarking of Energy and CO_2 *Intensities," Global Efficiency Intelligence, 2022.*

The Section 232 measures have allowed U.S. steelmakers to invest in new or expanded, state-of-the-art EAF capacity that will increase the domestic industry's climate advantage *vis-à-vis* major

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26 *Sustainability of the American Steel Industry*, American Iron and Steel Institute (Mar. 2021) at 4, attached as **Exhibit 5**.

27 Ali Hasanbeigi & Cecilia Springer, *How Clean is the U.S. Steel Industry? An International Benchmarking of Energy and* CO_2 *Intensities*, Global Efficiency Intelligence (Nov. 2019) at 19, attached as **Exhibit 6**.

28 *Id*. at 22, 24.

29 *Sustainability of the American Steel Industry*, American Iron and Steel Institute (Mar. 2021) at 3, attached as **Exhibit 5**; AISI Prehearing Statement at 9 (citing Hasanbeigi and Springer, supra n. 26).

import sources even further. The billions of dollars of new investments noted above includes 10 projects for new, expanded, or upgraded EAFs.[30]

The Section 232 response, in other words, plays an important role in ensuring that lower-emission U.S. steel production is not replaced by significantly higher-emission foreign blast furnace production. Preventing this type of trade-related "carbon leakage" is a critical tool for combatting climate change and advancing the climate-related national security interests of the United States. According to recent estimates, decarbonizing the steel industry between now and 2050 could require additional investments ranging from $278 billion to $1.4 trillion.[31] The domestic industry's ability to absorb these higher investment costs depends on continuation of the market stability that the Section 232 response has helped create.

This is especially true as major U.S. trading partners intervene extensively to subsidize their domestic steel producers and absorb the costs of their industries' transition. The European Union, for example, is providing hundreds of billions of euros in state support for EU steel companies to "foster{} the green transition" by upgrading facilities that would otherwise need to shut down.[32] The Canadian government is implementing similar subsidy programs.[33] These subsidies include government funding for transitions from blast furnace to EAF production, which the U.S. industry standardized through decades of private investment, without relying on help from

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30 Adam S. Hersh and Robert E. Scott, *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*, Economic Policy Institute (Mar. 24, 2021) at Appendix 1, attached as **Exhibit 4**.

31 *Steel Industry Set to Pivot to Hydrogen in $278 Billion Green Push*, Bloomberg NEF (Dec. 1, 2021), attached as **Exhibit 7**; Hector Forster, *Banks Seeking to Finalize Framework for Steel Decarbonization in Q2*, SP Global (Feb 9, 2022), attached as **Exhibit 8**.

32 *See, e.g.*, *Moving Towards Zero-Emission Steel: Technologies Available, Prospects, Timeline and Costs*, European Parliament (Dec. 2021) at 35-37, attached as **Exhibit 9**.

33 *See, e.g.*, Press Release, *ArcelorMittal Decarbonization Project in Hamilton, Canada Confirmed with the Announcement of a CAD$500M Investment by the Government of Ontario*, ArcelorMittal Website (Feb. 15, 2022), attached as **Exhibit 10**.

U.S. taxpayers. Foreign governments absorbing the costs of these investments puts U.S. producers at a severe competitive disadvantage and works at cross-purposes to the broader objective of reducing excess capacity and restoring balance to international markets.

While the steel industry's condition has improved significantly since the Section 232 measures went into effect, the recovery is incomplete. According to Commerce, long-term capacity utilization rates of at least 80 percent "are necessary to sustain adequate profitability and continued capital investment, research and development, and workforce enhancement in the steel sector."[34] These levels of utilization must be sustained over the course of the business cycle to reflect long-term improvements in the industry's position. The industry is moving towards these objectives, but it has not achieved them yet. It has only broken 80 percent annual capacity utilization in one year since Section 232 implementation – in 2021, when significant production capacity remained curtailed due to COVID-19.[35]

Because the threats of supply chain disruptions, global excess capacity, and state intervention in industries around the world are still acute, the Section 232 measures remain vital to the industry's ongoing recovery and its investments in a sustainable, low-carbon future. According to the OECD, global excess capacity remains at approximately 544 million metric tons as of 2021.[36] While China is the largest contributor to the overcapacity crisis, it is not just a "China problem." As noted above, governments around the world, including U.S. allies, continue to

[34] Steel Imports Report at 4.

[35] *See* American Iron and Steel Institute Industry Data, attached as **Exhibit 1**.

[36] *91st Session of the OECD Steel Committee – Chair's Statement*, OECD (Mar. 2022), attached as **Exhibit 11**.

expand subsidies in the name of decarbonization, exacerbating chronic excess capacity and market imbalances that continue to threaten market-oriented producers.[37]

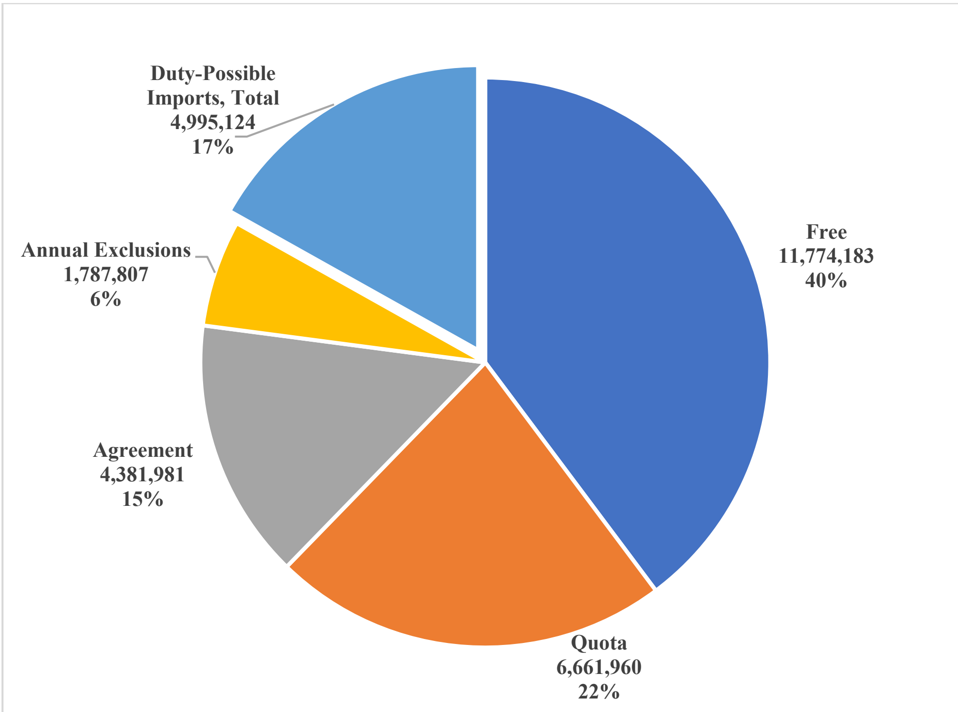
The Section 232 measures that remain in place are thus vital to U.S. national security interests regarding both climate change and the resilience of national defense and critical infrastructure supply chains. Any further narrowing of the program's coverage would seriously undermine its effectiveness with no meaningful economic benefits. The United States has already agreed to exemptions and other alternative arrangements with a number of U.S. allies and major sources of steel imports that allow significant volumes to enter the United States without Section 232 tariffs. These include full exemptions for Canada, Mexico, and Australia; tariff-rate quota arrangements for the European Union, Japan, and the United Kingdom; quota arrangements for Argentina, Brazil, and Korea; and a suspension of Section 232 measures as applied to imports from Ukraine.

In addition to these country-specific alternative arrangements, the Commerce continues to liberally grant product exclusions. According to Nucor's internal analysis, Commerce has granted more than 220,000 product exclusion requests covering more than 87 million tons of potential steel imports as of June 14, 2022. These exclusions remain available for volumes in excess of quotas or tariff-rate quotas under the alternative arrangements outlined above. Commerce has also granted a number of "general approved exclusions" ("GAE"), which exclude entire tariff lines of steel imports from all sources from Section 232 tariffs on an indefinite basis. Based on 2021 import volumes, Nucor estimates that only around 17 percent of total steel import volumes remain subject to Section 232 tariffs after accounting for these agreements and exclusions, not including

[37] Adam S. Hersh and Robert E. Scott, *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*, Economic Policy Institute (Mar. 24, 2021) at 7-8, attached as **Exhibit 4**.

GAEs. Any further narrowing of the program would significantly undermine its effectiveness and national security objectives.

Estimated 2021 Section 232 Duty Coverage



IV. THE SECTION 232 RESPONSE HAS NOT HARMED DOWNSTREAM CONSUMERS OR THE BROADER ECONOMY

The Section 232 response has contributed to the domestic steel industry's recovery without harming downstream consumers. Nor has it contributed to broader inflationary pressures resulting from COVID-19 supply chain disruptions and the Russian invasion of Ukraine. The actual effect of the Section 232 response on steel consuming industries and the broader economy has been remarkably consistent with the U.S. International Trade Commission's (the "Commission") conclusions regarding the effects of similar action taken on steel imports in 2001 under Section 201 of the Trade Act of 1974. The Commission's analysis there estimated that the Section 201 measures had a negligible economy-wide welfare impact, ranging "from a positive 0.0006 percent to a negative 0.0011 percent of gross domestic product."[38] The effects were so muted that "many firms had difficulty distinguishing between the effects of the safeguard measures and other changes in market conditions."[39] The Commission also noted that after imposition of Section 201 measures:

- Steel prices initially increased but then declined;
- Overall sales and profits in downstream industries increased; and
- Wages and productivity in downstream industries increased, while overall employment fell by less than in the period preceding the Section 201 measures.[40]

The impact of the Section 232 response on downstream industries and the broader economy has likewise been negligible, even as the response has contributed to meaningful improvements in the steel industry's condition and prospects. While steel is essential to U.S. national and economic security, steel consumption is ultimately a small share of total U.S. economic activity. In 2021, the total value of U.S. steel consumption was approximately $121 billion, or less than 0.53 percent of U.S. GDP.[41] The value of U.S. steel imports in 2021 was approximately $26.2 billion, or approximately 0.11 percent of U.S. GDP.[42] As noted above, only a small share of these imports are actually affected by Section 232 tariffs.

Steel likewise represents a small share of the total cost of downstream products in even the most significant steel-consuming industries. A recent study concluded that steel inputs account

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38 *Steel-Consuming Industries: Competitive Conditions with Respect to Steel Safeguard Measures*, Inv. No. 332-452, USITC Pub. 3632 (Sept. 2003) (Final) at 4-4.

39 *Id*. at xxvii.

40 *Id*. at vii-viii.

41 United States Geological Survey, *Mineral Commodity Summaries* (2022) at 88-89, available at https://pubs.usgs.gov/periodicals/mcs2022/mcs2022.pdf.

42 U.S. Census Bureau, *U.S. International Trade in Goods and Services, Annual Revision* (June 7, 2022) at Exhibit 7, available at https://www.census.gov/foreign-trade/Press-Release/ft900/final_2021.pdf.

for between 1 percent and 9.8 percent of total production costs in the seven industries that consume the largest volume of steel products.[43] The study concluded that the impact of the Section 232 measures on prices in these industries "ranged from zero to economically insignificant."[44] The measures thus had no meaningful impact on employment in downstream sectors, or in the U.S. economy more broadly. Total U.S. manufacturing employment increased from approximately 12.4 million workers at the beginning of 2017 to approximately 12.8 million workers in February 2020, just before the COVID-19 shutdowns, and it has returned to approximately 12.8 million workers as the economy has recovered.[45] Likewise, total U.S. unemployment fell steadily from 4.7 percent in January 2017 to 3.5 percent in February 2020, and it has returned to 3.6 percent as the economy has recovered.

The negligible impact on steel consuming industries and the broader economy is consistent with steel price trends following the Section 232 action. While prices increased temporarily immediately after imposition of the Section 232 measures, the increase was temporary, and prices declined rapidly as U.S. producers ramped up production and supply chains adjusted. By the end of 2019, steel prices were lower than they were in 2017, prior to the announcement of the investigation.

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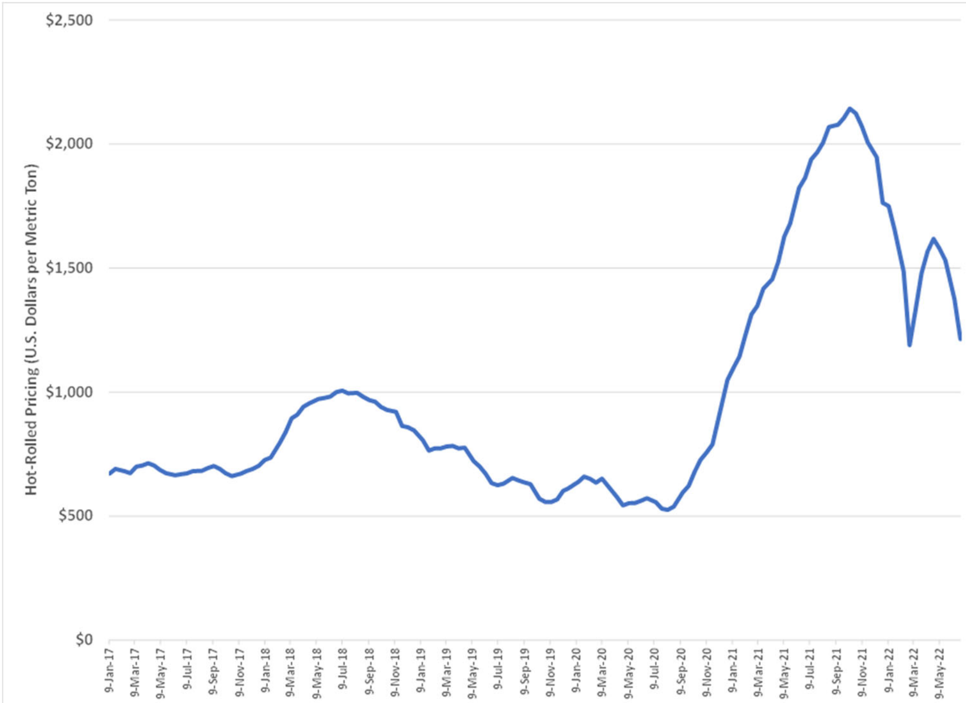
[43] Adam S. Hersh and Robert E. Scott, *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*, Economic Policy Institute (Mar. 24, 2021) at 19 (Table 1), attached as **Exhibit 4**.

[44] *Id*.

[45] *See* FRED, All Employees, Manufacturing, St. Louis Fed. (accessed June 30, 2022).



Source: SteelBenchmarker

U.S. inflation remained low throughout the period between the initiation of the Section 232 investigation and the outbreak of COVID-19, including during the period of temporary steel price increases in 2018. Annual inflation in the years from 2017-2019 was 2.1 percent, 1.9 percent, and 2.3 percent, respectively.[46]

Gradual declines in U.S. steel prices continued until the outbreak of COVID-19. The pandemic led to widespread shutdowns and supply chain disruptions throughout the global economy, including in the U.S. steel industry. Along with the rest of the economy, the steel industry reduced output dramatically in response to plummeting demand. In the spring of 2020, the domestic steel industry's capacity utilization rate fell as low as 54.6 percent. Faced with the prospect of long-term demand depression, end users and distributors alike rapidly destocked

46 News Release, *Consumer Price Index – May 2022*, U.S. Bureau of Labor Statistics (June 10, 2022) at Table 5, available at https://www.bls.gov/news.release/pdf/cpi.pdf.

inventories. The economic recovery, however, occurred more rapidly than expected. After contracting at annualized rates of 5.1 percent and 31.2 percent, respectively, in the first two quarters of 2020, U.S. GDP grew at an annualized rate of 33.8 percent in the third quarter and at an average annualized rate of 5.3 percent in the quarters through the end of 2021.[47]

This swift economic recovery was coupled with a shift in consumption away from services and towards goods, and durable goods in particular.[48] The combination of facility shutdowns and surging demand for goods led to temporary supply shortages and price spikes in industries ranging from lumber, to steel, to semiconductors.[49] This is a global phenomenon. According to an analysis by Pew Research, annual inflation in the first quarter of 2022 was at least two times higher than in the first quarter of 2020 in 37 out of the 44 economically significant countries examined.[50] Inflationary pressure around the world, especially on food and energy prices, has been exacerbated by Russia's invasion of Ukraine. According to the Federal Reserve's modeling, geopolitical unrest related to the invasion has contributed approximately 1.3 percentage points to global inflation, as the conflict "destroy{s} human and physical capital, shift{s} resources to less efficient uses, divert{s} international trade and capital flows, and disrupt{s} global supply chains."[51]

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[47] News Release, *Gross Domestic Products (Second Estimate), Corporate Profits (Preliminary Estimate)*, U.S. Bureau of Economic Analysis (May 26, 2022) at Table 1, available at https://www.bea.gov/news/2022/gross-domestic-product-second-estimate-and-corporate-profits-preliminary-first-quarter.

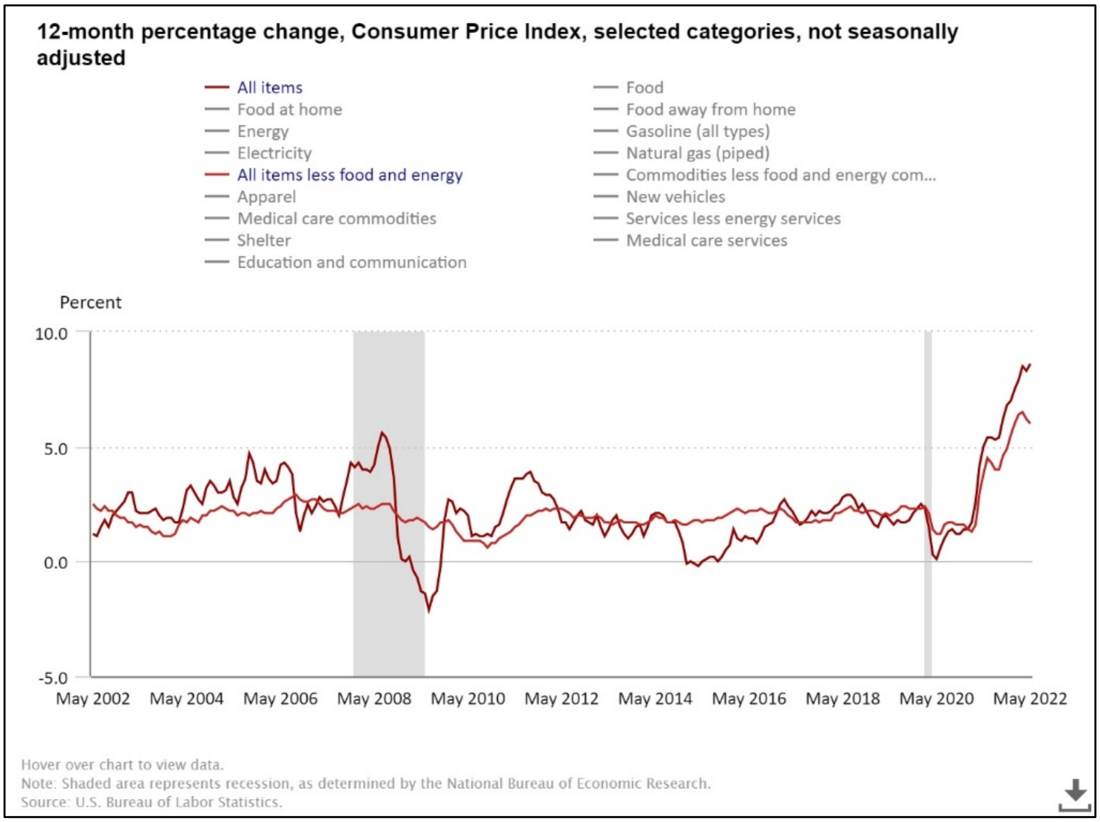
[48] *See, e.g.*, Demetrio Scopelliti, *COVID-19 Causes a Spike in Spending on Durable Goods*, Monthly Labor Review (Nov. 2021), attached as **Exhibit 12**.

[49] *See, e.g.*, Susan Halper and Evan Soltas, *Why the Pandemic Has Disrupted Supply Chains*, White House Blog (June 17, 2021), attached as **Exhibit 13**.

[50] Drew Desilver, *In the U.S. and Around the World, Inflation Is High and Getting Higher*, Pew Research Center (June 15, 2022), attached as **Exhibit 14**.

[51] Dario Caldara *et al.*, *The Effect of the War in Ukraine on Global Activity and Inflation*, FEDS Notes (May 27, 2022), attached as **Exhibit 15**.

The onset of higher U.S. inflation rates coincided with these phenomena and not with any U.S. trade action, whether the Section 232 action or the Section 301 action. A recent analysis concludes that "{t}he timing of the tariffs clearly shows no correlation with inflation," and that "the size of the tariffs . . . are simply insufficient for their removal to make a dent in current inflation."[52]



The Section 232 response has thus contributed to the national security objective of returning the U.S. steel industry to a healthier and more sustainable development trajectory. It has done so without harming downstream consumers or impacting broader economic conditions. Recent inflationary pressure has been caused by temporary supply-demand imbalances and supply

52 Adam S. Hersh, *Revoking Tariffs Would Not Tame Inflation But it Would Leave our Supply Chains Even More Vulnerable to Disruption*, Economic Policy Institute (June 21, 2022), attached as **Exhibit 3**.

chain disruptions related to COVID-19 and the Russian invasion of Ukraine. Arguments that further narrowing the scope of the Section 232 program would have any impact on U.S. inflation rates are inconsistent with the facts.

V. THE SECTION 301 TARIFFS ON CHINA HELP ENSURE ROBUST DOMESTIC SUPPLY CHAINS FOR CRITICAL INDUSTRIES

The Section 301 tariffs imposed in response to China's acts, policies, and practices related to intellectual property and technology transfer are another important factor contributing to the long-term development of U.S. steel industry supply chains. China's industrial policy objectives in the steel industry have never been limited to simply expanding production and capacity for steel mill products. Instead, the government has sought to use the expansion of steel mill production in large part to support the development of higher value-added downstream industries. This involves not only subsidizing basic steel production to ensure a stable supply of low-cost inputs to downstream industries, but also the acquisition of advanced production technologies using many of the same means that the Chinese government has used to acquire advanced technologies in other sectors.

The acquisition and application of advanced technologies to enhance production capabilities in more traditional manufacturing sectors was an underappreciated aspect of China's Made in China 2025 plan, and it remains a point of emphasis in current steel industry industrial policies. The Made in China 2025 policy called for "supporting priority industries, high end products, and key sectors in implementing technological restructuring" and "promoting development of {traditional industries including steel} towards the high end of the value chain."[53]

[53] *Notice of the State Council Regarding Promulgation of Made in China 2025* (国务院关于印发《中国制造2025》的通知), State Council Doc. No. 28 (May 8, 2015) at § 1.7.

More recent steel industrial policy plans retain this emphasis on supporting advanced production for higher value-added downstream applications. The 2022 *Guiding Opinion of Three Ministries Regarding Promoting High-Quality Development in the Steel Industry* calls for "supporting steel enterprises in developing with an eye towards industrial upgrading and strategic emerging industries, and towards prioritizing development of high-quality special steels, special alloy steels for high-end equipment applications, and other diverse, low-volume steel products used in core and foundational components. . . ."[54]

Given the Chinese government's continued interventions in support of technology acquisition and downstream steel manufacturing, the Section 301 response remains a vital bulwark against the threat of Chinese dominance in advanced, high-value-added steel industry supply chains. U.S. steel producers, including Nucor, are only as healthy as their customer base. China, moreover, has not lived up to its commitments under the Phase One trade agreement entered into on February 14, 2020.[55]

As with the Section 232 measures, the Section 301 tariffs have had no negative impact on U.S. prices or employment and may have contributed to positive employment trends in the United States. The Section 301 tariffs went into effect beginning in 2018, long before U.S. inflation began increasing due to COVID-19 and the Russian invasion of Ukraine. The Chinese government, moreover, engineered a depreciation of the RMB against the dollar by approximately 15 percent, which partially offset the effect of the nominal Section 301 tariff rates on prices and demand for

54 *Guiding Opinion of Three Ministries Regarding Promoting High-Quality Development in the Steel Industry*, Ministry of Industry and Information Technology Doc. NO. 6 (Feb. 7, 2022) at § 2.11.

55 *See, e.g.*, Chad P. Bown, *U.S.-China Phase One Tracker: China's Purchases of U.S. Goods*, PIIE (Mar. 11, 2022), attached as **Exhibit 16**.

imports of Chinese goods.[56] In other words, the "{Section} 301 tariffs have nothing to do with the current inflationary spike."[57] As noted above, both U.S. manufacturing employment and total U.S. employment increased between the implementation of the Section 301 tariffs and the outbreak of COVID-19, and both have recovered along with the broader economy, notwithstanding continuation of the tariffs.

The United States should not sacrifice its leverage in future negotiations with China by revoking Section 301 tariffs that are important to U.S. supply chain security and that do not meaningfully contribute to inflationary pressure or negatively impact the broader economy.

VI. CONCLUSION

The economic impact of the Section 232 and Section 301 measures has thus been overwhelmingly positive for the U.S. steel industry. Neither action, moreover, has negatively affected downstream consumers or to the U.S. economy.

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[56] Adam S. Hersh, *Testimony Submitted to the U.S. International Trade Commission*, Inv. No. 332-591 (July 8, 2022) at 2.

[57] Adam S. Hersh, *Revoking Tariffs Would Not Tame Inflation But it Would Leave our Supply Chains Even More Vulnerable to Disruption*, Economic Policy Institute (June 21, 2022), attached as **Exhibit 3**.

EXHIBIT LIST		
Exhibit No.	**Exhibit**	**Security**
1	American Iron and Steel Institute Industry Data	Public
2	OECD Steel Committee, *Steel Market Developments*, 84th Session (Mar. 5, 2018)	Public
3	Adam S. Hersh, *Revoking Tariffs Would Not Tame Inflation But it Would Leave our Supply Chains Even More Vulnerable to Disruption*, Economic Policy Institute (June 21, 2022)	Public
4	Adam S. Hersh and Robert E. Scott, *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*, Economic Policy Institute (Mar. 24, 2021	Public
5	*Sustainability of the American Steel Industry*, American Iron and Steel Institute (Mar. 2021)	Public
6	Ali Hasanbeigi & Cecilia Springer, *How Clean is the U.S. Steel Industry? An International Benchmarking of Energy and CO_2 Intensities*, Global Efficiency Intelligence (Nov. 2019)	Public
7	*Steel Industry Set to Pivot to Hydrogen in $278 Billion Green Push*, Bloomberg NEF (Dec. 1, 2021)	Public
8	Hector Forster, *Banks Seeking to Finalize Framework for Steel Decarbonization in Q2*, SP Global (Feb 9, 2022)	Public
9	*Moving Towards Zero-Emission Steel: Technologies Available, Prospects, Timeline and Costs*, European Parliament (Dec. 2021)	Public
10	Press Release, *ArcelorMittal Decarbonization Project in Hamilton, Canada Confirmed with the Announcement of a CAD$500M Investment by the Government of Ontario*, ArcelorMittal Website (Feb. 15, 2022)	Public

EXHIBIT LIST		
Exhibit No.	**Exhibit**	**Security**
11	*91st Session of the OECD Steel Committee – Chair's Statement*, OECD (Mar. 2022)	Public
12	Demetrio Scopelliti, *COVID-19 Causes a Spike in Spending on Durable Goods*, Monthly Labor Review (Nov. 2021)	Public
13	Susan Halper and Evan Soltas, *Why the Pandemic Has Disrupted Supply Chains*, White House Blog (June 17, 2021)	Public
14	Drew Desilver, *In the U.S. and Around the World, Inflation Is High and Getting Higher*, Pew Research Center (June 15, 2022)	Public
15	Dario Caldara *et al.*, *The Effect of the War in Ukraine on Global Activity and Inflation*, FEDS Notes (May 27, 2022)	Public
16	Chad P. Bown, *U.S.-China Phase One Tracker: China's Purchases of U.S. Goods*, PIIE (Mar. 11, 2022)	Public

EXHIBIT 1

Year	Production (Tons)	Capacity (Tons)	Utilization (%)	Sales (Million)	Net Income (Million)	Net Margin (%)
2004	109,879,000	116,100,000	94.60%	$38,504	$3,216	8.40%
2005	104,605,000	119,550,000	87.50%	$41,186	$2,918	7.10%
2006	108,621,240	123,526,808	87.90%	$42,701	$3,861	9.00%
2007	108,227,178	124,410,972	87.00%	$48,081	$3,360	7.00%
2008[1]	100,696,663	124,688,882	80.80%	$66,606	$4,701	7.10%
2009	64,150,172	124,503,002	51.50%	$32,188	($1,746)	-5.40%
2010	88,730,450	126,067,417	70.40%	$46,564	($251)	-0.50%
2011	95,236,975	127,892,088	74.50%	$57,373	$914	1.60%
2012	97,769,374	129,983,657	75.20%	$51,981	($388)	-0.70%
2013	95,766,186	124,885,268	76.70%	$49,419	($906)	-1.80%
2014	97,194,908	125,412,785	77.50%	$53,874	$975	1.80%
2015	86,912,000	124,000,000	70.10%	$42,301	($1,737)	-4.10%
2016	86,504,000	122,700,000	70.50%	$40,129	$879	2.20%
2017	89,962,000	121,600,000	74.00%	$48,122	$2,648	5.50%
2018	95,468,000	122,100,000	78.20%	$57,885	$5,099	8.80%
2019	96,740,143	121,200,000	79.80%	$52,350	$1,482	2.80%
2020	80,173,447	117,700,000	68.10%	$39,558	$242	0.60%
2021	94,719,681	116,078,040	81.60%			

Source: AISI Annual Statistical Reports

EXHIBIT 2

ITEM 3B: STEEL MARKET DEVELOPMENTS

84th session of the Steel Committee

Paris, March 5, 2018

Contact: Structural Policy Division,

Mr. Daichi MABASHI, Daichi.MABASHI@oecd.org;

Mr. Fabien MERCIER, Fabien.MERCIER@oecd.org;

Mr. Christian STEIDL, Christian.STEIDL@oecd.org

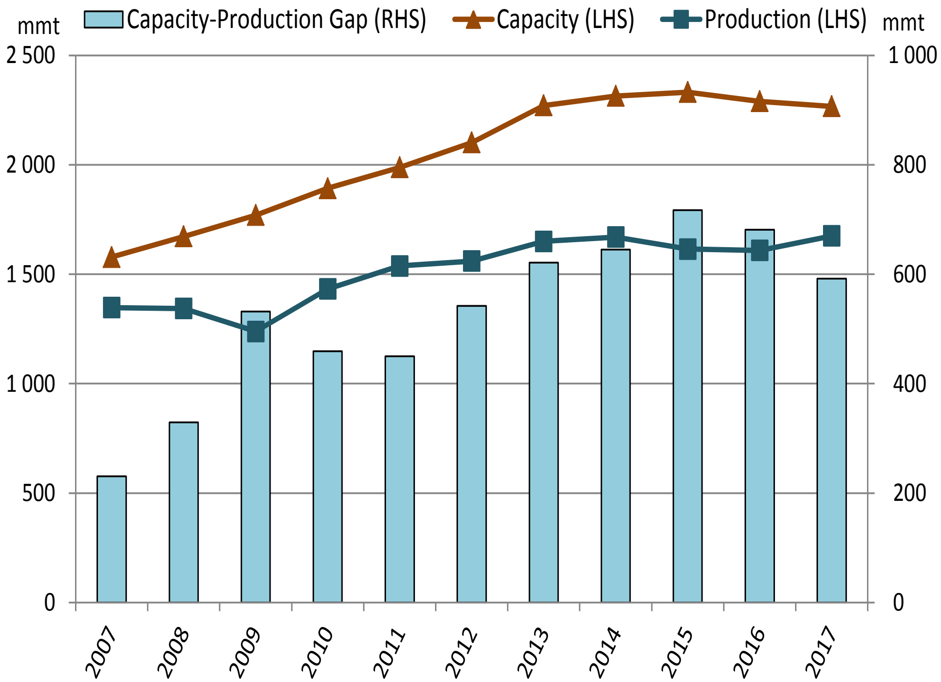
OECD

BETTER POLICIES FOR BETTER LIVES

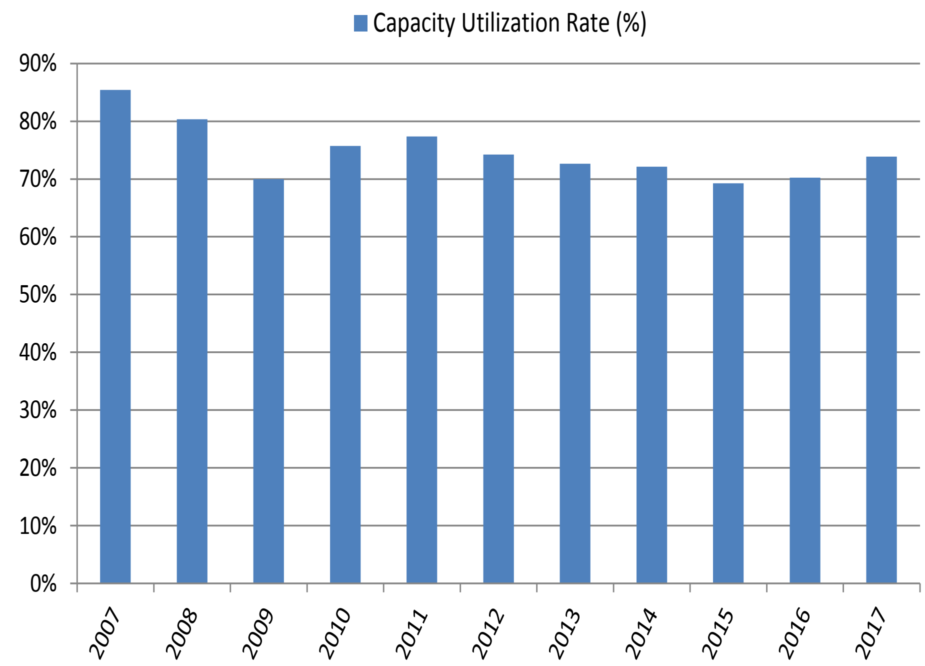
Global capacity developments

Global crude steelmaking capacity and production

Capacity-Production gap (mmt)



Capacity utilisation rate



Note: Capacity data reflects all information on changes up to December 2017. Annual production data for 2017 is calculated by applying the y-o-y growth rate for Jan-Nov production of 2017 to the annual production in 2016.
Source: OECD for capacity and World Steel for production.

EXHIBIT 3

Posted June 21, 2022 at 2:00 pm by **Adam S. Hersh**

Revoking tariffs would not tame inflation

But it would leave our supply chains even more vulnerable to disruption

Key takeaways:

- **Section 232 and 301 tariffs have nothing to do with the current inflationary spike**. The tariffs—implemented in 2018—had little effect on U.S. prices, and inflation only spiked after the pandemic recession began in February 2020.
- **Eliminating tariffs would not significantly reduce inflation**. At best, removing these tariffs would result in a one-time price decrease of 0.2%—a drop in the bucket when consumer prices have risen by more than three times as much, on average, *every month* since January 2021, driven largely by pandemic-related global supply chain disruptions and the war in Ukraine.
- **Removing these tariffs would undermine U.S. steel and aluminum industries and increase domestic dependence on unstable supply chains**. Tariff removal would result in job losses, plant closures, cancellations of planned investments, and further destabilize the U.S. manufacturing base at a time of intensifying strategic importance for good jobs, national security, and the race to green industry.

With dwindling options on inflation and a mounting chorus of special interest business lobbies, the Biden-Harris administration is **reportedly** considering removing some Trump-era tariffs in an effort to moderate rising prices in the U.S. economy.

Tempting as such an action may seem, it is certain to have unnoticeable effects on overall prices—at best. And the action will ensure, moving forward, that our supply chains will be even more vulnerable to the kinds of disruption risks we are seeing play out right now. These tariffs offer a tangible policy response to a real-world economy rife with market failures that invalidate the predictions of canonical economic trade models used to argue against keeping the tariffs.

In the absence of a more comprehensive approach to U.S. industrial strategy, the tariffs are working to resuscitate America's industrial base and have done so with no meaningful adverse impacts on prices. Pulling the rug from under this rebuild now, without first putting in place other policy solutions to address costly market failures, risks undoing this progress and jeopardizing the financial conditions in industries that are critical to building the infrastructure and renewable energy investments needed to power future economic growth.

Two broad sets of tariffs implemented under U.S. trade law in 2018 are under review by the Biden-Harris administration. The first and biggest group retaliated against findings of intellectual property theft and forced technology transfer in U.S. companies doing business in China, following a United States Trade Representative (USTR) investigation under Sec. 301 authority. This led the Trump administration to negotiate a "**Phase One**" economic agreement with China.

The second set of tariffs invoked national security concerns under Sec. 232 of the trade act to bolster **U.S. steel** and **aluminum industries**, perennially at risk of financial insolvency amid long-running, state policy-driven global supply gluts. Since joining the World Trade Organization in 2001, China's mushrooming steel investment accounted for nearly 70% of the growth in the world's steel production capacity—a 423% increase—though the tariffs apply more broadly to cover imports from a range of countries where industrial policies are driving investment on a non-commercial basis, worsening chronic overcapacity in global steel and aluminum markets, among other energy- and carbon-intensive basic industries.

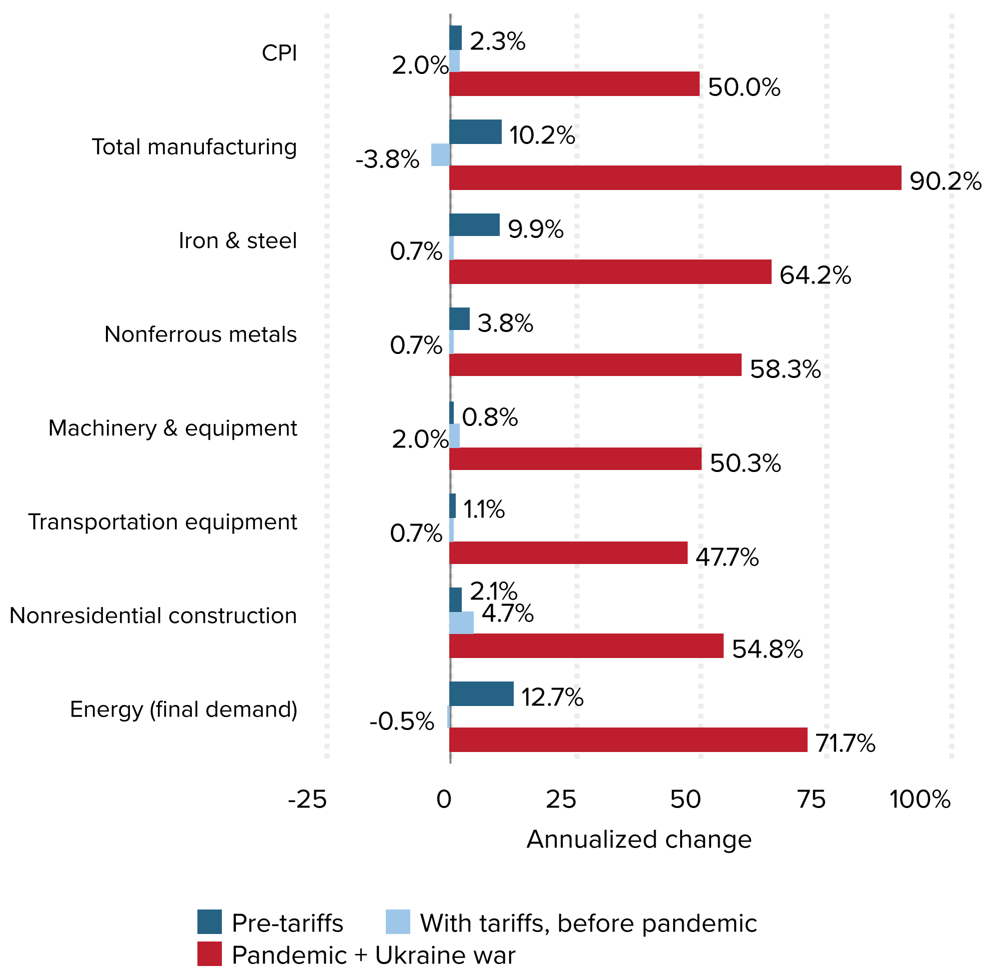
Ever since these tariffs were enacted, business lobbies and orthodox economists have warned that tariffs would devastate the economy. One can debate what alternative policy outcomes were possible or preferable, but it is clear that tariffs didn't make the sky fall. The data show no material adverse impact on consumers or the broader U.S. economy. Previous EPI analysis has shown that the Section 232 measures on **steel** and **aluminum** imports have had no meaningful real-world impact on the prices of the leading metal-consuming products (such as motor vehicles, machinery, construction materials, and more).

The unspectacular effects of these tariffs on prices are plain to see by breaking up the recent experience into three periods. **Figure A** compares the average inflation rate performance across consumer price and various key industrial goods price measures in the period preceding these tariffs, the nearly two-year period with tariffs in effect prior to the pandemic, and from the pre-pandemic business cycle peak through the latest May 2022 data. Inflation, broadly, decelerated substantially after implementation of the tariffs in the pre-pandemic period. This is true for manufactured goods writ large, as well as for consumer prices overall, measured in the Consumer Price Index (CPI). Tellingly, price increases for steel and aluminum slowed sharply to 0.7-0.8% annually from roughly 10% and 4% annually, respectively—largely attributable to U.S. producers redeploying and reinvesting in domestic production capacity amid improved financial conditions resulting from the tariffs.

Price increases for transportation equipment—the biggest metals-consuming industry, including for cars and trucks and their parts—slowed by more than one-third. In some other leading metal-using industries, prices accelerated modestly, but nothing to affect the overall downward trend in prices, and nothing on the order of doomsday predictions prophesied by tariff opponents. In other words, for two years markets and policymakers adjusted to these measures *before* the pandemic without a hiccup. Inflation, broadly, only spiked after February 2020; it is simply not plausible to infer that these tariffs had a causal role in pandemic-era inflation.

FIGURE A

Tariffs have nothing to do with the current inflationary spike



Note: Pre-tariffs = April 2016–February 2018; With tariffs, before pandemic = March 2018–January 2020; Pandemic = February 2020–May 2022.

Source: EPI analysis of BLS 2022 data.

It should not be surprising that these tariffs, though affecting a wide swath of U.S. imports, had little effect on U.S. prices. First, Chinese policymakers responded to the tariffs by depreciating their exchange rate by 15% from February 2018 to late 2019, offsetting much of the price impact by making *all* Chinese exports to the United States that much cheaper in dollar terms.

Second, the tariff measures themselves are rather porous, allowing significant shares of imports to pass around these duties. The Department of Commerce has granted hundreds of thousands of exclusions to both the Section 301 and Section 232 tariffs where businesses could demonstrate adverse economic impacts from limited alternative domestic sources, and where deemed essential under the COVID-19 public health emergency. More importers bypassed the tariffs by transshipping products through countries with preferable access to U.S. markets, perhaps after performing some trivially minimal transformation to qualify as a different product under U.S. trade rules.

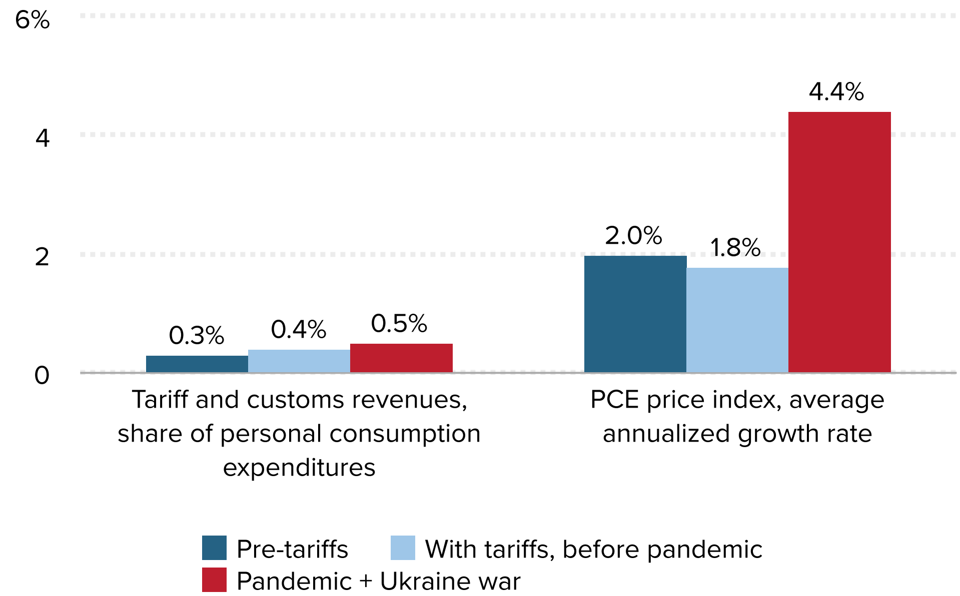
Finally, the tariffs are levied on a much smaller base than is implied by the volume of imports covered: the primary steel and aluminum and intermediate inputs of more processed parts and materials. These make up just a fraction of the overall cost of a final good supplied to consumers. For example, looking at pre-pandemic prices, the steel inputs required to make a new U.S. car amount to **just 2%** of the sales price, compared with 40% for semiconductors and other electronic components.

This suggests that removing the tariffs now—even ignoring impacts on already strained supply chains—would have a similarly negligible impact on the surging inflation we are now experiencing. **Figure B** illustrates why: overall tariff and customs duties paid on U.S. imports amount to a trivial share of overall personal consumption expenditures. In the nearly two years following the Sec. 232 and Sec. 301 tariffs, customs duties as a share of consumer expenditures increased from 0.3% to 0.4%, on average, relative to the period preceding tariffs. Even if one were to assume (implausibly) this was due to Sec. 301 and 232 tariffs and no other factors, they amounted to at most a 0.1% increase in prices.

But, of course, there were other economic factors at work and the increased tariff collection did not translate into higher inflation. In fact, Figure B shows that consumer prices decelerated from 2.0% to 1.8%, on average, annualized, after implementation of the tariffs and through the business cycle peak in the first quarter of 2020. Customs duties continued to ratchet up during the pandemic, minimally and mechanically, as people shifted from consuming services—less available in the pandemic—to goods, and imports surged with a stronger U.S. dollar, adding another 0.1% as a share of consumer spending. At best, removing these tariffs would result in a one-time price decrease of 0.2%—a drop in the bucket when you consider consumer prices have risen by more than three times as much, on average, *every month* since January 2021.

FIGURE B

Eliminating tariffs would yield at best inconsequential gains for consumers



Note: Pre-Trump tariffs = 2016, third quarter–2018, first quarter; With tariffs, before pandemic = 2018, second quarter–2019, fourth quarter; Pandemic = 2020, first quarter–present.

Source: EPI analysis of BEA 2022 data.

This is not to say that the tariffs had no impact—they did, particularly in helping U.S. steel and aluminum producers. The increase in the price of imported metal products makes it possible for U.S. producers to achieve economically viable financial margins and stabilize expectations of market conditions enough to entice reinvestment in new production capacity. Nonetheless, conditions of global chronic glut–especially given **expected global growth slowdown** from China's partial economic lockdown, the war in Ukraine, and ongoing pandemic-related supply chain disruptions—continue to threaten U.S. metals industries. This affects the strategic goods they produce and the millions of jobs they support directly and indirectly—and a robust manufacturing base more generally. The tariffs may be a crude instrument, but absent other feasible policy options to address the glaring market failures in global trade, they remain a critical tool to support ongoing industrial rebuilding and to ensure that these essential industries have the necessary resources for technology investments to decarbonize moving forward.

Congress applied different criteria for considering these two sets of tariff measures. The Sec. 232 measures clearly prioritize national security concerns over economic efficiency and consumer welfare; under conditions of chronic global gluts, U.S. steel and aluminum producers have been perennially at the brink of economic viability to the extreme that **only one** producer in a NATO country is capable of producing military- and aerospace-grade aluminum. The

Department of Commerce identifies an 80% capacity utilization rate in steel production as a minimum threshold for long-term financial viability of the industry. In the business cycle prior to the 232 tariffs, U.S. steelmakers reached this level of activity less than 5% of the time; though this has improved to 26% of the time since March 2018. The Sec. 232 measures afforded metals producers the financial breathing space to start rebuilding the industry with expanded investment and job creation.

As for the Sec. 301 tariffs, the Phase One agreement with China has gone largely **unfulfilled** in terms of the bulk commodity purchases pledged by Chinese policymakers and the promise to continue negotiations on further prying open Chinese markets to U.S. foreign direct investment and intellectual property monopolies. Ironically, however, if Chinese policymakers had lived up to their end of the bargain, the United States would arguably be in a worse position today in regard to inflation and supply-chain vulnerabilities. The kinds of intellectual property protections and free reign for their foreign investment in China that U.S. business interests sought would make it easier for big corporations to move—or merely threaten to relocate—operations to China, and to book profits in offshore tax havens.

People often focus on trade's tendency to push down prices. But by exporting in bulk U.S. natural gas and agricultural products to China, Phase One would have made these commodities scarcer, and therefore prices paid by American businesses and households for electricity and food would be higher.

It is clear that the United States is in dire need of an economic strategy rethink. Until a more comprehensive policy approach to U.S. industrial development is heeded, policymakers should at least keep in place the parts of policy that are working to promote U.S. industry.

EXHIBIT 4

Economic Policy Institute

Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures

Report • By Adam S. Hersh and Robert E. Scott • March 24, 2021

Executive summary

A strong domestic steel industry is critical to U.S. national defense, to the health of America's critical infrastructure, and to the competitiveness of many domestic manufacturing industries. Beyond supplying high-quality steel in sufficient quantities to meet national defense needs, the U.S. steel industry also plays a critical role in supporting the welfare of other industries essential to the broader health and operation of the economy and government. For decades, chronic global steel supply gluts have undermined the U.S. steel industry with surging imports to U.S. markets undercutting prices, domestic production, employment, and investments. This oversupply jeopardizes the fundamental health of the U.S. steel industry—one of the cleanest and most energy-efficient steel industries globally.

Global steel surpluses are the result of chronic global excess steelmaking capacity in major exporting countries, including China, India, Brazil, Korea, Turkey, the EU, and other nations, much of it from state-owned and state-supported enterprises that are heavy polluters. In 2018, the United States determined that steel imports posed significant risks to national security and imposed a 25% tariff and other trade remedies on certain steel products under Section 232 of the Trade Expansion Act of 1962. This report examines the impacts of these measures on domestic steel production and consuming industries, and it recommends that these measures be retained until a multilateral solution to the problem of global excess steel capacity can be achieved.

Key conclusions of this report include:

- **The U.S. steel industry is a vital component of the American economy.** In 2017, prior to Sec. 232 import measures, the U.S. steel industry supported nearly 2 million jobs that paid, on average, 27% more than the median earnings for men and 58% more than the median for women.

- **Global steel markets are plagued by chronic excess capacity.** Measured by the Organisation for Economic Co-operation and Development (OECD), global excess

SECTIONS

capacity is 5.8 times the productive capacity of the entire U.S. steel industry. Massive overcapacity driven by subsidies and other anti-competitive policies can only be disposed of by these producers flooding U.S. and other markets with exports, posing material harm to U.S. steel producers and risking the U.S. industry's ability to maintain operations, grow, and invest in areas essential to national defense, critical infrastructure, and broader economic welfare.

- **The economic picture for U.S. steel producers brightened considerably beginning in 2018 until the pandemic began.** Following implementation of Sec. 232 measures in 2018—and prior to the global downturn in 2020—U.S. steel output, employment, capital investment, and financial performance all improved. In particular, U.S. steel producers announced plans to invest more than $15.7 billion in new or upgraded steel facilities, creating at least 3,200 direct new jobs, many of which are now poised to come online. In addition, more than $5.9 billion was invested by nine firms in plant acquisitions as part of industry restructuring to increase efficiency, preserving additional jobs at those facilities.

- **Administrations dating back to the mid-20th century have worked to mitigate the effects on U.S. steel producers of unfair global practices.** For decades, unfair trade practices have threatened the U.S. steel industry with repeated crises. In this context, the recent Sec. 232 import measures simply continue a long thread of executive policy actions to provide relief for the damages wrought on U.S. producers by unfair competition and global surplus capacity in steel. For example, President Obama pressed the excess capacity issue through diplomatic channels at the G20 and in the U.S.-China Strategic and Economic Dialogue and under U.S. law, overseeing 370 trade remedy actions on imported steel products.

- **China has massively and rapidly expanded its steel production capacity.** China, the world's largest steel producer, used subsidies and other forms of distortionary government support to expand steel capacity by 418%, or 930 million metric tons (MMT), since 2000, such that by 2019 it controlled just shy of half of global steel capacity. Chinese steel firms are also investing in developing capacity overseas, including in Europe, Asia, and Latin America, in efforts to evade trade enforcement actions.

- **Countries across several continents followed in China's footsteps, developing more excess capacity.** Rapid growth in overcapacity is not limited to China. Other major steel-producing countries achieving rapid capacity growth between 2000 and 2019 include India, Turkey, Iran, South Korea, Vietnam, Russia, Brazil, Mexico, and Taiwan, with increases ranging from 8 MMT in Taiwan to 95 MMT in India. These are all countries where the state dominates or plays a significant role directing steel and other heavy industries, where government policies provide trade-distorting support to steel producers, or where producers have histories of unfair trade the in U.S. market. Governments are also intervening in markets to maintain capacity, including in the EU.

- **Rapid expansion elsewhere comes with falling domestic production.** In the United States, by contrast, total steel production capacity fell by 5.5 MMT to 110 MMT in 2019, with world market share shrinking to less than 5% in 2019 from 10% in 2000.

- **Section 232 measures delivered near-immediate benefits.** Once implemented in 2018, such Sec. 232 steel import measures as 25% tariffs on imported steel and import quotas on select countries helped curb U.S. steel imports by 27% by 2019. Import penetration of the U.S. market fell to 26% of all steel consumed in the United States in 2019, from 35% in 2017.
- **Section 232 measures have had no meaningful real-world impact on the prices of steel-consuming products (such as motor vehicles).** Econometric analysis shows that price changes in basic steel products had statistically zero or economically negligible causal effects on prices of "downstream," or steel-using goods, including new motor vehicles, construction equipment, electrical equipment and household appliances, motor vehicle parts, nonresidential construction goods, food at home, and durable goods more broadly—industries accounting for the majority of U.S. steel consumption. This lack of impact is unsurprising, given that steel is just one cost in a long list of inputs to production.
- **Widespread exclusions to Section 232 measures mitigate positive economic impacts.** Despite benefiting U.S. steel producers and having no discernible impact on steel consumers, Sec. 232 import measures have been progressively undermined by nearly 108,000 product-specific exclusions through July 2020 alone and broad, countrywide tariff exemptions for roughly one-third of all imports.
- **Jobs, national security, and the steel industry itself are at risk if Section 232 measures are discontinued or weakened in the post-pandemic economy.** The diminished global economic outlook as the world emerges from the COVID-19 pandemic means that the brief reprieve from a global supply glut and nascent recovery enjoyed by U.S. steelmakers is likely to evaporate. Premature relaxation or elimination of Sec. 232 measures, in the absence of any concrete measures to eliminate excess capacity and trade-distorting policies that contribute to the global steel glut, would put the U.S. steel industry at risk, imperiling new investments and hundreds of thousands of good jobs in steelmaking and in other indirect and induced jobs supported by steelmaking activity.
- **Relaxing or reversing Section 232 measures also would provide an advantage for low-priced, high carbon-polluting producers overseas.**
- **A permanent global solution is the best answer.** The Biden-Harris administration should press for a permanent multilateral solution to the chronic problem of excess global steel production capacity. But until such a solution is achieved, national security concerns and ensuring a sustainable economic recovery for the steel industry require the continuation of comprehensive Sec. 232 import measures and other policies to preserve the U.S. steel industry.

Introduction

In January 2018, the U.S. Department of Commerce (Commerce) concluded an investigation determining that imports of steel products pose significant risks to U.S.

national security and the industry's ability to maintain operations, grow, and invest in areas essential to national defense, critical infrastructure, and broader economic welfare under Section 232 of the Trade Expansion Act of 1962 (BIS 2018). Sec. 232 provides the president with authority to impose restrictions on products for which an investigation determines that the quantity or circumstances of imports to the United States "threaten to impair the national security" (CRS 2020).[1] Beyond supplying high-quality steel in sufficient quantities to meet national defense needs, the U.S. steel industry also plays a critical role in supporting the welfare of other industries essential to the broader health and operation of the economy and government.

Following the Commerce determination, President Trump authorized tariffs of 25% on imported steel products in March 2018.[2] The move also provided flexibility in implementation with respect to country of origin and product coverage and allowed domestic parties to petition for exclusion from tariffs where substitute domestic-sourced products were insufficiently available.[3] This action follows a continuous thread of presidents—including President Obama—seeking to redress unfair trade practices that for decades have kept the U.S. steel industry on the brink of crisis.

President Biden and his administration undoubtedly will want to reevaluate the policies inherited from their predecessors. To provide perspective for this reevaluation, this report reviews recent developments in global steel markets and analyzes the economic impacts of Sec. 232 steel import measures to assess their efficacy in reversing the long-term trends undermining U.S. steel producers, as well as for evaluating the relative costs and benefits of this policy. Specifically, we examine the effects of Sec. 232 measures on:

- the decades-long problem of chronic global surplus capacity in steel plaguing U.S. producers
- the economic viability of U.S. steel producers
- downstream consumers of steel products
- expected effects of prematurely relaxing or removing Sec. 232 measures

The results presented here demonstrate that Sec. 232 measures on imported steel products remain an important and necessary policy tool. The U.S. steel industry is critical not just for national defense, but also for infrastructure sectors, including electricity systems and equipment, transportation infrastructure and equipment, food and agricultural systems, water systems, energy security and independence, and metal-making and other advanced manufacturing uses. It is also a vital component of the American economy. In 2017, prior to the Sec. 232 import measures and the pandemic, the U.S. steel industry supported nearly 2 million jobs that paid, on average, 27% more than the median earnings for men and 58% more than the median for women (Schieder and Mokhiber 2018; AISI 2018).

Currently, the United States has an excessive dependence on unreliable foreign sources to supply national needs. In 2020, the pandemic and resulting economic contraction showed the dire consequences of reliance on uncertain foreign supplies for personal protective equipment, critical medical goods, and supplies of many other essential products. Policymakers should heed this sober warning when considering how to secure the future for U.S. steel production.

Policy action under Sec. 232 follows decades of a mounting crisis for U.S. steel producers that risks their continued ability to meet the needs of national defense, critical infrastructure, and the broader domestic economy. Steel producers support good-paying, middle-class jobs both directly and indirectly in related industries and throughout local communities where they serve as anchors for regional economies. In 2001, a similar Commerce investigation found “no probative evidence” that imported semi-finished steel products threatened U.S. producers (Bureau of Export Administration 2001). This determination resulted in severe negative consequences for the domestic industry—soon thereafter, nearly 40 U.S. steel producers declared bankruptcy (CRS 2003).

The threat to U.S. steel producers has only worsened in the intervening period, as chronic overcapacity in foreign steel-producing industries has become a permanent feature of global steel markets, driven by countries supporting their national industries on noncommercial terms. A flood of underpriced imports to the United States and third-country markets has done significant harm to U.S. producers and put the future viability of U.S. steel production in jeopardy.

Section 232 measures on imported steel products serve as a last resort to preserve the U.S. steel industry and domestic industrial base. To be certain, the best policy outcome would be for President Biden to achieve a permanent, multilateral solution to the chronic problem of global excess steel capacity. But the failures of decades-long efforts to eliminate global overcapacity through multilateral diplomatic engagement, coupled with foreign governments’ failures to address persistent and growing excess capacity, leave U.S. policymakers to choose between Sec. 232 measures and losing an industry critical for national security and broader economic well-being. Our analysis finds the choice is clear: President Biden should maintain these measures while pursuing multilateral efforts to achieve a long-term solution to unfair competition in global steel. Backtracking on Sec. 232 measures now, without a global solution to surplus capacity, would leave the U.S. industry and steelworkers in an even more precarious situation as more steel production and good-paying American jobs are moved offshore, including to countries with the worst environmental records.

Chronic global overcapacity threatens U.S. steel industry

Over the past several decades, chronic conditions of oversupply have come to define global steel markets—there is significantly more capacity to produce steel than there is demand for steel around the world. This chronic excess capacity is a direct result of policies pursued in many countries to support domestic steel producers on anti-competitive terms, with negative consequences for producers elsewhere around the world. It is also due to the basic economics of production in highly capital-intensive industries like steel, which encourages firms to maintain high levels of production capabilities. For decades, the United States has sought multilateral solutions to this persistent problem to little avail. Scant progress on the excess capacity issue made through diplomatic channels, and continued deterioration of the situation faced by producers operating on a commercial basis, left few other viable options for U.S. policymakers.

Surplus capacity puts downward pressure on prices for steel products, squeezing producer profit margins to an extent that threatens the ability of firms to service debts; to invest in research and development in more advanced products and cleaner production technology; to maintain workers' jobs, compensation, and retiree pensions; and even to remain financially solvent. Businesses incur both fixed costs and variable costs in the course of steel production. Variable costs change with the quantity a firm produces, whereas fixed costs must be incurred no matter how much a firm produces. For example, in the case of steel, variable costs include the cost of material inputs like iron ore, scrap, and coal, as well as electricity and compensation for workers. However, capital-intensive industries like steel face enormous fixed costs for investments in production facilities and equipment that dominate total costs of production.[4]

The capital intensity of steel production has several economic consequences that contradict textbook economic models of production and competition. First, in industries like steel, the capital-intensive nature of production means that producers face increasing returns to scale—the more raw steel that is produced, the more efficient it is to produce additional output—such that the minimum efficiency of scale for entering the market with competitive costs is so large as to create a nontrivial addition to industrywide capacity (Crotty 2002). That is, in order to be viable, steelmakers must maintain large production capacity and, when expanding capacity, must add capacity in large chunks. Second, because fixed costs of production dominate variable costs, it is almost always desirable for producers to operate near full capacity in order to minimize the average cost of production. For producers in many countries, production exceeds what can be consumed in domestic markets, and the excess must be disposed of through exports.

Finally, the capital invested in fixed assets is quite specific, meaning the equipment cannot be easily redeployed to other uses outside of steel production, as is typically assumed in textbook models of economic competition. This means that, typically, productive capacity of financially nonviable steel producers is not removed from the market, but rather acquired by other producers in better financial standing. Thus, the market mechanism of price competition and creative destruction does not work well to self-regulate excess capacity in the industry (Crotty 2002). In fact, the OECD finds that foreign governments maintain policies and implement barriers that prevent the contraction of steelmaking capacity during economic downturns (Rimini et al. 2020). Combined, these features of the steel industry create incentives for producers to build big and run hot, no matter what other producers in the market do. But when all producers follow this logic, the result, in aggregate, is chronic overinvestment in productive capacity.

In order to maintain the viability of national steel industries under such financial conditions, many countries have instituted policies designed to maintain and expand production on noncommercial terms or other policies impermissible under international trade rules like the World Trade Organization (WTO)'s Agreement on Subsidies and Countervailing Measures. Commerce and the U.S. International Trade Commission, as well as the WTO, regularly find such measures do significant material harm to U.S. producers operating on a commercial basis, discussed in further detail in the box below. At the time of the Sec. 232 report, Commerce had authorized 164 orders on steel imports for illegal dumping or trade-distorting subsidies by 40 countries, with another 20 ongoing investigations (BIS 2018). Some foreign producers also benefit from other policies favorable to domestic industries but not explicitly prohibited by international agreements, such as discretionary regulatory forbearance of environmental standards, discussed later in the report, in the section "Retreating from Section 232 measures would squeeze vulnerable producers, increase greenhouse gas emissions."

Widespread government interventions drive unfair trade in steel products

Government interventions in the steel industry—in contravention of international agreements to limit distortionary industrial policies—are widespread.[5] Such distortionary interventions include the provision of low-cost inputs, subsidized loans and equity infusions, grants, tax breaks, support for acquisition of overseas raw materials, export restraints on domestically produced raw materials, state-led debt restructuring and other corporate reorganizations, local content requirements, transnational subsidies for establishing third-country production operations, and other measures that forestall the bankruptcy and reorganization of financially nonviable firms—including state-owned enterprises or other government-directed firms operating on a noncommercial basis (Rimini et al. 2020; AISI 2020). Although such measures in practice subsidize U.S. consumers of steel products, they also impart hefty costs to general welfare by promoting a misallocation of resources and excessive pollution, as well as by posing a threat to U.S. national security and broader economic well-being beyond the steel industry, as found in Commerce's Sec. 232 investigation (BIS 2018).

The root cause of unfair trade is the unconstrained drive to expand steel production capacity without regard to economic costs or consequences. Much attention has focused on China, which is the world's largest producer and exporter of steel products and is currently subject to at least 64 anti-dumping and countervailing duty (anti-subsidy) orders. But China is by no means the only source of unfairly traded steel products (USITC 2021). Currently, the United States has numerous orders in place against unfairly traded steel imports from South Korea (32), Brazil (18), Japan (14), Italy (11), Mexico (six), Germany (four), Vietnam (four), Indonesia (four), Russia (three), Belgium (two), Canada (two), the United Kingdom (two), and the Netherlands (one).[6] And the United States is not alone. Worldwide, other countries have implemented 49 unfair trade orders against steel exports from the European Union and 74 orders against exports from the Russian Federation (EC 2021; WTO 2020).

Producers in many of these countries are highly export dependent as a result of having capacity to produce substantially more than their domestic market can consume. For example, in 2019, Brazil's production capacity exceeded domestic consumption by 40%, Japan's capacity exceeded domestic consumption by 42%, South Korea's capacity exceeded its domestic market by 29%, and Belgium's capacity exceeded domestic consumption by 140% (WSA 2020d). By comparison, the United States is a net importer of steel products.

As more producers run afoul of international rules to prevent unfair trading in steel products, more producers are attempting to evade the rules against distorting subsidies and government interventions. Evasive practices attempt to obscure the country of origin of steel products by transshipping goods produced with subsidies through third-country ports, or by establishing global production chains that perform minimal transformations or final processing of steel goods produced elsewhere with prohibited policy supports. In recent years, Belgium, the Netherlands, and Luxembourg have emerged—improbably—as centers of downstream processing and re-exportation of steel products and transshipment. Producers in other countries have been found or accused of transshipping steel to the U.S. market, including Canada, Japan, Mexico, and Vietnam. Recent Chinese outbound direct investments in steel companies in Europe, Southeast Asia, and Latin America raise concerns that the strategy of evading international rules in steel trade will be as aggressive as efforts to gain market share by expanding production capacity in spite of the chronic global glut (OECD 2020b).[7]

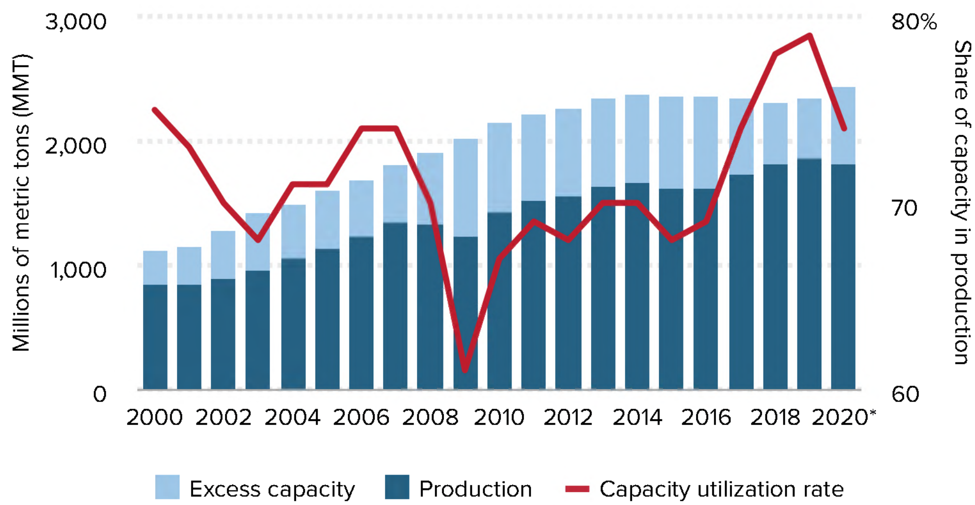
As a result, international disputes over steel capacity and multilateral efforts to resolve them are not new. The European Coal and Steel Community was formed in the aftermath of World War II to resolve continental tensions over steel production, providing a foundation for the European Union. The United States has been involved in international steel diplomacy since at least the Lyndon Johnson administration. In 1989, President George H.W. Bush launched efforts to reach a global agreement to abolish steel production subsidies. In the late 1990s, President Clinton initiated a "Steel Action Plan" in response to a flood of underpriced steel imports being dumped in the U.S. market. On a bilateral basis, President Obama pressed steel capacity issues with China for years through the Strategic and Economic Dialogue. He also moved multilateral partners to launch the Global Steel Forum at the 2016 G20 leaders' summit, and to find common ground and establish a level playing field through the decades-old Organisation for Economic Co-operation and Development (OECD)'s Steel Committee (White House Office of the Press Secretary 2017).

Despite these efforts, capacity for global steel production continues to substantially exceed global demand for steel products, as shown in **Figure A.** In 2000, the peak year before a recession and the year before China acceded to the World Trade Organization, global excess capacity of 282 million metric tons already exceeded production by one-third of total output (850 MMT). With surplus capacity already at substantial levels, capacity growth outstripped steel production growth for the next decade and a half. From 2000 to

Figure A

Soaring steel capacity glut fuels steel market instability

Global steel production, excess capacity, and capacity utilization rate, 2000–2020



Note: 2020* is a projected annual value.

Sources: OECD 2020a and 2020b; World Steel Association 2020a and 2020b.

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2015, production volume increased by 91% to 1,625 MMT, while excess capacity grew 166% to 752 MMT.

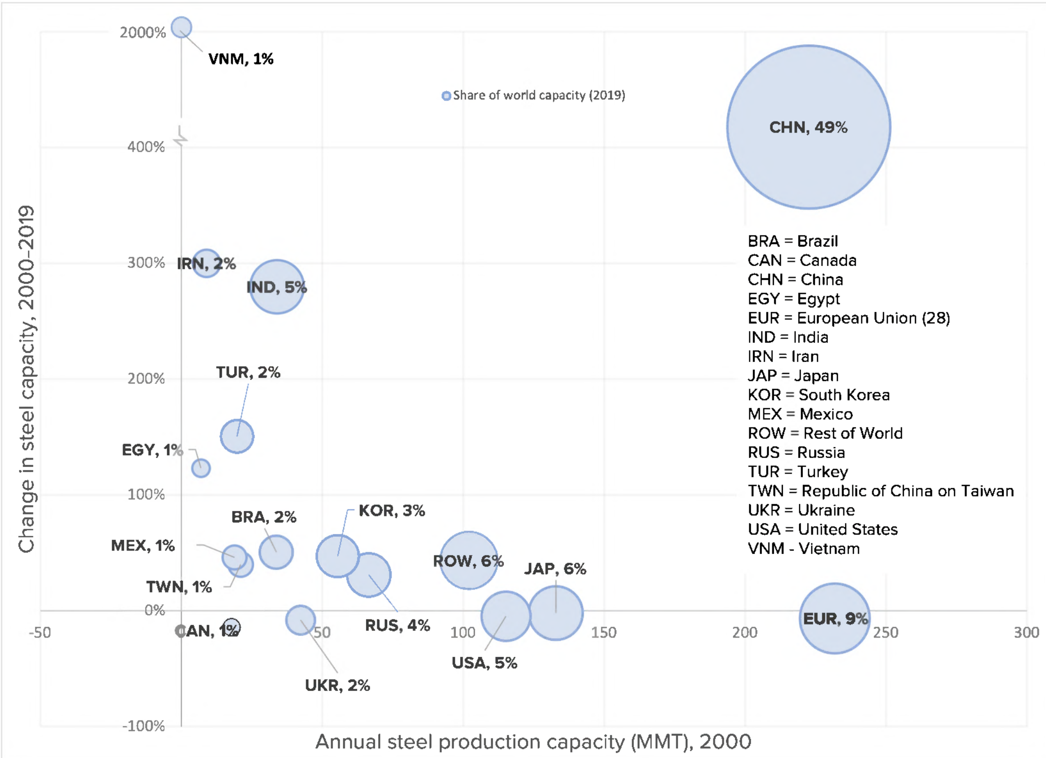
By the mid-2010s, total world production capacity stabilized near 2,400 MMT, and increased demand for steel products led production to increase and capacity utilization rates to rise. However, by 2017 excess capacity still remained high, at 616 MMT, and capacity utilization remained below the level in 2000. Only beginning in 2018 and 2019, coinciding with Sec. 232 measures, did world capacity utilization surpass the level in 2000. The global economic slowdown in 2020 resulting from the COVID-19 pandemic once again sent excess steel capacity up and dragged the capacity utilization rate down. By 2020, excess capacity reached 633 MMT, or the equivalent of 5.8 times *total* U.S. production capacity.

That world production capacity stabilized after 2014 belies significant changes in the composition of steel production capacity by country. **Figure B** illustrates these changes in the composition of global steel supply by plotting the production capacities of the world's largest steel-producing countries and country groups in 2000 on the horizontal axis against the percentage change in steel capacities in these country and country groups from 2000 to 2019 on the vertical axis; the size of each bubble indicates each country's relative share of global steel capacity in 2019. China, the world's largest steel producer, expanded production capacity by 418% since 2000, such that by 2019 it controlled just shy of half of global steel capacity.

Figure B

Rapid expansion of steelmaking capacity in many countries threatens U.S. steel production

Change in steel capacity by country, 2000–2019



Note: The figure plots each country's steel production capacity in 2000 on the horizontal axis against the percentage growth in capacity from 2000 to 2019 on the vertical axis. The bubble sizes reflect each country's relative share of global production capacity in 2019.

Source: OECD (2020a).

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Just the *additional* capacity installed in China since 2000 exceeds the combined capacity in 2019 of all other individual countries depicted in Figure B. During this time, U.S. capacity contracted 5.5 MMT, and its global market share was cut in half to less than 5% in 2019 from 10% of world capacity in 2000. Although Chinese producers are the largest culprits driving chronic excess steel capacity, they are far from alone in aggressive expansions that have displaced other producers and reshuffled the structure of world production. Other major steel-producing countries achieving rapid capacity growth between 2000 and 2019 include India (95 MMT, 280%), Turkey (30 MMT, 151%), Iran (27 MMT, 300%), Korea (26 MMT, 47%), Vietnam (22 MMT, 2,036%), Russia (21 MMT, 31%), Brazil (17 MMT, 51%), Mexico (9 MMT, 46%), and Taiwan (8 MMT, 40%). Each of these countries features state-dominated or state-directed economies, trade-distorting government policies supporting steel producers, or a history of shipping unfairly traded steel products to the U.S. market.

A multilateral solution to the chronic problem of global excess steel capacity remains essential. But until that time, the inefficacy of market mechanisms to address surplus overcapacity and national policy distortions introduced by foreign trade partners will continue plaguing U.S. steel producers, risking the industry's survival at a scale necessary to meet national security demands.

Section 232 measures improve industry conditions, spur investments and jobs

Given that the problem of global excess capacity for U.S. steel producers is clear, policymakers should ask: "Are Section 232 measures on imported steel working to improve their conditions?" In considering this question, it is important to understand that the effectiveness of relief has been undermined by considerable "leakage" from Commerce-granted exclusions and broad countrywide exclusions that have curtailed tariff coverage on imported steel. Nevertheless, our analysis demonstrates that Sec. 232 measures remain critical to the long-term prospects of U.S. steel producers. A survey of publicly available sources reveals that following implementation of Sec. 232 measures, U.S. steel producers announced new investments, upgrades, plant expansions, and reopenings of idled facilities in at least 15 states, including plans to invest more than $15.7 billion in new or upgraded steel facilities, creating at least 3,200 direct new jobs, many of which are now poised to come online (see **Appendix Table 1A**). In addition, more than $5.9 billion was invested in plant acquisitions by nine firms, as part of industry restructuring to increase efficiency, preserving additional jobs at those facilities (see **Appendix Table 1B**).[8]

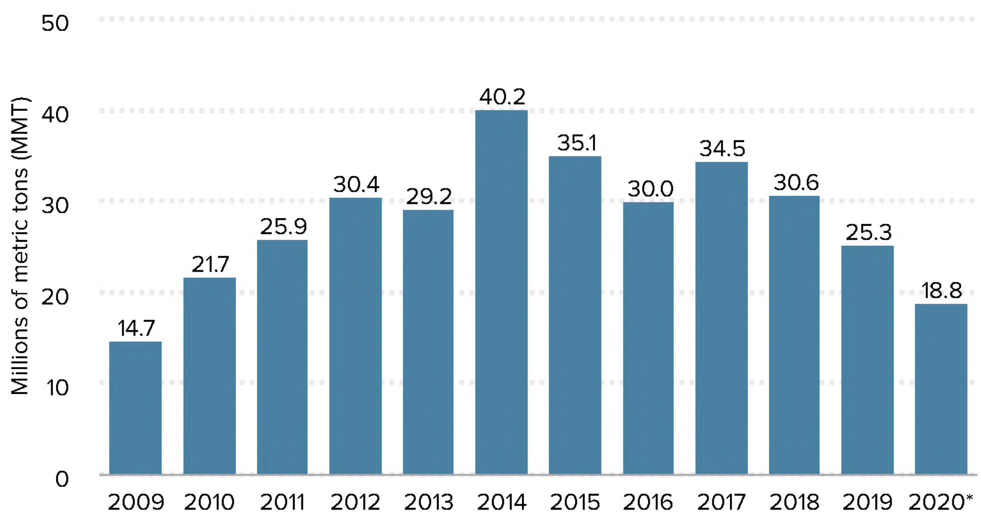
Individual anecdotes provide a suggestive initial glimpse at the effects of Sec. 232 steel import measures. But a more systematic assessment of available data demonstrates that the import measures coincided with improving conditions for U.S. producers—prior to the pandemic-related global recession beginning in 2020. Relief from the pressure of anti-competitive steel imports facilitated recovery of industrywide sales margins (a measure of profitability), production and capacity utilization rates, and a resurgence of new investment in steel industry fixed assets. Importantly, as discussed in the next section, these measures achieved improvements for U.S. steel producers without causing harm to downstream consumers of steel products in the United States.

From the trough of the Great Recession in 2009, U.S. steel imports rose sharply from 14.7 MMT to 40.2 MMT by 2014, as seen in **Figure C**. A series of nearly 69 new anti-dumping and countervailing duty determinations between 2014 and 2016 curbed the inflow of steel imports to 30 MMT in 2016—temporarily (USITC 2021).[9] However, many foreign producers evaded these import surge measures by relocating steel production and processing to third countries, and imports climbed once again, reaching 34.5 MMT in 2017. But the Sec. 232 measures successfully slowed the pace of imports in 2018 and 2019, when imports fell to just 25.3 MMT. Overall, the volume of steel imports fell 27% between 2017 and 2019—before the pandemic's "Great Lockdown" slowed U.S. and global economic activity. Separate data analysis shows that import penetration of the U.S. steel market fell to 26%

Figure C

U.S. import penetration trend sets stage for Section 232 steel measures

U.S. imports of steel products by volume, 2009–2020



* 2020 is a preliminary annual estimate.

Source: U.S. Census Bureau 2020b.

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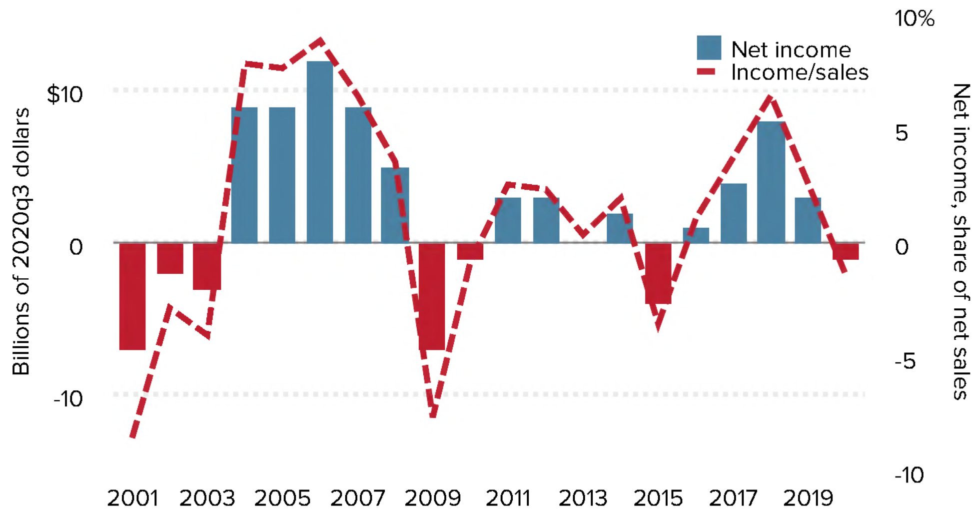
of all steel consumed in the United States in 2019, from 35% in 2017. As a result, the rate of capacity utilization for U.S. steel producers rose to 80% in 2019 from 72% in 2017 (WSA 2020a; OECD 2020a). Commerce (BIS 2018) found that an 80% capacity utilization, sustained over the business cycle, is a critical threshold for U.S. steel producers to achieve long-term financial viability.

Sec. 232 measures placing tariffs and quotas on foreign steel products were intended to create some breathing room for U.S. steel producers to recover market share and sustainable financial conditions enabling them to increase domestic production—which they did. The Sec. 232 measures have afforded the U.S. steel industry an opportunity to recover to a level of financial performance not experienced since before the Great Recession (**Figure D**), although this recovery has been undermined as exemptions from Sec. 232 measures allowed "leakage" of uncovered imports, and as recession from the pandemic's 2020 Great Lockdown set in. Following the Great Recession of 2007–2009, U.S. steel producers strained to achieve profitability. From the third quarter of 2009 through 2016, net income for the U.S. steel industry averaged just $73 million. Over the same period, net income as a share of sales—a measure of profitability—averaged 0%. In 2018, the year Sec. 232 measures were first imposed, net income in the steel industry reached $7.9 billion, or 6.4% of sales—its highest level since the real estate construction boom that preceded the Great Recession. Since then, however, the domestic industry has faced serious challenges. In 2019, the industry's net income receded to $2.9 billion, and in 2020 it sunk back into negative territory, posting losses with the pandemic-induced global recession.

Figure D

Steelmaker incomes recover with Section 232 import measures

U.S. steel producers' net income, annual and as a share of sales, 2001–2020



Note: 2020 data includes the first quarter through the third quarter.

Source: U.S. Census Bureau 2021; Bureau of Labor Statistics 2021b.

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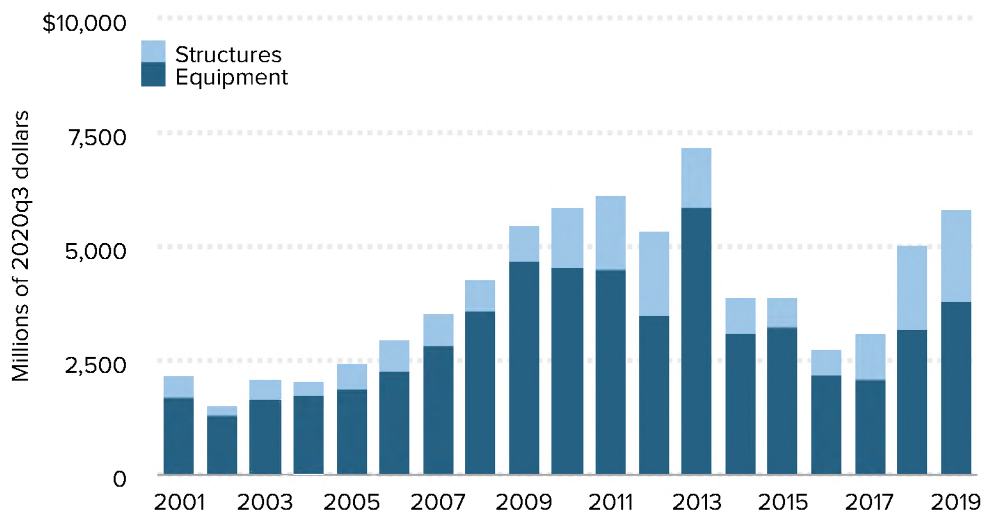
U.S. steel producers recovered with the Sec. 232 measures, bringing idled capacity back online with expectations for improving market conditions. However, more recently, the erosion of import coverage under Sec. 232 measures has coincided with declining prices and financial performance in the industry. Although the Sec. 232 measures initially covered all steel imports, Commerce has granted nearly 108,000 product exclusion requests from Sec. 232 measures as of July 2020 (CRS 2020; U.S. Department of Commerce 2021). A number of significant steel-producing countries, including Argentina, Brazil, Canada, Mexico, and South Korea, also obtained outright exemptions from Sec. 232 measures or quantitative quotas to replace import tariffs. These exclusions and exemptions significantly curtailed the coverage of Section 232 measures, although the measures remain significant in reversing the trend of declining viability of the U.S. steel industry. Today, a majority of steel products are imported to the United States either on a duty-free basis or under Sec. 232 product exclusions.

The U.S. steel industry's initial recovery under Sec. 232 measures and the expectations of relief from conditions of chronic global excess capacity helped draw new investments into U.S. steel production (**Figure E**). New investment, adjusted for inflation, surpassed $5 billion in 2018 and reached nearly $5.9 billion in 2019. However, the dwindling coverage of Sec. 232 measures mentioned above and resulting decline in net income seen in Figure D will make it difficult for the industry to sustain this investment trend and could put many producers in further financial jeopardy. As discussed earlier, capital-intensive investments to upgrade and expand production are long-lived fixed costs that only can be reversed at prohibitively high cost. Firms that have made substantial new investments under the

Figure E

U.S. capital investments in steel rise sharply following Sec. 232 measures

Real capital expenditures, 2001–2019



Sources: U.S Census Bureau 2020a; Bureau of Economic Analysis 2021.

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expectations of strong domestic demand and continuing Sec. 232 import relief may be deterred from future investments in technological upgrading and be squeezed by debt service commitments; those exploring expansion will likely shelve their plans.

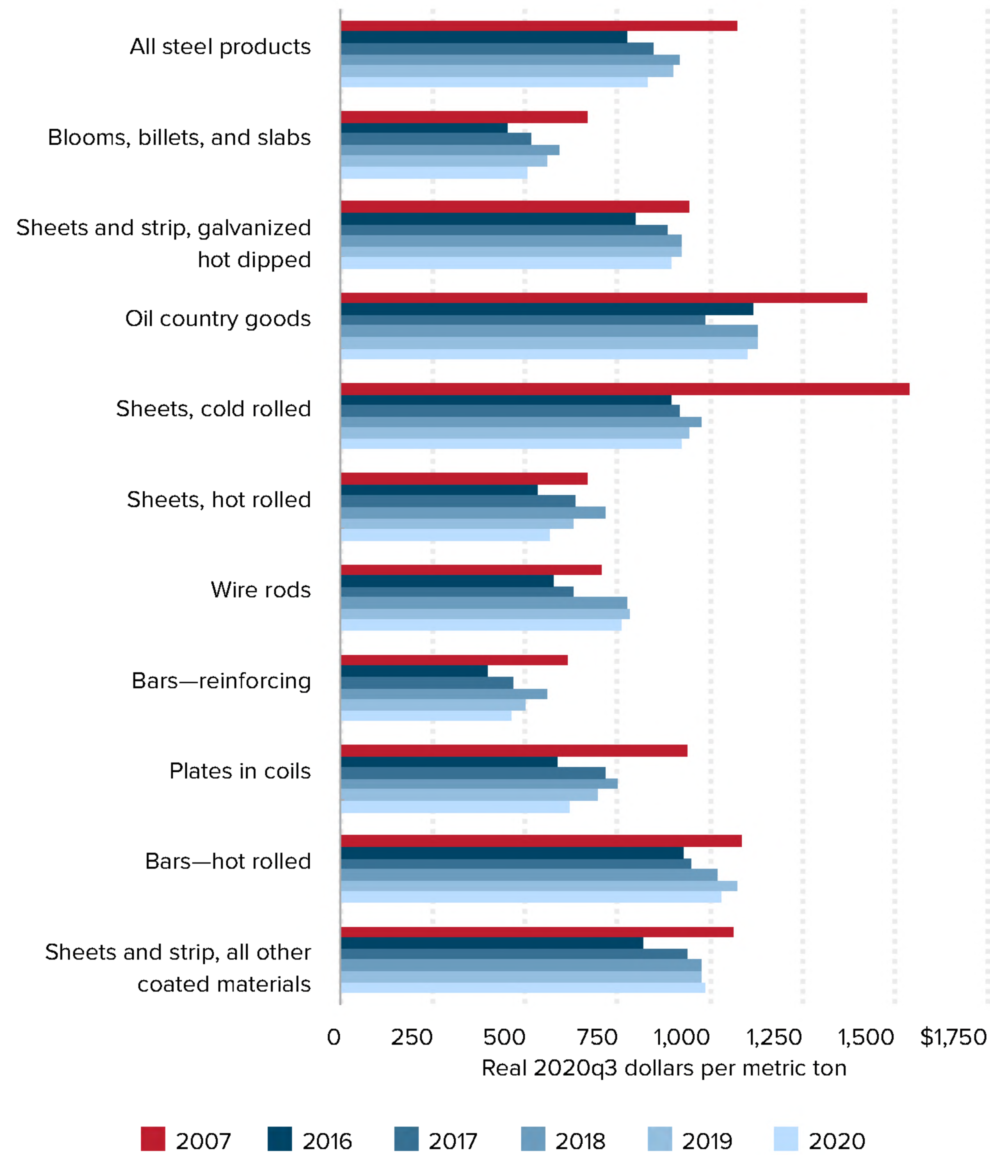
Despite a 25% tariff, the Sec. 232 measures had a limited effect on U.S. import prices of steel products, as seen in **Figure F**. The product categories in Figure F represent roughly three-fourths of total U.S. steel imports. Unit prices for imports of most steel products increased from 2017 to 2018—the year Sec. 232 import measures began. But then, import prices fell in 2019 and again in 2020, such that overall, averaged across all products, the import price of steel fell to $833 per metric ton in 2020 from $845 per metric ton in 2017.

Sec. 232 import measures coincided with and contributed to an increase in prices for steel products in the U.S. market, as can be seen in **Figure G**, comparing prices paid to domestic steel producers relative to those paid by U.S. steel consumers purchasing comparable products on international markets for import. Unsurprisingly, both U.S. producer and import prices follow a common trend, although imports generally are lower priced than U.S.-made steel, as excess capacity and trade-distorting foreign government policies depress global prices. As the world emerged from the Great Recession in July 2009, particularly with China's outsized stimulus investments in infrastructure and real estate construction (Hersh 2014), steel prices around the world began rising sharply. Steel demand was so strong that it pushed up prices for key steel inputs globally, including iron ore and coal (World Bank 2020). Then, as discussed in Section 2 above, expanded world steel production and surplus capacity through the middle of the last decade began driving prices down.

Figure F

Section 232 remedies have negligible effects on the real price of steel imports

Unit price of U.S. steel imports, inflation-adjusted, 2007 and 2016–2020



Sources: U.S. Census Bureau 2020b; Bureau of Labor Statistics 2021b.

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Following implementation of Sec. 232 measures, Figure G shows domestic steel prices rose faster than U.S. import prices. This is due to a combination of the Sec. 232 measures, other trade remedies—including anti-dumping and countervailing duty orders—and the appreciation in value of the U.S. dollar relative to foreign currencies, making foreign products comparatively less expensive in dollar terms. These factors drove a wedge between domestic and foreign prices, which enabled U.S. steelmakers to achieve more

Figure G

Global markets, not Section 232 measures, drive steel prices

U.S. producer and imported steel prices, 2009–2020

Source: Bureau of Labor Statistics 2021a and 2021c.

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sustainable operating margins. As input prices again eased in late 2018, steel prices fell in the U.S. market and globally—although they likely would have fallen further were it not for Sec. 232 import measures.

In recent months, U.S. and foreign steel prices are on the upswing—likely a temporary phenomenon caused by the lag between increasing demand as parts of the world economy recover from the Great Lockdown and the re-employment of steelmaking capacity—which, for blast furnace operations in particular, can take time and may occur only after market conditions create confidence that a facility can operate at a high level of capacity for a sustained period. In this environment, maintenance of Sec. 232 import measures will remain critical to ensuring the economic stability and financial viability of the U.S. industry. Country- and product-specific trade remedies, though significant, on their own have proven insufficient to abate the risk to the U.S. steel industry from anti-competitive imports and chronic excess production capacity.

Steel consumers face negligible effects from Section 232 measures

An important concern in assessing the impacts of Sec. 232 measures on imported steel products is how these measures affect downstream industries and consumers of products that use steel inputs. Indeed, as Sec. 232 measures were going into effect, a group of business lobbying associations representing downstream users sent a joint letter to the

U.S. Trade Representative expressing this concern and claiming “significant harm” from this policy (*Industry Week* 2018). Our analysis in this section shows this claim proved incorrect.

Critics of import measures more broadly, including those levied in 2018 against China for unfair trade practices pertaining to technology transfer, intellectual property, and innovation (USTR 2018), often point to a recent Federal Reserve study purporting to find that tariffs are associated with negative outcomes for the U.S. manufacturing sector (Flaaen and Pierce 2019). However, this analysis should be treated with a healthy dose of skepticism due to myriad methodological issues that introduce statistical bias and call into question the validity of their findings.[10] Weaknesses of Flaaen and Pierce’s (2019) results are illustrated in their own Figures 4 and B3, which demonstrate that import protection has no statistically significant impact on manufacturing employment, industrial output, or producer prices for virtually all of the period under consideration.

Given the inherent shortcomings of Flaaen and Pierce 2019, we implement an empirical strategy focused more narrowly on steel products and explicitly evaluating the causal effect of changes in the price of steel inputs on the prices of goods using steel. Our econometric analysis demonstrates that this relationship ranges from statistically insignificant (i.e., not statistically different from zero effect) to negligible. In other words, the statistical evidence does not support claims of harm from Sec. 232 measures that were predicted by certain steel-using businesses. This fact should not be surprising: Even in the downstream industries consuming the most steel, steel inputs amount to a minor share of overall production costs.

Harm to downstream industries would occur if Sec. 232 measures significantly increased steel prices, causing increased costs for producers or consumers of primary steel-containing goods, and then those costs squeezed profit margins or consumer welfare—by forcing consumers to either pay more for or consume less of a given product. To assess this linkage between steel input prices and end-user prices, we employ standard, related, and time-tested econometric techniques known as Granger causality analysis and vector autoregression (Granger 1969; Sims 1980). Vector autoregression (VAR) is a statistical method for modeling a system of variables and their interrelationship and co-evolution over time. In this case, we model (1) the price of primary steel inputs, (2) the price of steel-consuming products, and (3) the effective federal funds rate.[11]

Granger causality analysis uses the VAR model to test for evidence of a statistically causal relationship between the variables in the model. If past values of variable 1 are shown to significantly predict current values of variable 2, then it can be concluded that variable 1 “Granger-causes” variable 2. While the price variable used in this modeling includes the effects of Sec. 232 tariffs and quotas, the results of the statistical test are not limited to the effects of Sec. 232 measures, but rather evaluate whether a change in prices resulting from *any* factor causes a change in the price of the steel-using good. Technical discussion of this methodology and detailed results are presented in **Appendix 2**.

We summarize the results of this causal analysis in **Table 1**. Each row of the table presents a separate VAR model relating the price of a steel-containing product with the price of its most relevant primary steel input(s) and reports the causal effect found on end-use product prices. The end-use products investigated represent the U.S. industries consuming the largest volume of steel products: nonresidential construction, motor vehicles, motor vehicle parts, construction machinery, electrical equipment and household appliances, and food processing (food consumed at home). We also evaluate the possible impacts of Sec. 232 steel measures at a broader level by modeling the effects of steel product prices on aggregated prices for durable goods.

As shown in Table 1, this analysis finds no discernible effect of steel prices causing price changes in new motor vehicles, motor vehicle parts, construction machinery, electrical equipment and household appliances, or, broadly, durable goods. These results, therefore, suggest that even if Sec. 232 measures caused an increase in the price of steel products, one would not expect a significant impact on the price of downstream goods. For prices of nonresidential construction goods and food consumed at home, the price of relevant steel inputs is found to be statistically significant in causing changes in the prices of steel-using products.[12] While finding a statistical relationship between steel input prices and final goods prices, the same analysis shows that the economic significance of the impact is negligible: A 1% increase in steel input prices caused a 0.1% change in the price of construction goods and a less than 0.05% change in the price of food at home. However, as discussed in Appendix 2, causal analysis suggests the relationship between steel inputs and construction goods actually runs in the opposite direction, with demand for construction goods driving prices in the market for intermediate inputs.

To recap, while conceptually a relationship exists between input prices and final goods prices, econometric analysis of the causal relationship between prices finds effects ranging from statistically zero to essentially nothing. Sec. 232 measures simply did not have a meaningful, real-world impact on prices for steel-consuming products. This fact should not be surprising. Even in the industries that consume the largest volumes of steel products, steel is just one cost in a long list of inputs to production. Despite these industries accounting for the lion's share of steel consumption in the U.S. economy, the cost of their steel inputs is minor relative to their gross production. As shown in Table 1, the steel content as a share of total production ranges from 1% in food consumed at home to 9.8% in the motor vehicle parts industries. Illustrating the point in dollar terms, the average passenger car contains roughly 900 kg of steel (WSA n.d.). At a current cost of $1,048 per metric ton, the steel inputs amount to just 2% of the sales price for the average new U.S. car (Steel Benchmarker 2020; Kelley Blue Book 2020). In contrast, electronics components make up roughly 40% of a new car's price (Deloitte 2019).

Retreating from Section 232 measures would squeeze vulnerable producers, increase greenhouse gas emissions

Thus far, we have seen that Sec. 232 import measures have helped improve market conditions for U.S. steel producers amid chronic global excess capacity that threatens their

Table 1

Effects of Section 232 steel measures on end-use products

End-use product	Primary steel inputs	Total steel inputs as share of gross production costs	Causal effect on end-use goods prices
Durable goods (personal consumption expenditures)	Cold-rolled steel sheet and strip; hot-rolled steel sheet and strip, including tin mill products; hot-rolled steel bars, plates, and structural shapes, carbon	—	No statistical effect
New motor vehicles (consumer)	Cold-rolled steel sheet and strip	4.3%	No statistical effect
Motor vehicle parts (producer)	Hot-rolled steel sheet and strip, including tin mill products; Hot-rolled steel bars, plates, and structural shapes, carbon	9.8%	No statistical effect
Nonresidential construction goods	Hot-rolled steel bars, plates, and structural shapes, carbon	1.9%	Statistically significant but economically insignificant effect (a 1% change in steel causes a 0.1% change)
Construction machinery	Hot-rolled steel bars, plates, and structural shapes, carbon	8.2%	No statistical effect
Electrical equipment and household appliances	Cold-rolled steel sheet and strip; Steel wire, carbon	4.7%	No statistical effect
Food at home	Hot-rolled steel sheet and strip, including tin mill products	1.0%	Statistically significant but economically insignificant effect (a 1% change in steel causes <0.05% change)

Source: Authors' analysis of BLS (2020, 2021b, 2021c, and 2021d) and FRED (2021) data.

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financial viability. We also have seen that the impact of these measures on steel-consuming U.S. industries has ranged from zero to economically insignificant. Furthermore, the benefits of this policy have eroded since it began as more steel imports have been exempted from the Sec. 232 regime. As the world looks to move forward from the economic shock of the Great Lockdown caused by COVID-19, it is clear that eliminating or even further relaxing the steel import measures likely would pose serious economic consequences for U.S. steel producers. Two important points are noteworthy here.

First, a slow and uneven recovery from the 2020 economic downturn is expected, with global demand for steel products uncertain. The International Monetary Fund (IMF) recently revised down its global economic growth forecast for 2021; it projects “limited progress toward catching up to the [expected] path of economic activity for 2020–2025” (IMF 2020).[13] Families around the world have suffered deep economic scarring from lost jobs and income and depleted savings—not to mention, tragically, the many who have lost prime wage-earners. Millions of people worldwide who contracted the virus are likely to suffer long-term effects, reducing prospects for employment and earnings and allocating a larger share of disposable income toward health care services and away from goods consumption. At the same time, the downturn and its long-lasting effects have dampened public-sector revenues at a time when governments have undertaken unprecedented expenditures meeting the public health crisis and providing social protections. The enduring effects of this shock will dampen, in the near term, a recovery of household consumption and, in turn, business investment. In the longer term, the human toll will dampen prospects for economic potential, dragging down investments in human and fixed asset capital and the productivity growth these investments provide.

Economic recovery, of course, is contingent on how well world governments abate the global health crisis, but it is clear that even under optimistic scenarios, demand for steel production will remain muted for some time. U.S. steel demand declined 16% in 2020, and in 2021 it is expected to remain more than 10% below 2019 levels (WSA 2020c). Globally, steel demand declined 6.4% from 2019 to 2020 and is forecast to remain nearly 3% below 2019 levels (OECD 2020c). At the same time, countries have not retreated from policy efforts to prop up national steel industries (see text box, “Widespread government interventions drive unfair trade in steel products”) and are continuing to install additional productive capacity. The OECD (2020b) projects that by 2022, producers will add as much as another 3% of steelmaking capacity worldwide, concentrated in Asia and the Middle East.

Together, these trends point to increased excess steelmaking capacity and lower capacity utilization rates that would drive prices down and squeeze U.S. steel producers who face competition with imports produced on a noncommercial basis. These are exactly the pressures Sec. 232 measures are designed to address, in the absence of multilateral agreements to manage excess capacity. Retreating from these measures now, particularly after many U.S. companies committed to new investments in production (Figure E; **Appendix 1**), would leave U.S. steel producers in untenable financial positions, further jeopardizing their capacity to meet national security needs.

Second, a significant ancillary benefit of Sec. 232 import measures has been to divert steel production to more environmentally sustainable producers. Relaxing Sec. 232 measures would reverse this progress as the world looks to decarbonizing and achieving net-neutral emissions by midcentury. The U.S. steel industry is one of the cleanest and most energy-efficient steel industries globally. A 2019 report measuring the CO2 emissions intensity of steel industries in 15 major steel-producing countries ranked U.S. steelmakers among the least CO2 intensive industries—with industries in Brazil, Canada, China, France, Germany, India, Japan, South Korea, and other countries having higher CO2 emissions intensity (Hasanbeigi and Springer 2019, Figure 14).

Even this analysis understates that difference in environmental impact, as it does not account for the substantial pollution from ocean freight required to transport raw materials and finished products in supply-chain webs around the world before foreign steel products can reach the U.S. market (ENVI 2020). If Sec. 232 measures are relaxed, it is precisely the most polluting national steel industries, in countries that have rapidly expanded capacity at the expense of more efficient producers, that stand to capture marginal changes in market share. And as excess capacity further squeezes prices and profit margins, firms will face difficulty investing in new technologies to allow for greener steel production and will risk being shut out of markets as consumers develop preferences for low-carbon products.

Conclusion: The Section 232 trade measures helped slow the flood of unfair imports that was squeezing the U.S. steel industry without hurting downstream steel-using producers and consumers

Surging steel imports have undermined domestic steel production, prices, employment, profits, investments, and the fundamental health of the U.S. domestic steel industry. Global steel surpluses are the result of chronic global excess steelmaking capacity in major exporting countries. The steel Section 232 trade restraints imposed in 2018, including both tariffs and quotas on imports from selected countries, helped slow the flood of steel imports. Following imposition of these measures, U.S. steel output, employment, capital investment, and financial investment all improved.

Meanwhile, statistical analysis in this report has demonstrated that Section 232 measures have had no economically significant impacts on the prices of downstream products. Despite the benefits of the Section 232 tariffs for the domestic steel industry and its workers, and the minimal impacts of trade restraints on downstream industries, these measures have been progressively weakened by nearly 108,000 product-specific exclusions and broad tariff exemptions for a number of countries.

The domestic steel industry is just beginning to emerge from the depths of the COVID-19 recession with a steep hill to climb, given widening excess global steel capacity. With the right policies and major investments planned by the new administration in economic rebuilding, clean energy, and infrastructure construction, U.S. steel producers can be poised for a substantial upswing in employment, output, and investment that fuels growth in clean, efficient, state-of-the-art domestic steel production. The window to this opportunity could be slammed shut by the premature and unplanned elimination of the Section 232 import measures.

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Endnotes

1. 19 U.S.C. §1862; https://www.law.cornell.edu/uscode/text/19/1862.

2. Adjusting Imports of Aluminum Into the United States, 83 Fed. Reg. 25849–25855 (March 15, 2018).

3. Adjusting Imports of Steel Into the United States, 83 Fed. Reg. 25857–25877 (March 15, 2018).

4. The capital-to-labor ratio for primary metals producers is 76% higher than for durable goods manufacturing industries overall. See BLS (2020).

5. This section is based, in part, on information summarized in *Examples of Policies and Practices Contributing to the Global Excess Capacity Crisis*, a report by the American Iron and Steel Institute and the Steel Manufacturers Association included at the end of this report.

6. There are two anti-dumping orders in place against Canadian steel products, and there are both anti-dumping and countervailing duty orders in place against wind towers, a major steel-using product. South Korean steel orders include six countervailing duty orders and 26 antidumping orders. EPI analysis of USITC (2021).

7. Countries receiving Chinese direct foreign investment in steel include Cambodia, Malaysia, Indonesia, Myanmar, Pakistan, the Philippines, Bolivia, Vietnam, the United Kingdom, and the Netherlands. See OECD (2020b).

8. These are direct steelmaking jobs; the investments would also generate indirect employment through the goods and services procured in expansion products, as well as induced employment generated by the incomes from direct and indirect employees.

9. The USITC (2021) lists 276 anti-dumping and countervailing duties in effect on steel products (categories ISM, ISO, and ISP) as of December 28, 2020, and of those, 69 orders went into effect between 2014 and 2016.

10. It is worth briefly considering several reasons why. First, the core explanatory variable—"import protection"—ignores the actual incidence and evolution of protection over time as more products received exclusions from tariffs. Second, their statistical model explicitly embraces violations of the core assumptions on which the statistical method is built, biasing the results. In particular, equation 7 specifies measures of import protection, input costs, and foreign retaliation as "independent" variables associated with the dependent variables of manufacturing employment, output, and producer prices. In fact, as Flaaen and Pierce appropriately theorize, input costs and foreign retaliation are, at least in part, caused by import protection. Finally, Flaaen and Pierce's analysis conflates the effects of Sec. 232 import measures with Sec. 301 trade remedies. Conditions of chronic excess global steel capacity—explained in Section 2 above—mean that market conditions are significantly different for steel products than for other manufactured goods, suggesting that pooling data for steel products and other manufactured goods more broadly is inappropriate and may bias estimates of the statistical significance.

11. The federal funds rate—the interest rate at which depository institutions borrow and lend federal balances held at Federal Reserve Banks—is the primary target for Federal Reserve monetary policy actions and is linked both in theory and in practice to changes in price levels as well as to the level of demand for goods and services across the economy.

12. The causal effect of steel prices on food-at-home prices shows only weak statistical significance, at the 90% probability threshold; the model for other significant goods found 95% to 99% probability.

13. What's more, as dour as the IMF's assessment is, their forecasts are notorious for being overly optimistic. See Rosnick and Weisbrot (2007).

14. Producer Price Index by Commodity: Metals and Metal Products: Iron and Steel (WPU101); Producer Price Index by Commodity: Metals and Metal Products: Cold Rolled Steel Sheet and Strip (WPU101707); Producer Price Index by Commodity: Metals and Metal Products: Hot Rolled Steel Sheet and Strip, Including Tin Mill Products (WPU101703); Producer Price Index by Commodity: Metals and Metal Products: Hot Rolled Steel Bars, Plates, and Structural Shapes (WPU101704); Producer Price Index by Commodity: Metals and Metal Products: Steel Wire (WPU101705); Consumer Price Index for All Urban Consumers: New Vehicles in U.S. City Average (CUUR0000SETA01); Producer Price Index by Commodity: Transportation Equipment: Motor Vehicles Parts (WPU1412); Producer Price Index by Industry: Construction Machinery Manufacturing (PCU333120333120); Producer Price Index by Commodity: Inputs to Industries: Net Inputs to

Nonresidential Construction, Goods (WPUIP2312001); Producer Price Index by Industry: Electrical Equipment and Appliance Manufacturing (PCU335335); Consumer Price Index for All Urban Consumers: Food at Home in U.S. City Average (CUSR0000SAF11); Personal consumption expenditures: Durable goods (chain-type price index) (DDURRG3M086SBEA); and Effective Federal Funds Rate (FEDFUNDS).

15. Motor vehicle parts manufacturing requires significant inputs from both hot-rolled sheet and strip as well as hot-rolled bars, plates, and structural shapes. Electrical equipment and household appliances require significant inputs from both cold-rolled sheet and strip and carbon steel wire. Therefore, these products are modeled as a four-equation VAR of the form

$$\begin{bmatrix} \triangle p_t^1 \\ \triangle p_t^2 \\ \triangle p_t^3 \\ \triangle i_t \end{bmatrix} = a_0 + A_1 \begin{bmatrix} \triangle p_{t-1}^1 \\ \triangle p_{t-1}^2 \\ \triangle p_{t-1}^3 \\ \triangle i_{t-1} \end{bmatrix} + \cdots + A_k \begin{bmatrix} \triangle p_{t-k}^1 \\ \triangle p_{t-k}^2 \\ \triangle p_{t-k}^3 \\ \triangle i_{t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \\ \varepsilon_{4,t} \end{bmatrix}$$

where A_1 and A_k are 4 × 4 matrices of coefficients.

Appendix 1: New and expanded U.S. steel production under Section 232 measures capacity

Appendix Table 1A

Significant new, expanded, and restarted U.S. steel production since Section 232 measures

	Company	Facility	Additional capacity (metric tons)	Investment ($ millions)	Jobs created
1	AM/NS Calvert	Calvert, AL, new EAF	1,650,000	$775	TBD
2	Big River Steel	Brownsville, TX, new EAF	TBD	$1,600	TBD
3	Big River Steel	Osceola, AR, doubled EAF and finishing capacity	1,600,000	$1,200	TBD
4	Carpenter Technology	Reading, PA, new strip hot-rolling mill	NA	$100	TBD
5	Charter Steel	Cuyahoga Heights, OH, new SBQ rolling mill	NA	$150	25
6	Cleveland-Cliffs Inc.	Silver Bay, MN, new low-silica DR-grade pellets production	NA	$100	NA
7	Cleveland-Cliffs Inc.	Toledo, OH, new HBI plant	NA	$940	160
8	Commercial Metals Company	Durant, OK, new micro mill	350,000	$250	300
9	Commercial Metals Company	Mesa, AZ, micro mill expansion	500,000	$300	185
10	JSW USA		1,500,000	$500	TBD
11	North Star BlueScope	Delta, OH, new EAF	850,000*	$700	NA
12	Nucor	Blytheville, AR, new 3rd gen. galvanizing line	NA	$275	TBD
13	Nucor	Blytheville, AR, new specialty cold mill complex	NA	$245	100
14	Nucor	Brandenburg, KY, new plate mill	1,200,000	$1,700	400
15	Nucor	Convent, LA, DRI upgrade	NA	$200	NA
16	Nucor	Frostproof, FL, new rebar micro mill	350,000	$240	250

Appendix Table 1A (cont.)

	Company	Facility	Additional capacity (metric tons)	Investment ($ millions)	Jobs created
17	Nucor	Ghent, KY, flat-rolled mill expansion	1,400,000	$650	70
18	Nucor	Ghent, KY, new hot band galvanizing line	NA	$200	75
19	Nucor	Sedalia, MO, new rebar micro mill	350,000	$245	255
20	Nucor	Bourbonnais, IL, full-range merchant bar quality mill	NA	$185	100
21	PRO-TEC Coating Company (JV of U.S. Steel and Kobe)	Leipsic, OH, new CGL line	NA	$400	TBD
22	SSAB	Mobile, AL, EAF upgrade	NA	$100	50
23	Steel Dynamics Inc.	Sinton, TX, new EAF and finishing facilities	3,000,000	$1,900	625
24	Steel Dynamics Inc.	Columbus, MS, new galvanizing line	NA	$142	45
25	U.S. Steel	Fairfield, AL, new EAF	1,600,000	$215	150
26	U.S. Steel	Granite City, IL, restart steelmaking	1,500,000	Not Stated	500
27	U.S. Steel	Gary, IN, upgrade steelmaking facilities	NA	$750	NA
28	U.S. Steel	Mon Valley, PA, upgrade coke plant controls	NA	$200	NA
29	U.S. Steel	Mon Valley, PA, new endless casting and rolling line, and cogen facility	NA	$1,500	NA
	13 states			**$15,762**	**3,290**

*Additional is equivalent to 936,965 short tons; current is 2,100,000 short tons.

Notes: Additional capacity includes newly announced capacity or restarted basic oxygen furnace (BOF) or electric arc furnace (EAF) capacity, where available; does not include rolling mill, galvanizing or finishing capacity. Investment includes entries including significant new and expanded investments of $100+ million. Jobs created includes direct steel employment by company where available—does not include indirect jobs such as construction or contractors. SBQ refers to special bar quality. AM/NS Calvert is a joint venture of Arcelor Mittal and Nippon Steel Corp; JSW steel is an OH steel co.; SSAB is a Swedish/US steel co; ATI Metals is a specialty steel producer.

Sources: American Iron and Steel Institute; Steel Manufacturers Association. Compiled from public

Appendix Table 1A (cont.)

sources.

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Appendix Table 1B

2018–2020 steel industry acquisitions

	Company	Description	Investment ($ millions)
1	Cleveland-Cliffs Inc.	Multiple locations, acquire AK Steel	$1,100
2	Cleveland-Cliffs Inc.	Multiple locations, acquire ArcelorMittal USA	$1,400
3	Commercial Metals Company	Multiple locations, acquire USA assets of Gerdau	$600
4	Liberty House Group	Multiple locations (GA, IL, NM, OH, SC, TX), acquire Keystone Consolidated Industries	$320
5	Steel Dynamics, Inc.	Ashland, KY, acquire and reopen KY Electric Steel rolling mill	NA
6	Steel Dynamics, Inc.	Terra Haute, IN, acquire Heartland Steel Processing LLC	NA
7	Tenaris	Multiple locations, acquire IPSCO Tubulars	$1,067
8	ATI	Vandergrift, PA, consolidate operations	$65-85
9	U.S. Steel	Osceola, AR, acquire Big River Steel	$1,474
			$5,961

Sources: American Iron and Steel Institute; Steel Manufacturers Association. Compiled from public sources.

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Appendix 2: Methodology for analyzing causal relationship between steel prices and steel-consuming industries

This appendix outlines the methodological approach for assessing how Sec. 232 measures on imported steel products may affect downstream industries and consumers of products that use steel inputs. Harm to downstream industries and consumers could occur if Sec. 232 measures caused an increase in prices for steel products paid by U.S. users of steel and if those price increases were passed through to producer or consumer prices for steel-embodying goods. In order to assess this possibility, we evaluate a more basic question: Do changes in prices of basic steel products cause changes in steel-using products? This question asks whether *any* change in steel prices is a significant determinant of goods prices that use steel as an intermediate input, irrespective of what factors cause a change in steel prices.

Data and methodology

To evaluate this question, we estimate reduced-form vector autoregressions (VARs) that model the variables of interest as an interrelated system that co-evolves over time (Sims 1980). The VAR is an attractive analytical tool because it does not force an assumed structural form onto the data. Each variable in the system is modeled jointly as a function of its past values and the past values of the other related variables in the system. After estimating the system, we can evaluate causal relationships between the variables by testing whether past values of one variable are statistically significant determinants of the current value of another variable, following Granger (1969).

Our variables of interest are (1) prices for steel products, (2) prices for steel-using products, and (3) the effective federal funds rate—the interest rate at which depository institutions borrow and lend reserve balances held at Federal Reserve Banks.[14] This interest rate is the primary target for Federal Reserve monetary policy actions and is linked both in theory and in practice to changes in general price levels, as well as to the level of demand for goods and services across the economy via the Taylor Rule (Taylor 1993). Data are observed monthly and drawn from the Federal Reserve Bank of St. Louis's FRED Economic Data, spanning December 2001 to January 2020, or two business cycle expansions, other than for steel wire, for which available data begin in July 2004. Univariate analysis with a modified Dickey-Fuller test (Cheung and Lai 1995) fails to reject the null hypothesis of a unit root for each variable under consideration. While the individual variables are nonstationary (integrated of order one, or first-difference stationary), tests with Johansen's procedure show that there is no cointegration—or a stable, long-run relationship—between the variables (Johansen 1995), and the system can be modeled with a VAR, as opposed to a vector error correction model.

The VAR model consists of

$$\begin{bmatrix} \Delta p_t^1 \\ \Delta p_t^2 \\ \Delta i_t \end{bmatrix} = \alpha_0 + A_1 \begin{bmatrix} \Delta p_{t-1}^1 \\ \Delta p_{t-1}^2 \\ \Delta i_{t-1} \end{bmatrix} + \cdots + A_k \begin{bmatrix} \Delta p_{t-k}^1 \\ \Delta p_{t-k}^2 \\ \Delta i_{t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix}$$

where p_t^1 is the natural log of price at time t of the relevant steel product input price, p_t^2 is the natural log of the price of the steel-using product, and i_t is the natural log of the effective federal funds interest rate. The pairings of steel product input prices p^1 and steel-using product prices p^2 are given in **Section 4, Table 1.**[15] The model estimates parameters α_0, $A_1$to A_k, and ε_t, which are, respectively, a vector of constant terms, 3×3 matrices of coefficients relating the current dependent variable to past values of the independent variables, and a vector of randomly distributed residual with mean zero and uncorrelated across time.

The specific number k lags of the dependent and independent variables specified varies for each set of steel product and steel-consuming goods modeled, and they are chosen with some subjectivity, though guided by minimizing a battery of statistical tests, including the likelihood ratio test, the final prediction error, Akaike's information criterion, Schwarz's Bayesian information criterion, and the Hannan and Quinn information criterion (Neilsen 2001; Lütkepohl 2005). Results were robust to alternative lag-length specifications. The VAR parameters were estimated simultaneously by the "seemingly unrelated regression" method of Zellner and Theil (1962). Post-estimation, the statistical assumptions were tested to confirm that the VAR parameters are stable (with eigenvalues lying within the unit circle), and that the residual is normally distributed and not serially correlated, indicating that the models are well-specified.

The specific parameters estimated that define the structures of VARs are typically of less concern than how the system behaves when there is an exogenous change in one of the variables. In this case, we are concerned whether a change in the price p^1 causes a change in p^2, evaluated with a Granger (1969) causality test. This evaluates the hypothesis that the coefficients on $\Delta p_{t-1}^1, \cdots, \Delta p_{t-k}^1$ are jointly statistically significant in determining Δp_t^2 against the null hypothesis that the coefficients are all equal to zero. If the test statistic exceeds a critical value at a 95% probability or higher, we can reject the null hypothesis and conclude that Δp_t^1 Granger-causes Δp_t^2. In the event we identify a significant causal relationship, then the system of equations making up each VAR can be used to simulate the effect on p^2 of a shock to p^1 by simulating an impulse response function.

Results

Appendix Table 2 reports the Wald test statistic χ^2 and the associated probability for rejecting the null hypothesis of zero causal effect for each pair of prices. For the majority of end-use products considered, we find no statistical evidence that steel input prices affect the price of end-use products (<95% probability). This means that a change in steel prices is expected to have no effect on the price of end-use goods. We do find statistically significant causal effects (>95% probability) of steel input prices on the prices of nonresidential construction goods and food at home.

For end-use goods experiencing a causal effect of steel prices, we estimate the impact of a 1% increase in steel input prices using an orthogonalized impulse response function, with results summarized in the final column of Appendix Table 2. For each end-use good, the shock from an initial change in steel prices reaches its maximum impact on end-use prices in the following one to two months, then gradually dissipates to zero over the ensuing months, meaning there is no permanent effect on prices.

These were not the only statistically significant causal relationships identified in the VAR modeling. In a majority of the models, Granger analysis finds that the effective federal funds rate has a causal effect on steel product price levels, as theory would predict. We also find that prices of nonresidential construction goods have a causal effect on prices of hot-rolled bars, plates, and structural shapes—more than five times the size of the effect of hot-rolled bar prices on nonresidential construction goods—suggesting that demand for construction projects leads demand, and therefore pricing, of intermediate inputs to construction.

Appendix 3: Countries of concern—examples of policies and practices contributing to the global excess capacity crisis

Interventionist policies by governments around the world have driven a buildup of excess steel production capacity. Because China is the largest source of global excess steel capacity, the crisis is frequently mischaracterized as "just a China problem." However, as a report from the American Iron and Steel Institute and the Steel Manufacturers Association shows, numerous countries contribute to global overcapacity through state interventions that commonly include: the provision of low-cost inputs, subsidized loans and equity infusions, grants, tax breaks, support for acquisition of overseas raw materials, export restraints on domestically produced raw materials, state-led debt restructuring and other corporate reorganizations, local content requirements, transnational subsidies for establishing third-country operations, and other measures that forestall the exit of inefficient capacity. Read the report, *Examples of Policies and Practices Contributing to the Global Excess Capacity Crisis*, to learn how global steel overcapacity is fueled by government policies in South Korea, Japan, Vietnam, Indonesia, the Russian federation, Brazil, the Netherlands, Germany, the United Kingdom, Italy, Canada, and Mexico.

Appendix Table 2

Granger causality test results

Effects of steel prices on end-use goods prices

End-use product	Steel product(s)	k-lags	χ^2	Probability of significance	Causality	Average effect of 1% price increase
Durable goods	Iron and steel	1	3.5322	94.0%	Weak	0.02%
Durable goods	Cold-rolled sheet and strip	1	1.0615	69.7%	N	0.00%
	Hot-rolled sheet and strip, incl. tin mill products	1	0.6951	59.6%	N	0.00%
	Hot-rolled bars, plates, and structural shapes, carbon	1	1.0796	70.1%	N	0.00%
New motor vehicles	Cold-rolled sheet and strip	2	1.5724	54.4%	N	0.00%
Motor vehicle parts	Hot-rolled sheet and strip, incl. tin mill products	4	2.6699	38.6%	N	0.00%
	Hot-rolled bars, plates, and structural shapes, carbon	4	5.8361	78.8%	N	0.00%
Construction machinery	Hot-rolled bars, plates, and structural shapes, carbon	1	0.2072	35.1%	N	0.00%
Nonresidential construction goods	Hot-rolled bars, plates, and structural shapes, carbon	1	5.2682	97.8%	Y	0.10%
Electrical equipment and household appliances	Cold-rolled sheet and strip	2	1.6912	80.7%	N	0.00%

Appendix Table 2 (cont.)

End-use product	Steel product(s)	k-lags	χ^2	Probability of significance	Causality	Average effect of 1% price increase
	Steel wire, carbon	2	0.4380	49.2%	N	0.00%
Food at home	Hot-rolled sheet and strip, incl. tin mill products	3	8.8442	96.9%	Y	0.05%

Source: Authors analysis of BLS (2021b, 2021c, and 2021d) and FRED (2021) data.

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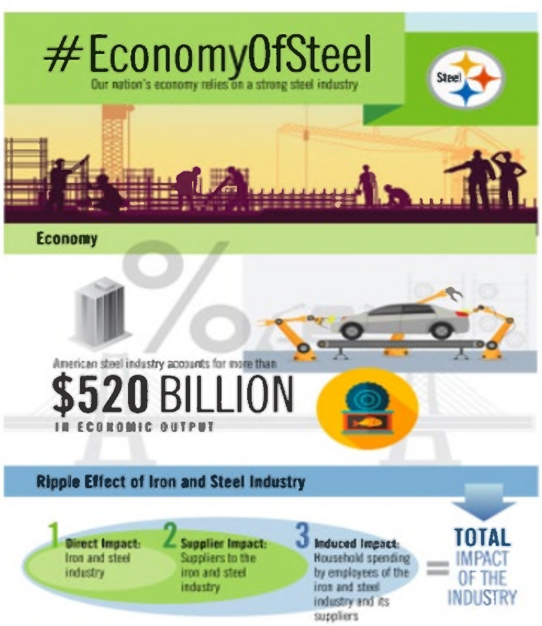
EXHIBIT 5

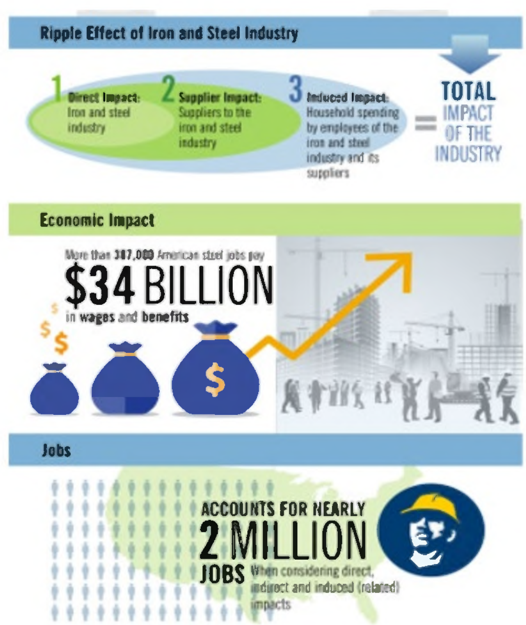
SUSTAINABILITY OF THE AMERICAN STEEL INDUSTRY

Steel's attributes, including its inherent durability and recyclability, make it vital to modern society. The American steel industry is committed to manufacturing innovative products and implementing processes that achieve environmental, social and economic sustainability. The American steel industry is the cleanest and most energy-efficient of the seven largest steel producing countries in the world.[1]

VITAL TO THE U.S. ECONOMY

The American iron and steel industry is a dynamic part of the U.S. economy, accounting for more than $520 billion in economic output and nearly two million jobs.[2] These workers earned more than $130 billion in wages and benefits, and the industry generated $56 billion in federal, state and local taxes.





LEADERSHIP IN RECYCLING

Steel is the most recycled material on the planet[3] and steel products are 100 percent recyclable at the end of their useful lives. Once produced, steel can be continually recycled into new steel products without any deterioration in product quality—a steel beam can become another steel beam, or a refrigerator, car door or roof panel.

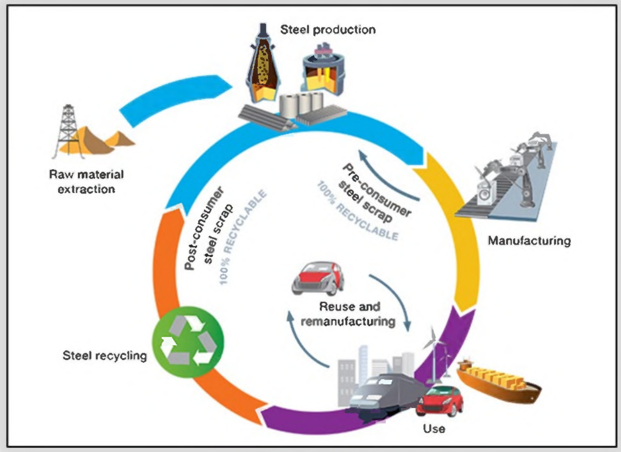
In the U.S. alone, there are typically 60 to 80 million tons of steel scrap recycled per year into new steel products.[4] [5]In the past 30 years, more than one billion tons of steel scrap have been recycled into new steel by the American steel industry. The U.S. recycles enough steel scrap to build 25 Eiffel Towers every day of the year,[6] and annually recycles enough steel scrap to build more than 650 Golden Gate Bridges.[7]

In addition:

- Recycling steel from a single car reduces greenhouse gas (GHG) emissions equivalent to consuming more than 300 gallons of gasoline.[8]
- Each year, the steel industry recycles steel from about 12 million appliances.[9]
- Recycling a single refrigerator reduces the equivalent GHG emissions by 225 pounds of CO_2.[10]
- Recycling one steel food can conserves enough energy to light a 60-watt light bulb for more than four hours.[11]

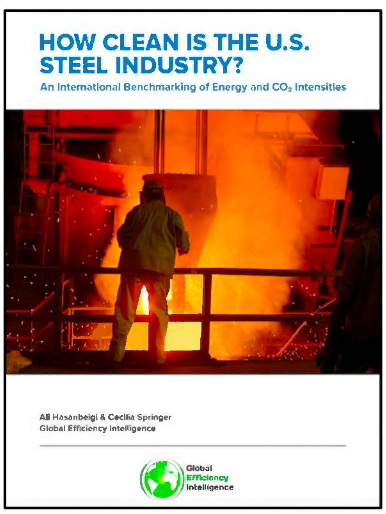
With today's sorting and separating technology, millions of tons of iron and steel are diverted from landfills to recycling and beneficial re-use. Nearly 100 percent of the steel industry's co-products can be used beneficially[12] in other applications. Slag is used in cement, road construction, fertilizers, and hydraulic engineering. Process gases are used to produce heat and/or electricity. Metal oxides, such as iron oxides, nickel and zinc, can be recovered from steelmaking dust.

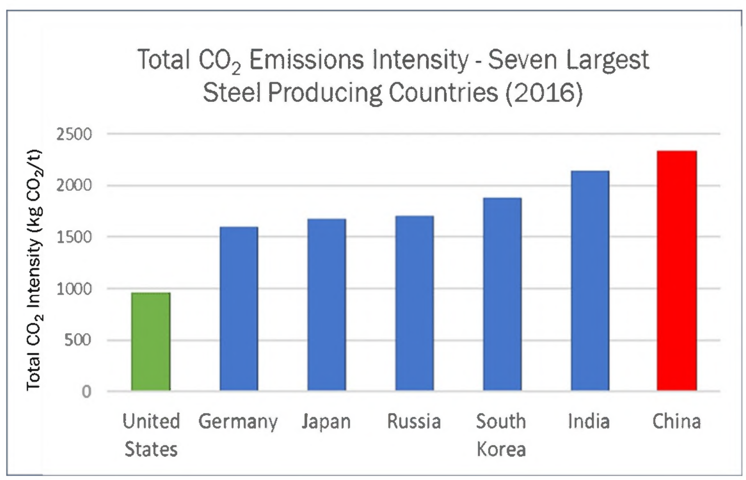
Steel in the circular economy: Steel's inherent durability and recyclability make it an ideal fit for the circular economy. Once produced, steel becomes a permanent resource that can be continuously recycled into new steel. And, as all steel contains recycled content and is 100 percent recyclable at end of life, steel products are conducive to reuse and remanufacturing. These characteristics of steel make it an ideal material for the circular economy.



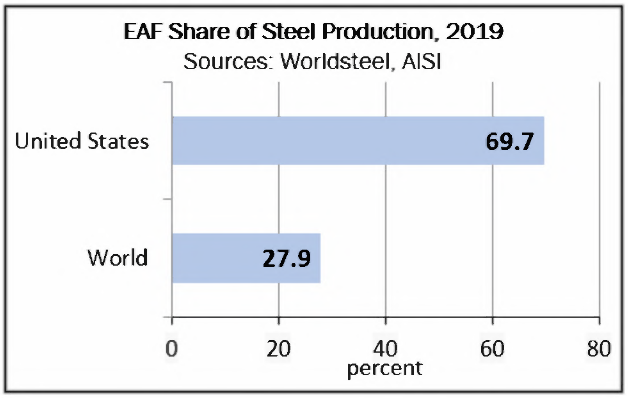
AMERICAN CLEAN STEEL PRODUCTION VS. OTHER REGIONS

The American steel industry is the cleanest and most energy-efficient of the leading steel industries in the world. Of the seven largest steel producing countries, the U.S. has the lowest CO_2 emissions per ton of steel produced and the lowest energy intensity.[13] By contrast, Chinese steel production creates CO_2 emissions that are almost 2.5 times higher—and uses 50 percent more energy compared to the U.S.— per ton of steel produced.[14]





<u>Adapted from</u>: *Hasanbeigi and Springer, "How Clean is the U.S. Steel Industry?" Global Efficiency Intelligence, 2019.*



U.S. steelmaking GHG emissions are lower than the other major producing countries for several reasons:

Lower process emissions: The U.S. produces a higher percentage of its steel from electric arc furnaces (EAF) than most other regions, resulting in lower process emissions of CO_2 from steelmaking. Seventy percent of American steel is produced this way—recycling steel scrap to produce new steel using electricity. Steel that is produced by blast furnace and basic oxygen furnace (BF/BOF) technology in the United States has the lowest CO_2 intensity of steel produced via BF/BOF in the seven largest steel producing countries. The American steel industry also uses a much higher percentage of low-emitting natural gas in our mills than most other countries.

Iron pellets vs. sinter: Integrated steel mills in the United States that employ BF/BOF technologies are almost entirely fed by domestically sourced iron ore pellets —in contrast to a reliance on lower-quality sintered iron used in China and elsewhere —resulting in lower emissions of CO_2, as well as NOx, SO_2 and particulate matter.[15]

China/U.S. comparisons for specific steel products: A recent study demonstrated that the GHG emissions resulting from Chinese production of hot-rolled structural sections were three times greater than the production of the same structural sections in the U.S.[16] Another recent study demonstrated that the GHG emissions per ton of hot-dip galvanized (HDG) coil produced in China were nearly 50 percent higher than the emissions from the same HDG coil produced in the U.S.[17]

Renewable energy and technology advancements: Work is underway on additional projects to further enhance the sustainability of American steel industry operations, including: increased use of renewable energy in steel production, and advancements in domestic production using direct reduced iron (DRI) and hot briquetted iron (HBI) in place of pig iron in both integrated and EAF steelmaking. HBI and DRI use natural gas as a reductant which will further increase blast furnace and electric arc furnace productivity and reduce CO_2 emissions.[18]

America's electrical grid also has a low CO_2 intensity compared to many other countries. According to the Energy Information Administration, the electricity grid was 19 percent coal-based in the U.S. in 2020,[19] whereas China relied on coal for 58 percent of its electricity generation.[20] Coal-based electricity has a significantly higher CO_2 emissions profile compared to other fuel sources.[21]

Steel producers in the U.S. have announced projects that employ renewable energy to supply all or most of a facility's energy requirements, and additional research is underway to assess the use of carbon capture technology in the steelmaking process.[22] As a result of these and other advancements in steelmaking and energy efficiency, the steel industry in the United States has reduced its energy intensity by 35 percent and CO_2 emissions intensity by 37 percent per ton of steel shipped since 1990.[23] And EPA data indicates that the production of iron, steel and metallurgical coke in the U.S. amounted to less than one percent of national CO_2 emissions, compared to the global scale of total CO_2 emissions from steel —which is nearly seven percent.[24] Additionally, industry innovations will continue to decrease the CO_2 intensity of steel produced in the U.S.

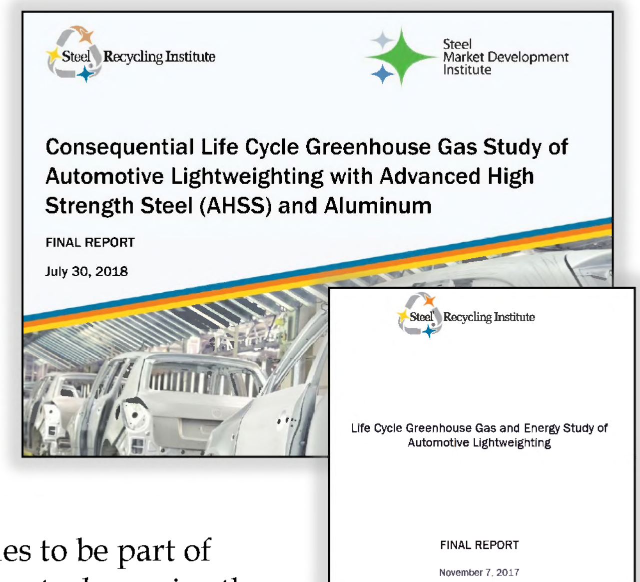
STEEL INDUSTRY INNOVATION TO MEET CUSTOMER SUSTAINABILITY NEEDS

There are more than 3,500 steel grades available today, and approximately 75 percent of these modern steels have been developed in the past 20 years.[25] These products can help reduce energy consumption and CO_2 emissions throughout the economy.

Steel provides solutions: Steel is a critical component in the continued development of clean energy and technologies to reduce America's carbon footprint. Wind, solar and tidal renewable energy systems all depend on steel. Stainless steel is vital to industries like solar power, biofuels, wind energy, green construction, low-carbon transportation, sea-water purification and surgical equipment.

Electrical steels are at the core of the electrical grid, and we continue innovating and producing more efficient electrical steels to power the technologies of today. And advanced high-strength steels (AHSS) help auto manufacturers reduce vehicle mass, thus increasing fuel-efficiency, cost-efficiency and reducing tailpipe emissions.

Automotive applications: AHSS helps auto manufacturers to reduce the mass of vehicles while maintaining safety standards, thereby increasing fuel economy and reducing tailpipe emissions. Steel's superior sustainability performance minimizes environmental impact when measured through the entire life cycle.



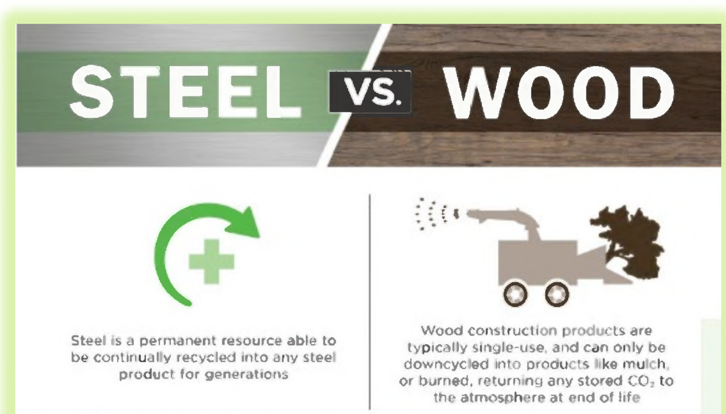
An AISI peer-reviewed study demonstrates the use of AHSS for automotive lightweighting results in an immediate and sustained decrease in GHG emissions, whereas the use of aluminum for lightweighting the same vehicle fleet results in a dramatic increase in overall GHG emissions lasting for several decades.[26]

As the move toward electric vehicles continues to be part of many automakers' future sustainability plans, steel remains the preferred material for battery pack protection due to its inherent strength. Thinner advanced grades of steel also enable optimization of space allowing for packaging of more batteries, which means traveling farther on a single battery charge.

Construction applications: Steel has a vital role in infrastructure through replacement and new construction of bridges, roadways, guiderails and utility structures. Infrastructure also includes the energy grid, energy development and transmission, water infrastructure and public safety— all of which use steel.

Steel for short span bridges is lighter than other materials and can provide a savings of up to 25 percent in total superstructure costs, partially due to the fact that heavier equipment may not be needed to set the girders. For example, the American steel industry is leading the development of new technologies like press-brake-formed steel tub girder bridges. This technology provides significant savings in construction costs and can provide an expected life service of more than 100 years—and the girders can be installed in 22 minutes.[27]

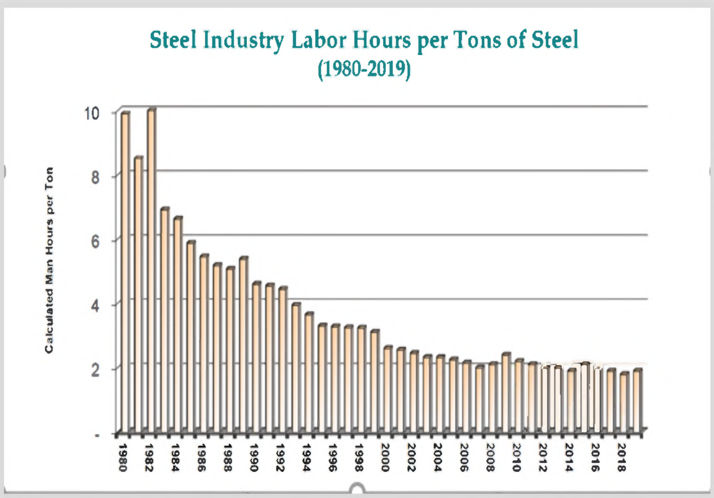
Structural steel produced in North America typically contains 90 percent or more recycled steel.[28] Steel framing itself contains a minimum of 25 percent recycled steel[29] and is continually recyclable. Steel utility poles are approximately 50 percent lighter than wood,[30] reducing transportation costs and making them easier to handle on the job site. ENERGY-STAR-qualified metal roof products can lower roof temperatures significantly, thereby reducing a building's peak cooling demand.[31]

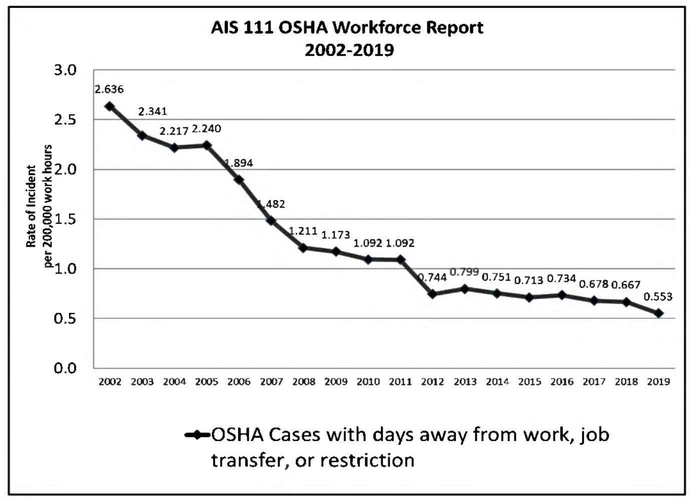


As a building material, steel also meets sustainability requirements in standards such as the International Green Construction Code and in green building rating systems like U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED), where steel products can help earn points toward LEED v4 and v4.1 certification.[32] Industry-wide environmental product declarations (EPDs)[33] are available for most steel construction products, allowing designers to select steel and fully understand its environmental impacts and benefits.

SAFETY AND PRODUCTIVITY – MAKING STRIDES TO INCREASE EFFICIENCY

The American steel industry is committed to strong safety standards and has reduced workplace incidents significantly over time. Even as worker safety improved dramatically, the steel industry has seen a five-fold increase in workforce productivity since the early 1980s—going from an average of 10.1 worker-hours per finished ton of steel to an average of 1.9 worker-hours today, and in some cases under one worker-hour.





Source: AISI Annual Statistical Report and U.S. Bureau cf Labor Statistics

POLICIES MUST ENHANCE STEEL INDUSTRY COMPETITIVENESS

Government policies should promote the American steel industry's competitiveness to facilitate its role in reducing CO_2 emissions while minimizing negative impacts on domestic production and employment. Environmental and climate policies should not place undue costs on the operations of domestic steel producers that are not borne by international competitors. This will ensure that the production of steel is not shifted to areas of the world with higher levels of energy use and negative environmental impacts.

In particular, the steel industry supports the establishment of a strong and effective border adjustment mechanism so that imported energy-intensive goods bear the same climate-related costs as competing U.S.-made goods. This is essential to ensuring that any CO_2 reduction policies actually reduce overall global emissions, thereby avoiding what is known as "carbon leakage."

THE PILLARS OF STEEL SUSTAINABILITY

ENVIRONMENTAL	SOCIAL	ECONOMIC
• Most recycled material in the world • Cleanest among the seven largest steel-producing countries • Nearly 100 percent of co-products beneficially used • Lowest level of CO_2 emissions per ton of steel produced due to: - Production of more steel from EAFs - Integrated mills use pelletized iron vs. the lower quality sintered iron used elsewhere - Increasingly using natural gas-based DRI and HBI as a replacement for pig iron • Implementing energy efficiency projects	• Supports nearly two million jobs • Strongest safety standards and reduced workplace incidents, while attaining five-fold increase in workforce productivity • More than 3,500 steel grades reduce energy consumption • Inherent durability and recyclability make steel vital to modern society	• $520 billion output • Innovation meets customer needs • Enables the production of lighter weight vehicles with better fuel efficiency • Allows the construction of more efficient steel bridges and buildings using less material, resulting in lower overall CO_2 emissions

Learn more about the American steel industry and its sustainability at:
@AISISteel and @EnviroMetal

American
Iron and Steel
Institute

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EXHIBIT 6

NOVEMBER 2019

HOW CLEAN IS THE U.S. STEEL INDUSTRY?

An International Benchmarking of Energy and CO_2 Intensities

Ali Hasanbeigi & Cecilia Springer
Global Efficiency Intelligence

Global Efficiency Intelligence

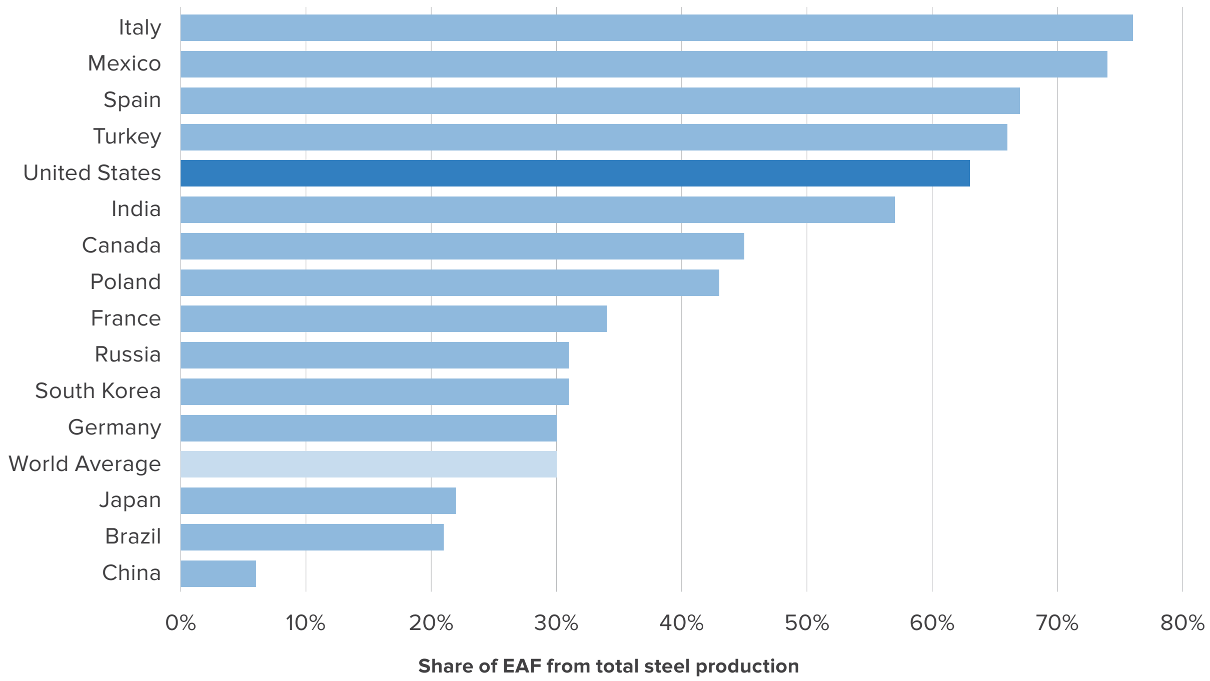


Figure 13. The share of EAF from total steel production in the studied countries in 2016

The ranking of the CO_2 emissions intensity of the steel industry among the countries studied (Figure 14) is slightly different from the energy intensity ranking. Spain has the lowest and China has the highest CO_2 emissions intensity. The U.S. steel industry's CO_2 emissions intensity again ranks 4th lowest among the countries studied. Mexico and Canada switched ranks with Turkey and have lower CO_2 emissions intensity. This is partly because of higher share of natural gas used in Mexico and Canada (70 percent and 65 percent of total fuel used in steel industry, respectively) compared to that in Turkey (30 percent of fuel used). Natural gas has a significantly lower emissions factor per unit of energy compared to coal and coke, which are the primary type of energy used in the steel industry in many countries. Other factors affecting the CO_2 emissions intensity of the steel industry are discussed in section 5.4.

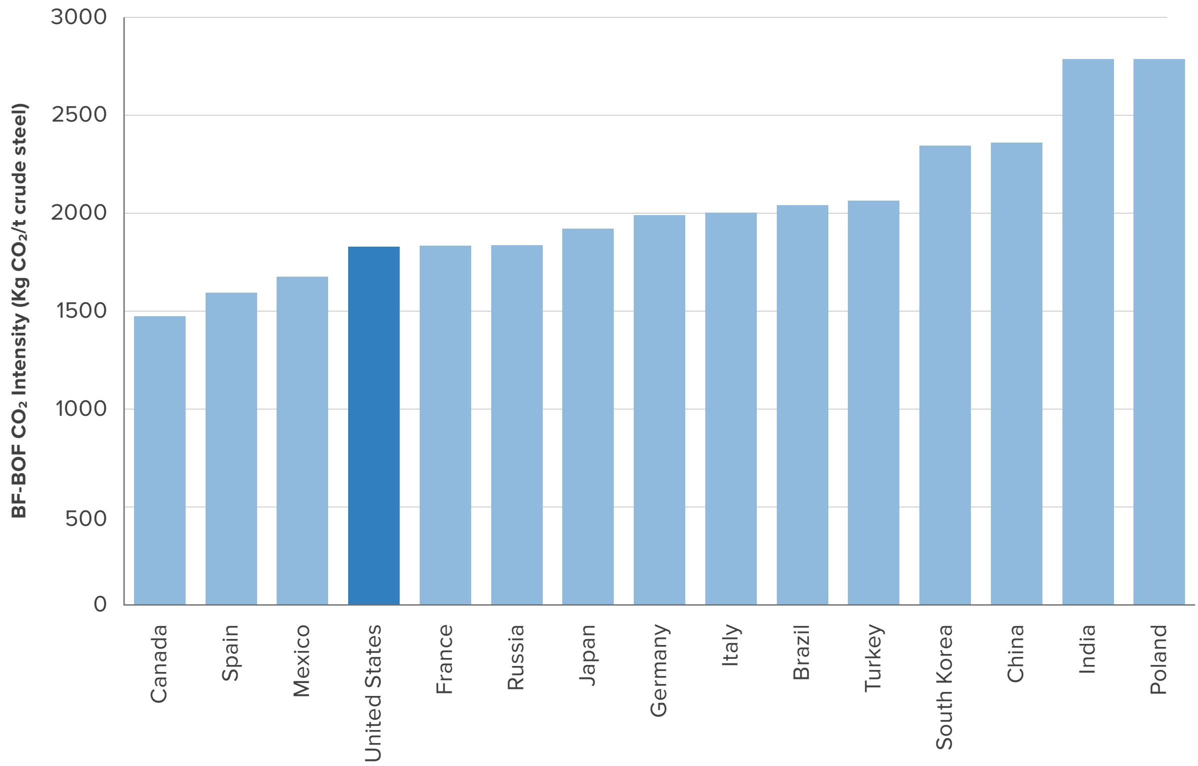


Figure 16. The CO_2 intensity of BF-BOF steel production in the studied countries in 2016

The weighted average CO_2 emissions intensity (weighted by their share of production in total production) of BF-BOF steel production in the fifteen countries studied in 2016 was 2,238 kg CO_2/t crude steel.

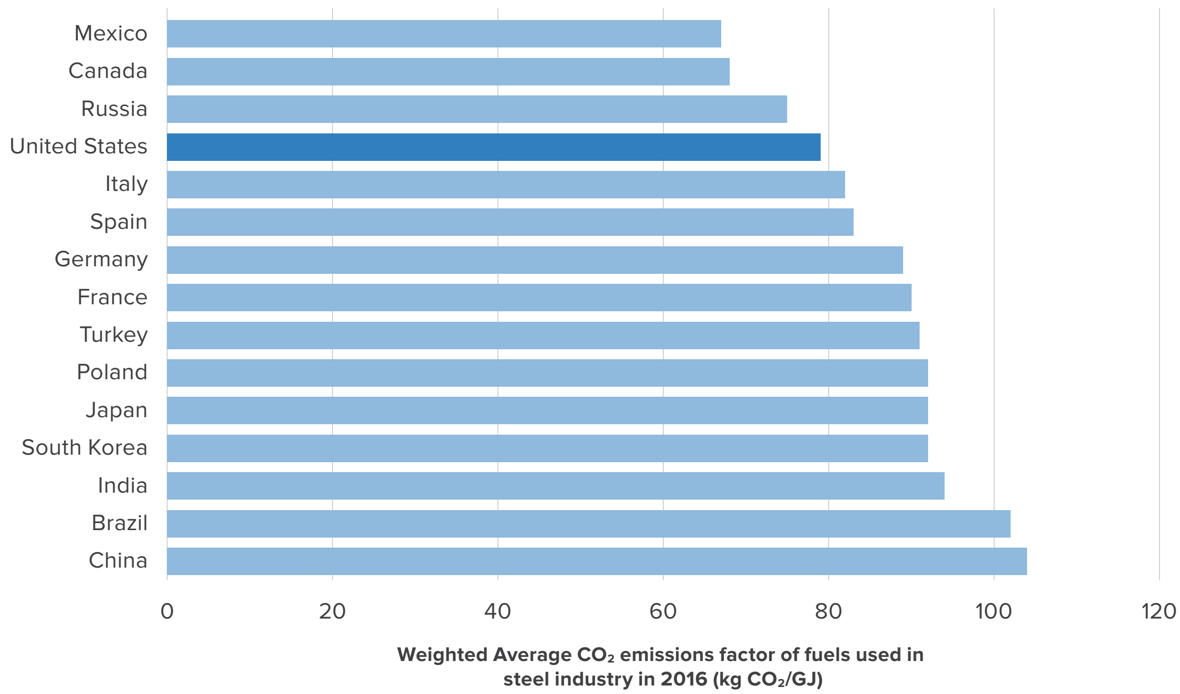


Figure 17. Weighted average CO_2 emissions factors of fuels in the steel industry in the studied countries in 2016

The ranks of countries for CO_2 intensity of EAF steel production in somewhat different from that of energy intensity. Figure 19 shows that France and Canada have the lowest and India and China have the highest CO_2 intensity of EAF steel production. In addition to the energy intensity that influences CO_2 intensity of EAF, the other important factor is electricity grid CO_2 emissions factor. The primary type of energy used in EAFs is electricity. Therefore, if the emissions factor of the electricity used in the steel industry is lower, it will help to reduce the CO_2 intensity of EAF steel production. As can be seen in Figure 20, France and Canada have the lowest electricity grid CO_2 emissions factors. India and China not only have the highest energy intensity of EAF steel production, they also have some of the highest electricity grid CO_2 emissions factors among countries studied.

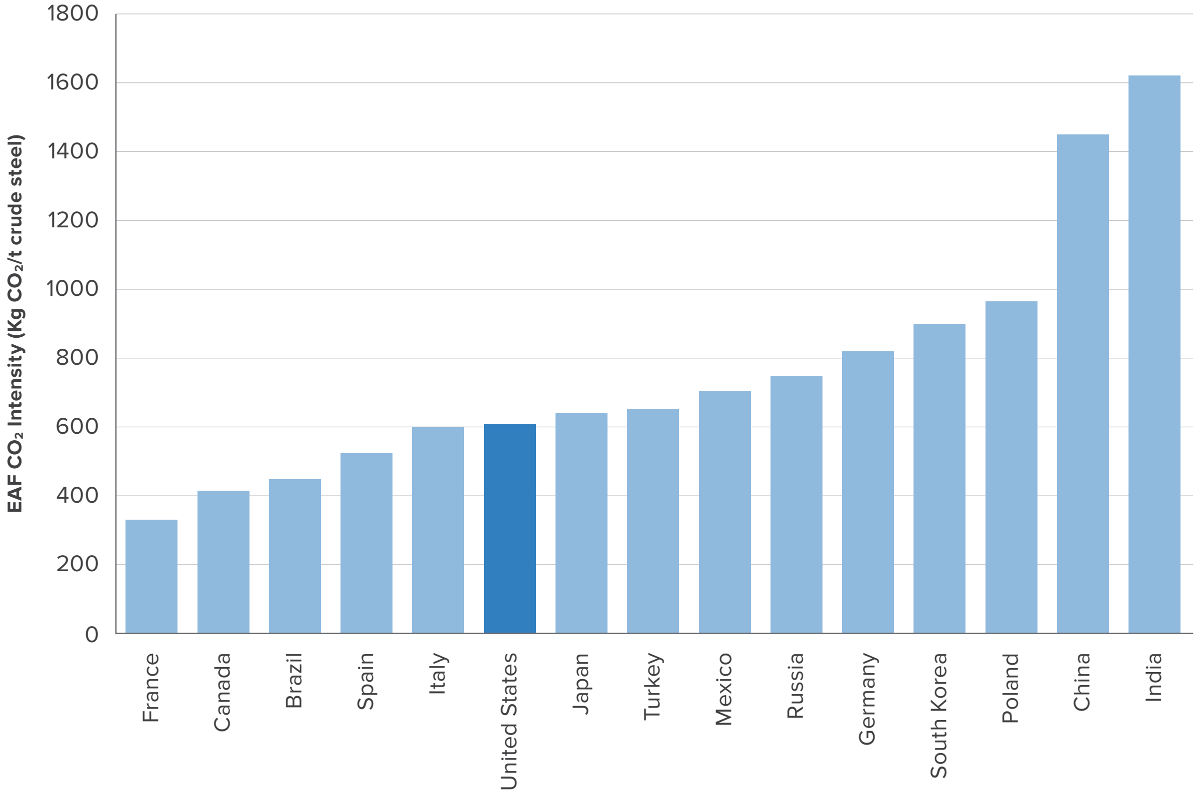


Figure 19. The CO_2 intensity of EAF steel production in the studied countries in 2016

The weighted average CO_2 emissions intensity (weighted by their share of production from total production) of EAF steel production in the fifteen countries studied in 2016 was 1,173 kg CO_2/t crude steel.

EXHIBIT 7

Steel Industry Set to Pivot to Hydrogen in $278 Billion Green Push

December 1, 2021

New York and Beijing, December 1, 2021 – Steel production could be made with almost no carbon emissions through $278 billion of extra investment by 2050, according to a new report from research firm BloombergNEF (BNEF). Hydrogen and recycling are likely to play a central role in reducing emissions from steel production. Steel is responsible for around 7% of man-made greenhouse gas emissions every year and is one of the world's most polluting industries.

Government and corporate net-zero commitments are pushing the steel industry to cancel out its emissions by 2050. Efforts to decarbonize steel production are central to the net-zero aspirations of China, Japan, Korea and the European Union. The report "*Decarbonizing Steel: A Net-Zero Pathway*", which was launched in time for the virtual BNEF Summit Shanghai, outlines the path to making profitable, low-emissions steel and describes how a combination of falling hydrogen costs, cheap clean power, and increased recycling could reduce emissions to net zero, even while total output increases.

By 2050, green hydrogen could be the cheapest production method for steel and capture 31% of the market. Another 45% could come from recycled material, and the rest from a combination of older, coal-fired plants fitted with carbon capture systems and innovative processes using electricity to refine iron ore into iron and steel. This made in a newer, typically natural gas-fired process known as DRI, or direct reduced iron. Converting a significant portion of the fleet to hydrogen would require more DRI plants and more electric furnaces. Blast furnace production would fall to 18% of capacity in this scenario.

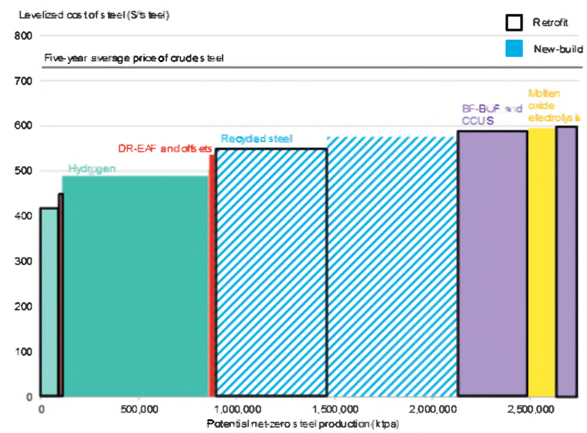
"The steel industry cannot afford to wait for the 2040s to start its transition," said Julia Attwood, head of sustainable materials at BNEF and lead author of the report. "The next ten years could see a massive expansion of steel capacity to meet demand in growing economies, such as India. Today's new plants are tomorrow's retrofits. Commissioning natural gas-fired plants could set producers up to have some of the lowest-cost capacity by retrofitting them to burn hydrogen in the 2030s and 2040s. But continuing to build new coal-fired plants will leave producers with only bad options toward a net-zero future by 2050."

In order to achieve this transformation, there are five key actions for the sector to consider: boost the amount of steel that is recycled, particularly in China; procure clean energy for electric furnaces; design all new capacity to be hydrogen or carbon capture-ready; begin blending hydrogen in existing coal- and gas-based plants to lower the cost of green hydrogen; and retrofit or close any remaining coal-fired capacity by 2050.

Producing green steel from hydrogen and electric furnaces will require massive amounts of clean energy, and a shift to higher grades

2030, according to research by BloombergNEF. South Africa and India have good iron ore reserves and the potential to produce a large amount of low-cost clean power. The world's largest iron ore producer, Australia, however, currently produces lower grade ores, and could lose its number one place in the supply chain, if it does not invest in equipment to upgrade its product.

Figure 1: 2050 decarbonization pathway for steel



Source: BloombergNEF. Note: CCUS is carbon capture and storage, DR-EAF is direct reduction of iron paired with an electric arc furnace. BF-BOF is a blast furnace paired with a basic oxygen furnace. BAU is business-as-usual.

China will continue to play a pivotal role. Currently home to 57% of the world's steelmaking capacity, its path to lower emissions will set the direction for the industry as a whole. The Chinese steel industry intends to focus first on increasing recycling and energy efficiency before adopting early-stage technologies like hydrogen and carbon capture.

Want to learn how we help our clients put it all together? Contact us to hydrogen. Green hydrogen is both the cheapest and most practical way to make green steel, once recycling levels are ramped up. This transition will cause both great disruption, and great opportunity. Companies and investors don't yet appreciate the scale of the changes ahead."

The support that policymakers provide for industrial decarbonization could also be a deciding factor for steelmakers. Subsidies for key enabling technologies, such as the hydrogen and carbon capture tax credits in the U.S.'s pending Build Back Better Bill, green steel procurement mandates for the public sector, like the Industrial Deep Decarbonization Initiative announced at COP26, or rising carbon prices, like those in the EU's Emissions Trading Scheme, could all help green steel to compete with fossil-fuel based production.

BloombergNEF estimates that new clean capacity and retrofits for lower emissions will cost the steel industry an additional $278 billion compared to business-as-usual capacity growth. This is a relatively modest figure, compared to the $172 trillion estimated by BNEF to decarbonize the global energy sector. Most of the costs to make green steel come from operations, rather than capital costs. Reducing the cost of green hydrogen is thus critical, and BNEF estimates that these should fall more than 80% by 2050 to under $1/kg in most parts of the world. Green recycling is also a cost-effective and immediate solution. Steel recycled using 100% clean electricity would only require a 5% premium to match costs for today's recycled material. By

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About BloombergNEF

BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy. Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition. We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

Cost of New Renewables Temporarily Rises as Inflation Starts to Bite

Scaling Carbon Removal: BNEF Climate-Technology White Papers

Disruptive Technologies

$223bn Investment Needed for India to Meet 2030 Wind and Solar Goals

Press Release

Net-Zero Road Transport By 2050 Still Possible, As Electric Vehicles Set To Quintuple By 2025

Report

Reform Needed to Unlock $550 Billion Carbon Offsets Market

Report

Fashion Reins In Consumption by Designing In Circularity

Press Release

BloombergNEF Announces its First Net Zero Summit in Bali Ahead of B20 and G20 Summits

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EXHIBIT 8

COAL | ENERGY TRANSITION | METALS | SHIPPING — 09 Feb 2022 | 20:55 UTC

Banks seeking to finalize framework for steel decarbonization in Q2

Author Hector Forster
Editor Tom Balcerek
Commodity Coal, Energy Transition, Metals, Shipping

HIGHLIGHTS

ING, Citi, Goldman among members of Steel Climate-Aligned Finance Working Group

Adopting a crude steel-based emissions benchmark

IEA sees industry challenges to lower steel carbon intensity

A group of banks including ING, Citi and Goldman Sachs, plan to finalize a framework for lending to support the global steel industry's decarbonization efforts during the second quarter, following further dialogue with stakeholders including steel companies and industry groups.

The Steel Climate-Aligned Finance Working Group, which is led by ING, expects its work will support clients and inject new capital into projects and investments, while tracking banks' lending activities tied to carbon emissions goals. Attracting financing for new steel projects may help spur market availability of lower emissions steel, as growing groups of consumers and end-users seek to decarbonize steel-intensive construction, autos and other goods.

"The purpose of this is for banks to report on the climate alignment of their lending portfolios and to serve as an engagement tool with clients," said Erik van Doezum, director for metals, mining & fertilizers at ING, in an interview from Amsterdam.

The six banks in the group, including Societe Generale, Standard Chartered and UniCredit, have discussed necessary steps and common standards, such as adopting a crude steel-based emissions benchmark. The focus is on corporate and project finance-based non-resource lending, rather than trade finance.

A separate group of 13 banks have been established to review the framework, which may support a broader and geographically wide take up of the measures, affecting steel financing in Asia and the Americas, Van Doezum said.

The Steel Climate-Aligned Finance Working Group falls under the umbrella of the Net Zero Steel Initiative (NZSI), which is part of the broader multi-industry Mission Possible Platform.

A recent model built by the MPP suggested it will cost $1.4 trillion to decarbonize steel over the next 28 years, according to Van Doezum. "Transitioning steel is a huge challenge," he said.

ING expects the working group to establish a dedicated carbon emissions-based financing association for steel. The new association can further adapt the agreed final methodology, trajectory, financial scope, data use and governance going forward.

"Much like with the Poseidon Principles, this is going to be a living and breathing agreement, so there's going to be an association that will house it," Van Doezum said. The association can adapt with changes over time.

The agreement will be modelled after the Poseidon Principles, the first sector-specific climate-aligned finance agreement for maritime shipping, which has seen bank signatories expand since 2019. The draft will align with other related initiatives and help set global best practices on climate for financial institutions that facilitate steelmaking.

The top 15 private lenders provide 50% of debt financing to the steel sector and many form part of the working group or the review group, with loans by far the greatest source of funding for steel companies, ahead of equities and bonds, said ING, citing external financial industry rankings.

Many banks may be involved in loan syndication, leading to potential for wider take up and referencing of the standards by lenders.

Several European and global steel producers have announced related investments and plans in new direct reduction iron (DRI) plants, electric arc furnace mills and adaptations to steel production and rolling facilities.

The investments are expected to benefit from lower carbon-emissions energy and optimize processes, using best-in-class or innovative technology, many yet to be commercialized. Such investments are expected to see support from various financing routes, including in Europe from government support and guarantees, specialist funds and so-called contracts for differences instruments to help provide market stability.

The Net Zero Steel Initiative aims to put the global steel sector on a path to net-zero emissions by 2050, providing a platform for stakeholders to align on a net-zero transition pathway and nurture supportive policy frameworks and financing for investment in decarbonization projects.

The International Energy Agency's November report on the steel sector noted more progress needed for carbon emissions reductions to meet the Paris-based agency's Net Zero Emissions by 2050 scenario.

Under the IEA's scenario, achieving an average 4%/year reduction in carbon intensity of crude steel production between 2020-2030 and maintaining the rate of decline after 2030 "will not be easy," the IEA said in the report.

"Potential for energy efficiency improvements will likely soon be exhausted. Thus, innovation in the upcoming decade will be crucial to commercialize new low-emissions processes, including those that integrate carbon capture utilization and storage and hydrogen, to realize the long-term transformational change required," the IEA said.Carbon prices and risk management may be crucial for related steel investments, as will low-carbon power supplies from renewables to support electrification and move away from coal and oil-based fossil fuels, and generate affordable green hydrogen.

"By leading this climate aligned finance agreement for steel, we are trying to show our willingness and how important it is we play our part," Van Doezum said.

"However it is very important to recognize the constraints and we do need government actions to facilitate that as well."

EXHIBIT 9

STUDY

Requested by the ITRE committee

European Parliament

Moving towards Zero-Emission Steel

Technologies Available, Prospects, Timeline and Costs

Policy Department for Economic, Scientific and Quality of Life Policies
Directorate-General for Internal Policies
Authors: Liliana GUEVARA OPINSKA, Marwa MAHMOUD, Csinszka BENE, and Koen RADEMAEKERS, Trinomics
PE 695.484- December 2021

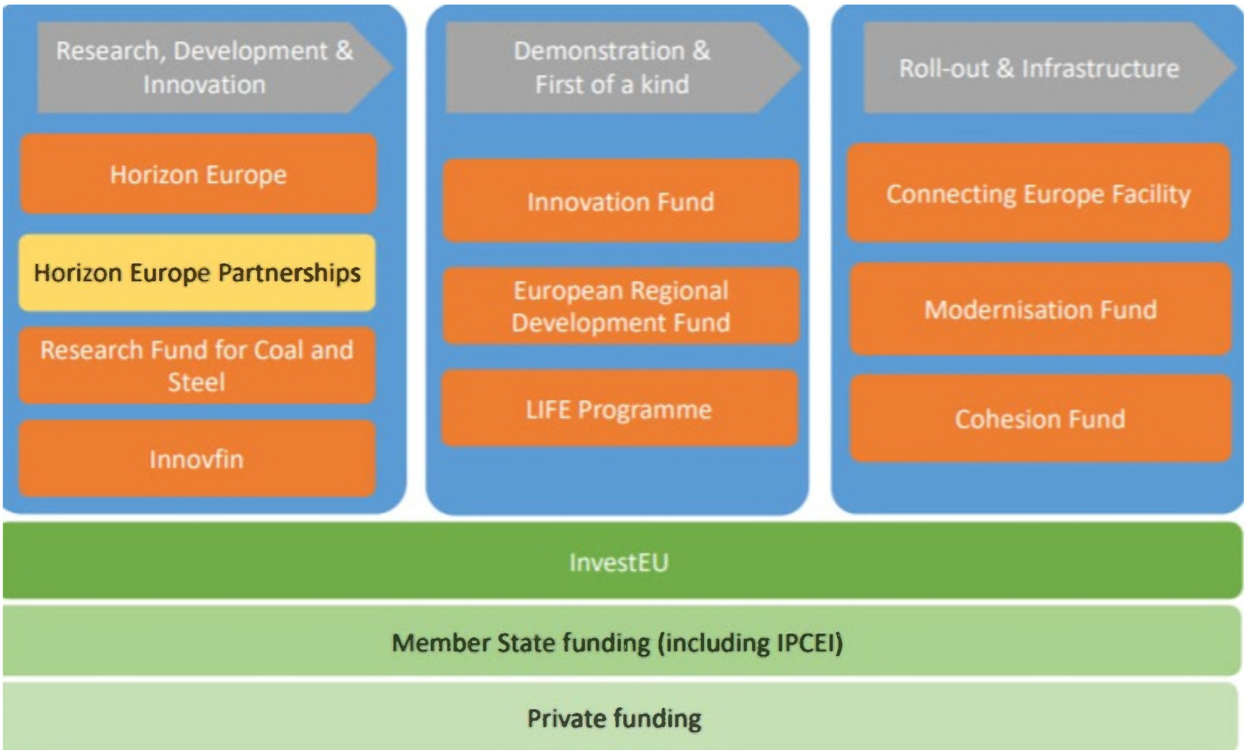
EN

3. EU INVESTMENT INSTRUMENTS AND INITIATIVES TO SUPPORT DEPLOYMENT OF ZERO EMISSION STEEL

3.1. Existing funding and budget programmes

Figure 3-1 below provides a good overview of the key funding and support mechanisms at EU-level available for the steel sector. In this section of the report, we provide a brief summary of the key funding instruments available.

Figure 3-3: EU programmes supporting the decarbonisation of the steel industry



Source: ESTEP AISBL (2020) Proposal for a European Partnership under Horizon Europe Clean Steel – Low Carbon Steelmaking.

3.1.1. The Recovery and Resilience Facility

The Recovery and Resilience Facility (RRF) is a key component of the Next Generation EU (NGEU) recovery package which will be made available as part of the long-term budget for 2021-2027 to support EU Member States in their recovery from the coronavirus pandemic. Under the RRF, €723.8 billion will be made available to Member States in the form of loans and grants to support reforms and investments; 37% of total investments will be allocated towards fostering the green transition[100].

The RRF provides a unique opportunity for Member States to invest in the decarbonisation of their energy-intensive industries, including the steel industry. Based on the Commission's analysis of the submitted RRF plans, it is possible to assert that several Member States plan to use a portion of the funds to support the decarbonisation of their steel industry. For example, the Italian RRF plan mentions investments in clean hydrogen production including 5 GW of installed electrolysis capacity by 2030.

[100] European Commission (2021) *Recovery and Resilience Facility*. Available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en.

The plan foresees that at a later stage RRF investments could be complemented by the Just Transition Fund to support areas like Taranto in transitioning towards a hydrogen-based clean steel production and the reskilling of steel workers[101]. Decarbonisation of industry is an important component of the majority of submitted RRF plans, however only a few countries explicitly mention the steel sector.

3.1.2. Just Transition Mechanism

The Just Transition Mechanism (JTM) is a key policy to ensure a fair transition towards a climate-neutral economy. It provides targeted support to help mobilise at least €65-75 billion[102] in the next MFF period of 2021-2027 in the most affected regions, to mitigate the socio-economic and employment impacts of the transition[103]. As part of the JTM, the Just Transition Fund (JTF) will invest €17.5 billion in the territories most negatively affected by the transition, including regions with polluting heavy industry. The steel sector is one of the priorities of JTF support in six Member States[104]. Based on the Territorial Just Transition Plans submitted by Member States, the JTF will support the deployment of new technologies as well as programs for economic diversification, upskilling and reskilling of workers and the decarbonisation of the industry overall. Moreover, grants and loans are also accessible for public and private use under the new InvestEU Just Transition scheme and the new Public Sector Loan Facility.

3.1.3. InvestEU

The InvestEU programme will provide a budgetary guarantee and mobilise €10-15 billion in private sector investments, while the loan facility combines €1.5 billion of grants from the EU budget with €10 billion of loans from the EIB to mobilise between €25 and €30 billion of public investment. Investments in sustainable industrial applications that result in emission reduction are a priority of the Fund, both under the *Sustainable Infrastructure* and the *Research, Innovation and Digitalisation* windows of the InvestEU programme. Financial support under the InvestEU Fund can take various forms of equity or loan finance provided by the European Investment Bank Group or other implementing partners.

Selected projects for funding already include a break-through initiative in steelmaking by Belgian ArcelorMittal, who received €75 million in European Investment Bank (EIB) loans to scale up two projects, of which 'Steelanol', an industrial-scale demonstration plant that captures waste gases (carbon and hydrogen) from the blast furnace used in steelmaking and biologically converts them into recycled-carbon ethanol that can be used in liquid fuel blends[105]. The InvestEU Advisory Hub can support potential project applicants.

[101] European Commission (2021) SWD(2021) 165 final. *Analysis of the recovery and resilience plan of Italy*. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021SC0165&from=EN.

[102] Note: The amount cited is based on 3 different funding mechanisms: the Just Transition Fund (EU budget), a dedicated scheme under InvestEU (private funding) and a public sector loan facility with back up from the EIB. For more information please see: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism/just-transition-funding-sources_en.

[103] European Commission (2021) https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal/finance-and-green-deal/just-transition-mechanism_en.

[104] Belgium (Hainaut), France (Bouches-du-Rhône, Nord), Italy (Taranto), Luxemburg (Esch-sur-Alzette), Slovakia (Košice) and Sweden (Upper Norrland).

[105] EIB (2020) Belgium: EU supports ArcelorMittal with EUR 75m EIB loan to scale up breakthrough technology to reduce carbon emissions. Available at: https://www.eib.org/en/press/all/2020-120-eu-supports-arcelormittal-with-eur-75m-eib-loan-to-scale-up-breakthrough-technology-to-reduce-carbon-emissions#_edn4.

3.1.4. Innovation Fund

Aims at funding innovative low-carbon technologies and processes programmes in the energy-intensive industries with European value added that can bring significant emission reductions. Such programmes include products substituting carbon intensive ones, CCS and CCU, innovative renewable energy generation and energy storage.

The Innovation Fund supports the creation of adequate financial incentives for projects that invest in the next generation of technologies that are necessary to achieve the EU's low-carbon transition[106]. It is funded by auctioning of allowances under the EU ETS. It is estimated that the Innovation Fund will provide around €25 billion of support over the period 2020 – 2030 (depending on the carbon price[107]).

Projects are selected based on effectiveness of GHG emissions avoidance, degree of innovation, project maturity, scalability, and cost efficiency. Innovation Fund grants will pay for up to 60% of project costs, and up to 40% of the grant is paid up front, with additional disbursements paid upon achievement of performance milestones.

3.1.5. Sustainable financing taxonomy

The EU action plan 'Financing Sustainable Growth' describes the EU's strategy in addressing sustainable finance in relation to Paris Agreement. The sustainable finance taxonomy represents a part of this action plan, with the aim of further incentivising and channelling private sector investments in sustainable development. The delegated acts of the sustainable finance taxonomy set criteria for activities that can make substantial contribution to climate change mitigation and adaptation activities[108]. Iron and steel production activities are among the activities listed in the EU taxonomy for sustainable investment[109], with technical screening criteria recognising the most climate-friendly forms of production while ensuring no significant harm to the environment. The technical screening criteria also recognizes the importance of R&D and innovation activities for low-carbon/carbon neutral steel manufacturing. The criteria also encourage investments in breakthrough technologies[110].

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106 European Commission (2021). Available at:) https://ec.europa.eu/clima/policies/innovation-fund_en.

107 At 50 €//tonCO_2.

108 EC. (2021). Commission delegated act regulation supplementing regulation 2020/852 of the European Parliament by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:d84ec73c-c773-11eb-a925-01aa75ed71a1.0021.02/DOC_1&format=PDF and Annex 1 https://ec.europa.eu/finance/docs/level-2-measures/taxonomy-regulation-delegated-act-2021-2800-annex-1_en.pdf.

109 Ibid.

110 EC. (2021). Commission SWD *Towards competitive and clean European Steel*. Available at: https://ec.europa.eu/info/sites/default/files/swd-competitive-clean-european-steel_en.pdf.

EXHIBIT 10

15 February 2022 16:30 CET

ArcelorMittal decarbonisation project in Hamilton, Canada confirmed with the announcement of a CAD$500M investment by the Government of Ontario

New DRI and EAF installations at ArcelorMittal Dofasco in Hamilton, Ontario will reduce carbon emissions by approximately 60%

ArcelorMittal (the 'Company') has today confirmed with the Government of Ontario its plan for a c. CAD$1.8 billion investment in decarbonisation technologies at ArcelorMittal Dofasco's plant in Hamilton. As announced in July, 2021, the investment will reduce annual CO2 emissions at ArcelorMittal's Hamilton, Ontario operations by approximately 3 million tonnes, which represents approximately 60% of emissions. This means the Hamilton plant will transition away from the blast furnace-basic oxygen furnace steelmaking production route to the Direct Reduced Iron (DRI) – Electric Arc Furnace (EAF) production route, which carries a significantly lower carbon footprint.

The project is scheduled to be complete by 2028, although the Company is looking for opportunities to accelerate the project timelines.

The new manufacturing processes contribute to a considerable reduction of CO2 emissions and

At the heart of the plan is a 2.5 million tonne capacity DRI facility and an EAF facility capable of producing 2.4 million tonnes of high-quality steel through its existing secondary metallurgy and secondary casting facilities. Modification of the existing EAF facility and continuous casters will also be undertaken to align productivity, quality and energy capabilities between all assets in the new footprint.

This project contributes to the sustainability of well-paying skilled positions in advanced manufacturing and is also expected to support as many as 2,500 jobs during the engineering and construction phases. It will also support ArcelorMittal Dofasco's customers decarbonisation ambitions while further enhancing ArcelorMittal Dofasco's capability to support the most demanding product segments including automotive exposed, advanced high strength steels, and consumer packing.

This new production route for ArcelorMittal Dofasco will provide a technically advanced manufacturing environment for operations, maintenance, and technology staff to work in, with improved health and safety. New positions, training, and development will be provided for employees moving from existing business units to new assets, with approximately 160,000 training hours required to transition our workforce to the new footprint.

Announcing the Investment, Vic Fedeli, Minster of Economic Development Job Creation and Trade said:

"From day one, our government's plan has been to unleash Ontario's economic potential by reducing the cost of doing business in Ontario by nearly $7 billion a year. This once-in-a-generation investment to transform the province into a world-leading producer of green steel is a major step forward as we strive for a full economic recovery and transform our auto supply chains to build the car of the future – right here in Ontario."

Speaking at the announcement in Hamilton, John Brett, ArcelorMittal North America CEO, said:

"Reducing our CO2 emissions intensity worldwide by 25% by 2030 is an ambitious target for a steel and mining company; but we believe it is achievable and that it is our responsibility to invent or innovate the processes and technologies that will enable us to reach that goal. As part of that, we understand that in the coming years, the assets used to make steel will undergo a transformation on a scale not seen for many decades."

Highlighting the impact of the announcement, ArcelorMittal Dofasco President and CEO Ron Bedard said:

"This is the most significant construction project ever undertaken at Dofasco. And the most important achievement in the project

and in Europe by 35% by 2030.

[1] Calculated using the US EPA greenhouse gas equivalencies calculator - https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator

About ArcelorMittal

ArcelorMittal is the world's leading steel and mining company, with a presence in 60 countries and primary steelmaking facilities in 16 countries. In 2021, ArcelorMittal had revenues of $76.6 billion and crude steel production of 69.1 million metric tonnes, while iron ore production reached 50.9 million metric tonnes. Our purpose is to produce ever smarter steels that have a positive benefit for people and planet. Steels made using innovative processes which use less energy, emit significantly less carbon and reduce costs. Steels that are cleaner, stronger and reusable. Steels for electric vehicles and renewable energy infrastructure that will support societies as they transform through this century. With steel at our core, our inventive people and an entrepreneurial culture at heart, we will support the world in making that change. This is what we believe it takes to be the steel company of the future. ArcelorMittal is listed on the stock exchanges of New York (MT), Amsterdam (MT), Paris (MT), Luxembourg (MT) and on the Spanish stock exchanges of Barcelona, Bilbao, Madrid and Valencia (MTS). For more information about ArcelorMittal please visit: http://corporate.arcelormittal.com/

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EXHIBIT 11

91st Session of the OECD Steel Committee - Chair's Statement

Urgent need to secure the steel value chain

Statement by Mr Ulf ZUMKLEY, Chair of the OECD Steel Committee

91st session of the Steel Committee, 29-31 March 2022

At its 91st session held on 29-31 March 2022, the OECD Steel Committee held in-depth discussions about the impacts of the large-scale aggression by Russia against Ukraine on global steel markets and the outlook, and ways in which the Committee could work together to bring greater stability to steel markets and support Ukraine's eventual recovery from the war.

Delegates of the Steel Committee:

- Exchanged views on the implications of the war in Ukraine for global steel markets, noting the sharp negative effects along the entire steel supply chain. The effects include a decline in global steel demand growth this year and supply side shocks on products ranging from key raw materials to finished steel products.
- Explored possible practical support that the Committee could provide to Ukraine as part of the call by the OECD Council on 8 March 2022 for the OECD to contribute to eventual recovery and reconstruction. Members also explored options for sourcing alternative steel-related materials as a way to stabilise global steel markets.
- Agreed to further the Committee's analytical work on structural problems facing the steel industry, and to promote policy settings towards a level global playing field for steel, in particular by:
  - Building further transparency of subsidies and other government support measures, carrying out analytical work to understand their impacts, and developing evidence-based policy recommendations on the use of these measures.
  - Better understanding the implications of state-owned enterprises (SOEs) for the health of global steel markets, and renewing their call for such enterprises to act in accordance with market principles.
  - Monitoring potential trade measure circumvention in steel using new tools developed by the OECD and working together to help prevent these practices.
  - Monitoring new low-carbon steel projects, not only to better assess the implications and impacts for the sector (whether in terms of capacity or industrial development), but also to identify and anticipate related challenges.
  - Monitoring excess capacity, which stood at 544 million tonnes in 2021 and has remained at persistently elevated levels since 2018, highlighting the need for further capacity reductions in the relevant jurisdictions.

Global steel markets impacted severely by Russia's large-scale aggression against Ukraine

While global steel markets were recovering throughout 2021, the outlook has worsened significantly since Russia's large-scale aggression against Ukraine began. Even before the war started, steel market activity was slowing in response to growing economic uncertainties, and risks were building. Increased stress on global supply chains, including semiconductor chip shortages, rising energy costs and the prospects for higher interest rates due to accelerating inflation were dampening industrial activity and global demand for steel.

While recognising that the most important consequences of the war are human in nature, participants of the Steel Committee discussed the significant implications that the conflict is having on global steel markets. The impacts are being felt directly as a significant negative supply shock on steel and raw materials from Russia and Ukraine, affecting the European steel industry in particular, leading to surging steel and raw material prices. The global steel industry is also suffering from indirect impacts such as higher energy and production costs as well as a slowdown in global economic growth that will dampen steel demand considerably going forward. Participants discussed the impacts of the crisis on steel demand growth in different regions and economies, noting the developing stagnation and potential declines in global steel demand this year.

Wider impacts are harder to predict, but in case the conflict continues longer term, implications may include a further fragmentation of steel value chains, a slower transition towards decarbonisation of the steel industry through rising costs and reduced incomes, and, in some OECD countries, challenging access to gas supplies. Pressures for higher defence spending and changes in the structure of energy markets could also affect the steel industry in different ways.

Support for recovery of Ukraine's steel industry

Ukraine has a longstanding and active role in the Steel Committee. The steel industry plays a critical role in the Ukrainian economy, and steel will play an equally critical role in the country's eventual recovery and reconstruction from the war. The Committee agreed that the diverse expertise, knowledge and experience of its membership could be mobilised to help the recovery of Ukraine's steel industry and related supply chains, as a practical way to support the country's recovery process and as part of the call by the OECD Council on 8 March 2022 for the OECD to contribute to eventual recovery and reconstruction. In this context, members agreed to revisit their programme of work to accommodate work to support Ukraine's recovery.

In view of the negative supply shock caused by the war on steel-related materials, and the need to bring greater stability to steel markets, members called on the Committee to explore ways to secure the steel supply chain as a positive way to help the steel industry, and to ensure unobstructed trade flows of construction steel products to Ukraine for the eventual rebuilding process. The Committee agreed to examine export restrictions and interdependencies along the steel supply chain more closely, to explore ways to coordinate better access to raw materials, and to engage more closely with interested non-OECD partners to encourage dialogue on these issues.

The Committee will strengthen its work on structural issues for a level playing field in global steel markets

Industrial production has returned to its pre-pandemic levels. At the same time, higher costs incurred by the manufacturing sector, up to an all-time high for producer price indices during the second half of 2021, weighing down on demand. In addition to exploring practical ways to help offset some of the more immediate steel-related challenges stemming from the war, members of the Committee are committed to furthering their work on longer-term structural issues facing the industry and policy solutions to these challenges. In this context, the Committee discussed its work to build transparency on government subsidies and other measures that can hinder market function and contribute to excess capacity in the steel sector, including via SOEs, new evidence of possible trade circumvention and its impacts, and climate-related challenges and relevance for the work of the Steel Committee.

Members agreed to strengthen the Committee's important work on building a database of subsidies and government support measures in key steel-producing jurisdictions, and to explore future analytical work that would analyse the impacts of these measures, particularly on excess capacity. The gap between global capacity and production has remained elevated over the past several years, stabilising at a level of 544.1 mmt in 2021. The latest OECD analysis suggests that excess capacity is likely to continue growing, with a total of 88.5 million metric tonnes (mmt) of capacity underway for completion, while an additional 73.3 mmt are in the planning stages for the 2022-24 period. Capacity growth is being driven by investment activity particularly in EAF and carbon-intensive BOF facilities in the Middle East and Southeast Asia, respectively. Should all the projects be realised, global steelmaking capacity could increase by 6.6% from its level of 2 454.3 mmt in 2021, adding to supply side pressures for the steel industry because many of these facilities are being built specifically to export their production.

SOEs have played an important role in global capacity developments. The Committee discussed an interim report showing substantial growth in SOE steelmaking capacity since 2000, which accounted for 21% of global steelmaking capacity in 2021. This growth has been primarily attributable to China, potentially supported by subsidisation via market-distorting instruments. Such practices can help keep financially unviable steel enterprises operating in the market, causing inefficiencies in their respective domestic steel markets and in the global steel market.

Market-distorting government interventions contribute to unfair trade practices that harm domestic steel markets. While trade defence instruments are used to address unfair trade practices, new OECD empirical analysis shows that the extent of circumvention of legitimate trade remedy actions appears to be quite common in the global steel markets. A large share of the potential circumvention behaviour identified is associated with antidumping measures initiated in 2015, at the onset of the steel crisis. Most of the potential circumvention behaviour appears to involve Viet Nam as an intermediary economy and China as subject economy. The Steel Committee agreed to further study trade circumvention trends based on the tools developed by the OECD, and to foster cooperation amongst its members to better understand and reduce circumvention.

Related

- OECD work on steel

Related Documents

91st Session of the Steel Committee, virtual meeting, 29-31 March 2022

EXHIBIT 12

BEYOND BLS

Beyond BLS briefly summarizes articles, reports, working papers, and other works published outside BLS on broad topics of interest to MLR readers.

NOVEMBER 2021

COVID-19 causes a spike in spending on durable goods

Summary written by: Demetrio Scopelliti

During times of economic uncertainty, consumers typically postpone purchasing durable goods, such as kitchen appliances, motor vehicles, sports equipment, and furniture. In fact, at the onset of the coronavirus disease 2019 (COVID-19), household spending on durable goods contracted substantially. However, as time passed, spending on durable goods rose sharply. What caused this to happen?

In "Why has durable goods spending been so strong during the COVID-19 pandemic?," authors Kristen Tauber and William Van Zandweghe (*Economic Commentary*, Federal Reserve Bank of Cleveland, July 2021) use an econometric model to support their assertion that increased spending on durable goods was caused by a shift in consumer demand from services to durable goods and by increased disposable income from fiscal stimulus. The authors indicate that these two conditions account for approximately half of the rise in durable goods spending in 2020.

Tauber and Zandweghe argue that the lockdown and social-distancing safeguards implemented by government, businesses, and consumers during COVID-19 caused a shift in consumer demand from services to durable goods. By spending more time at home, consumers reduced travel, cut back on eating at restaurants, and exercised at home instead of the gym. These actions may have led consumers to substitute services with durable goods by upgrading their kitchen appliances and electronics and purchasing sports equipment.

The authors indicate that unlike the gradual increase in disposable income typically seen after peaks in previous business cycles, disposable income during COVID-19 rose sharply and indirectly caused a boom in durable-goods spending as a result. The authors cite data from U.S. national accounts showing that disposable income increased by $1.18 trillion in 2020 and that about 81 percent of that increase, or $957 billion, resulted from fiscal stimulus. Tauber and Zandweghe show that increased consumer spending on motor vehicles, recreational goods, and furniture and appliances coincided with three rounds of fiscal stimulus that were paid out between April 2020 and April 2021.

The authors acknowledge that the change in consumer behavior brought on by COVID-19 will not be permanent as public health concerns subside and the economy reopens, enabling consumption to emulate a more traditional combination of spending on durable goods, nondurable goods, and services. Reducing fiscal stimulus will cause disposable income to return to its normal long-term trajectory, thus slowing consumer spending on durable goods.

EXHIBIT 13

WRITTEN MATERIALS

Why the Pandemic Has Disrupted Supply Chains

JUNE 17, 2021 • BLOG

By Susan Helper and Evan Soltas

These are times of rapid transition for the U.S. economy. With the winding down of the worst of the pandemic, businesses have added jobs at a rate of 540,000 per month since January. Many consumers are making large purchases with savings accumulated during the pandemic, sending new home sales to their highest level in 14 years and auto sales to their highest level in 15 years.

While a fast pivot to growth is good news for businesses and workers, it also creates challenges. Entire industries that shrank dramatically during the pandemic, such as the hotel and restaurant sectors, are now trying to reopen. Some businesses report that they have been unable to hire quickly enough to keep pace with their rising need for workers, leading to an all-time record 8.3 million job openings in April. Others do not have enough of their products in inventory to avoid running out of stock. The situation has been especially difficult for businesses with complex supply chains, as their production is vulnerable to disruption due to shortages of inputs from other businesses.

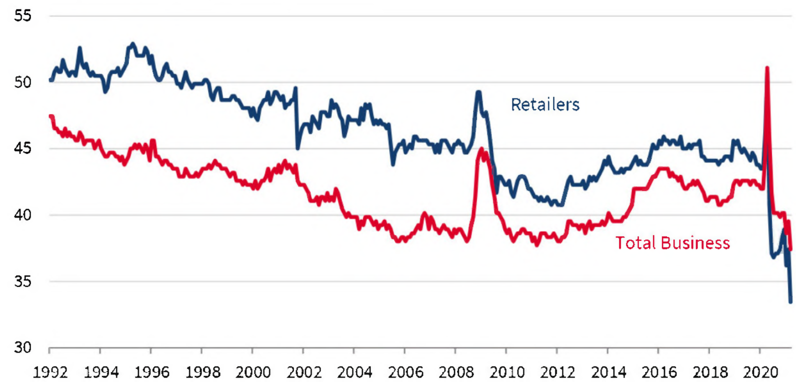
These shortages and supply-chain disruptions are significant and widespread—but are likely to be transitory. Below, we describe the disruptions, the ways that supply chains have adjusted to disruptions in the past, and how the Administration is working to address both short- and long-term supply chain issues.

Figure 1 shows that both the economy-wide and retail-sector inventory-to-sales ratios hit record lows in March. These ratios measure how many days of current sales that businesses and retailers could support out of existing inventories. When the pandemic hit, businesses were stuck with billions of dollars in unsold goods, causing inventory-to-sales ratios to surge briefly before businesses liquidated these inventories. But, as the economy recovered and demand increased, businesses have not yet been able to bring inventories fully back to pre-pandemic levels, causing inventory-to-sales ratios to fall.

The figure shows that while retailers had 43 days of inventory in February 2020, today they have just 33 days. Inventories of cars and homes are also at or near record lows, sufficient for just one month of car sales and 4.4 months of home sales, as compared to pre-pandemic levels of about two months for cars and 5.5 months for homes. These low inventories have caused cascading issues in industrial supply chains. In the latest U.S. Census Small Business Pulse survey, held from May 31 to June 6, 36 percent of small businesses reported delays with domestic suppliers, with delays concentrated in manufacturing, construction, and trade sectors, as shown in Figure 2. While no comparable survey data exist from before the pandemic, industry-specific surveys on input shortages suggest these levels are much higher than usual.

Figure 1. Businesses Have Little Inventory to Sell

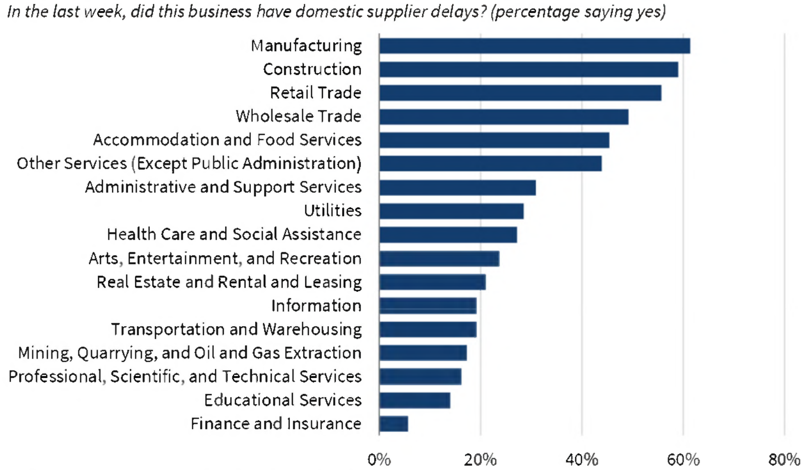
Inventory-to-sales ratio (days of sales in inventory)



Sources: U.S. Census Bureau; CEA Calculations

Figure 2. Supply-Chain Disruptions By Sector

In the last week, did this business have domestic supplier delays? (percentage saying yes)



Sources: U.S. Census Bureau; CEA Calculations.

Data also suggest these shortages are holding back business activity in some sectors. A record share of homebuilders, surveyed by the National Association of Homebuilders in May, reported shortages of key materials such as framing lumber, wallboard, and roofing. Homebuilders appear to be responding to these shortages in part by delaying new construction, as housing starts have been volatile for several months.

Another impact of the shortages has been abrupt price increases. Between May 2020 and May 2021, prices of commodities tracked within the Producer

Price Index rose by 19 percent, the largest year-over-year increase since 1974, in part reflecting base effects. Some increases have been especially dramatic. Facing a shortage of lumber, homebuilders briefly sent prices to $1,711 per thousand board-feet last month, an amount that implies a typical 2,000-square-foot house would require more than $27,000 in framing lumber alone, relative to a lumber bill of about $7,000 before the pandemic.[1] Lumber prices have now rapidly come back down, falling 38 percent from their record high, in an early sign that some shortages may be short-lived.

Supply-chain disruptions are also having a material impact on consumer prices, especially in the motor vehicle sector. Over half of the May increase in core inflation as measured by the Consumer Price Index comes from this sector, if we include prices of new, used, leased, and rental automobiles. This sector also accounted for one-third of the economy-wide increase in prices compared to a year ago.[2]

A key reason for the acute problems in motor vehicles is that automakers appear to have underestimated demand for their products after the start of the pandemic. Expecting weak demand, they cancelled orders of semiconductors, an item with a long lead time and with a secular increase in demand from other industries. This problem is compounded by the fragmentation in recent decades of the auto supply chain across many countries and many firms. This phenomenon has made it difficult for automakers to trace the root causes of bottlenecks, since for example a semiconductor may be designed by one firm, manufactured by a second firm, embedded into a component (such as an air bag) by a third supplier, and only then delivered to an automaker's assembly plant. In most cases, neither the automaker nor the semiconductor manufacturer can trace what goes on in these intermediate layers (or "tiers") of the supply chain, due in part to lack of trust among parties in supply chains, who fear that the information might be used to replace them or to bargain for a price reduction. While these problems are most acute in semiconductors, they are found in other parts of the auto supply chain as well. The auto sector is "the industry of industries," so the price of cars is affected by the prices of the 30,000 parts in the car, from semiconductors to steel to plastic to rubber, and the logistics of transporting these parts across multiple national borders.

While the economy-wide nature of these shortages is unusual, the history of supply disruptions in specific industries may offer insights as to how the shortages will be resolved over time. In the past, many industries have been surprised by strong demand and caught with too little inventory of specific goods. Others have been hit with a supply shock due to a crop failure or a natural disaster which took key factories temporarily offline, such as after the 2011 earthquake in Japan. In many such cases, markets made their way back to equilibrium relatively quickly.

Take coffee, for example. As some coffee drinkers can remember, coffee prices have spiked repeatedly due to frosts that damage coffee harvests, most recently in late 2010. Each time, the weather normalized, harvests improved, and prices fell back towards their previous levels. Similar transitory price spikes have occurred in markets for agricultural goods and other commodities—peanut butter amid a drought in 2011, or eggs amid an outbreak of bird flu in 2015.

Figure 3. Surges and Declines in Coffee Prices

U.S. city average price of ground roast coffee (price per pound)

Source: U.S. Bureau of Labor Statistics

The toilet-paper shortage in the early days of the pandemic offers another useful case study. Stay-at-home orders led to a sudden 40-percent increase in demand for retail toilet paper, the fluffier kind used by households. Yet supply cannot rise overnight to satisfy demand. Toilet paper is bulky to store, and demand is ordinarily very stable, which led retailers to keep only two to three weeks of sales in inventory and manufacturers to operate their plants at 92-percent capacity. Worried they would be left without toilet paper, Americans cleaned out store shelves.

How did U.S. toilet-paper manufacturers respond to the shortages? None appear to have added production lines or built new plants to expand capacity. That is because the modern toilet-paper manufacturing process is highly mechanized and capital-intensive, requiring four-story-tall machines that cost billions of dollars and months to assemble before a single roll comes off the line. And few appear to have converted factories from scratchier commercial toilet paper to retail varieties, unlike the rapid retoolings that allowed U.S. manufacturers to ramp up production of cleaning wipes and hand sanitizer. Nor did many sell commercial toilet paper to households.

Instead, manufacturers wrung a bit more out of their existing processes. They ran plants at nearly 100-percent capacity and restarted idled machinery. Some streamlined their product offerings, reducing machine downtime and, in particular, shifting to large-roll products that could get more paper to households without costly changes to machinery. Others invested in their distribution systems, so that they could anticipate and respond more quickly to local shortages.

These resilient responses from manufacturers helped to shorten the stressful period of empty store shelves.

There is evidence indicating that the current disruptions are likely to be mostly transitory. Indices of current delivery times are at record highs in surveys of manufacturers by three regional Federal Reserve Banks, but Fed indices for future delivery times are in their typical ranges. While current indices report conditions at the time of the survey, the future indices report expectations about conditions in six months. Taken together, the data suggest that manufacturers anticipate current supply-chain issues will have abated within six months or so.

While markets will eventually adjust, they can be slow and the impact on producers and consumers can be costly. The public sector can play a valuable role in reducing these costs by facilitating short-term adjustments and by addressing vulnerabilities in U.S. supply chains. The U.S. government has, at critical moments, provided such support: helping Japan respond after the 2011 earthquake, for instance, or producing COVID-19 vaccines through Operation Warp Speed. Last week, the Biden-Harris Administration released the conclusions of its 100-day review of supply chains for four critical products: semiconductor manufacturing and advanced packaging; large capacity batteries, like those for electric vehicles; critical minerals and materials; and pharmaceuticals and active pharmaceutical ingredients. Guided by these reviews, the Administration will act to address both short-term strains and long-term vulnerabilities, such as those due to excessive concentration of production of key inputs in a few firms and locations.

The Administration has established a Supply Chain Disruptions Task Force to monitor and address short-term supply issues. This Task Force is convening meetings of stakeholders in industries with urgent supply-chain problems, such as construction and semiconductors, to identify the immediate bottlenecks as well as potential solutions.

For the longer term, the Administration proposes a variety of actions to strengthen our industrial base, increasing resilience and reducing lead times to respond to crises. It vows to reverse long-time policies that have prioritized low costs over security, sustainability and resilience. Because these policies ignored the costs of being unprepared for risk, the United States has ended up with brittle supply chains that are, adjusted for the costs associated with this risk, also quite expensive. The Administration proposes to reverse this damage by investing in research, production, workers, and communities that will rebuild sustainable manufacturing capacity across the country. In particular, the Administration recommends that Congress support at least $50 billion in investment to advance domestic semiconductor manufacturing and research. Another proposed action would address international vulnerabilities to supply chains. Because it does not make sense to produce everything at home, and because U.S. security also depends on the security of our allies, the United States must work with its international partners on collective approaches to supply chain resilience, rather than being dependent on geopolitical competitors for key products.

Restarting the economy after a pandemic and a recession has not been and will not be simple. Hundreds of thousands of small and large businesses have to reopen, millions of laid-off workers have to find new employers, and manufacturers have to bring back production lines idled during the pandemic. Such changes take time. The Biden-Harris Administration is working to speed up the resolution of these transitory shortages and supply-chain disruptions—to make our supply chains more resilient to future shocks and to build back better,.

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[1] Calculations assume 16,000 board-feet of framing lumber in the house.

[2] “Core inflation” is a measure that removes from the price index those products, like food and energy, whose prices are usually volatile.

EXHIBIT 14

JUNE 15, 2022

In the U.S. and around the world, inflation is high and getting higher

BY **DREW DESILVER**

Produce prices are displayed at a grocery store on June 10, 2022, in New York City. (Spencer Platt/Getty Images)

Two years ago, with millions of people out of work and central bankers and politicians striving to lift the U.S. economy out of a pandemic-induced recession like an afterthought. A year later, with unemployment falling and the many of those same policymakers insisted that the price hikes were " consequence of snarled supply chains, labor shortages and other issu themselves sooner rather than later.

Now, with the inflation rate higher than it's been since the early 1980 administration officials acknowledge that they missed their call. According to the latest report from the Bureau of Labor Statistics, the annual inflation rate in May was 8.6%, its highest level since 1981, as measured by the consumer price index. Other inflation metrics also have shown significant increases over the past year or so, though not quite to the same extent as the CPI.

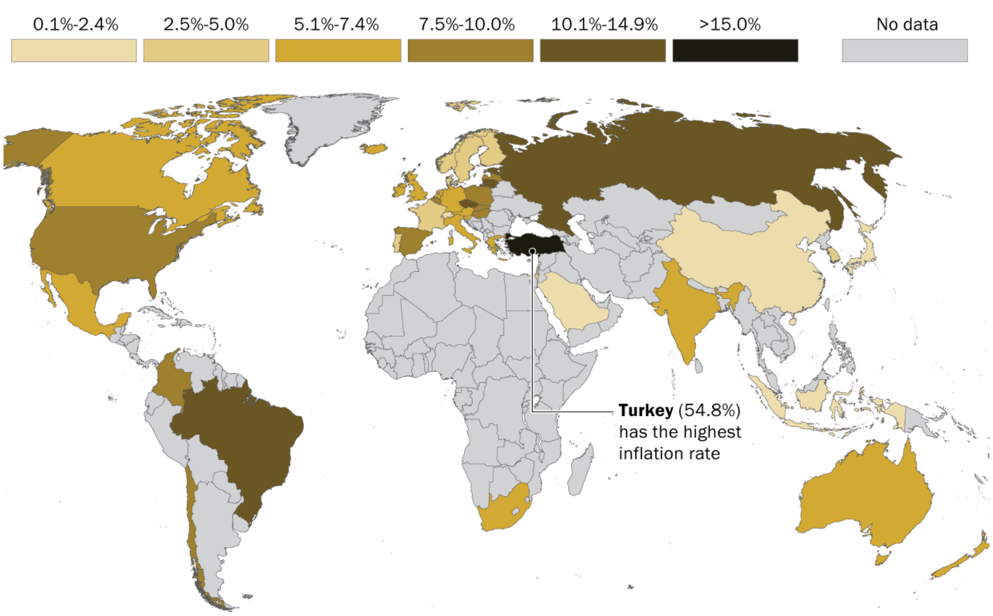
How we did this ⊕

Inflation in the United States was relatively low for so long that, for entire generations of Americans, rapid price hikes may have seemed like a relic of the distant past. Between the start of 1991 and the end of 2019, year-over-year inflation averaged about 2.3% a month, and exceeded 5.0% only four times. Today, Americans rate inflation as the nation's top problem, and President Joe Biden has said addressing the problem is his top domestic priority.

But the U.S. is hardly the only place where people are experiencing inflationary whiplash. A Pew Research Center analysis of data from 44 advanced economies finds that, in nearly all of them, consumer prices have risen substantially since pre-pandemic times.

Where inflation is highest and lowest across 44 countries

Annual inflation rate, first quarter 2022



Note: Chart includes 37 of 38 member nations of the Organization for Economic Cooperation and Development (OECD) and seven other economically significant countries for which the OECD provides data.
Source: Pew Research analysis of OECD data.

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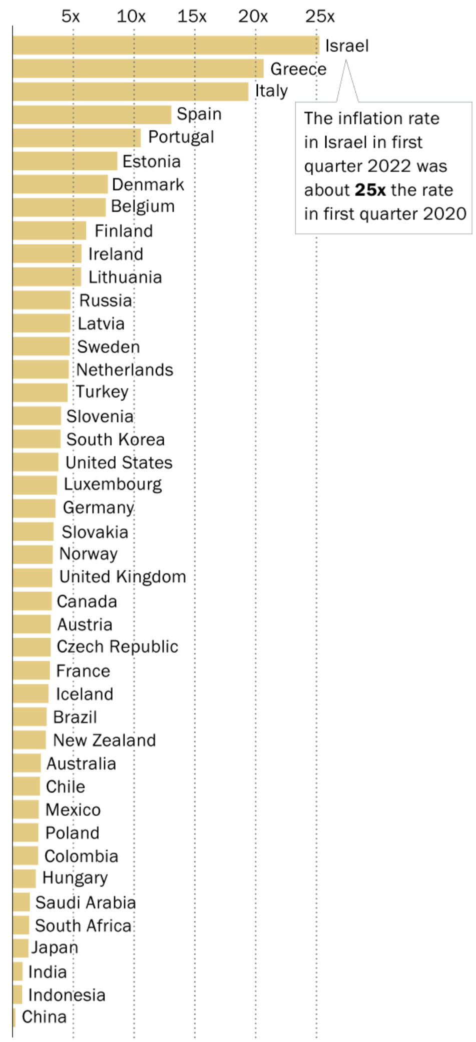
In 37 of these 44 nations, the average annual inflation rate in the first
was at least twice what it was in the first quarter of 2020, as COVID-1
deadly spread. In 16 countries, first-quarter inflation was more than
two years prior. (For this analysis, we used data from the Organizatio
Cooperation and Development, a group of mostly highly developed, d
The data covers 37 of the 38 OECD member nations, plus seven other
significant countries.)

Among the countries studied, Turkey had by far the highest inflation rate in the first quarter of 2022: an eye-opening 54.8%. Turkey has experienced high inflation for years, but it shot up in late 2021 as the government pursued unorthodox economic policies, such as cutting interest rates rather than raising them.

U.S. inflation rate has almost quadrupled over past two years, but in many other countries, it's risen even faster

Change in annual inflation rate between first quarter of 2020 and first quarter of 2022



Note: Chart includes 36 of 38 member nations of the Organization for Economic Cooperation and Development (OECD) and seven other economically significant countries for which the OECD provides data. Switzerland, another OECD country, had an inflation rate of -0.13% in the first quarter of 2020; it had increased to 2.06% by the same period in 2022. Data for Costa Rica, which joined the OECD in May 2021, not included.
Source: Pew Research analysis of OECD data.

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The country where inflation has grown *fastest* over the past two years inflation rate in Israel had been below 2.0% (and not infrequently ne from the start of 2012 through mid-2021; in the first quarter of 2020 But after a relatively mild recession, Israel's consumer price index began rising quickly: It averaged 3.36% in the first quarter of this year, more than 25 times the inflation rate in the same period in 2020.

Besides Israel, other countries with very large increases in inflation between 2020 and 2022 include Italy, which saw a nearly twentyfold increase in the first quarter of 2022 compared with two years earlier (from 0.29% to 5.67%); Switzerland, which went from -0.13% in the first quarter of 2020 to 2.06% in the same period of this year; and Greece, a country that knows something about economic turbulence. Following the Greek economy's near-meltdown in the mid-2010s, the country experienced several years of low inflation – including more than one bout of deflation, the last starting during the first spring and summer of the pandemic. Since then, however, prices have rocketed upward: The annual inflation rate in Greece reached 7.44% in this year's first quarter – nearly 21 times what it was two years earlier (0.36%).

Annual U.S. inflation in the first quarter of this year averaged just below 8.0% – the 13th-highest rate among the 44 countries examined. The first-quarter inflation rate in the U.S. was almost four times its level in 2020's first quarter.

Regardless of the *absolute* level of inflation in each country, most show variations on the same basic pattern: relatively low levels before the COVID-19 pandemic struck in the first quarter of 2020; flat or falling rates for the rest of that year and into 2021, as many governments sharply curtailed most economic activity; and rising rates starting in mid- to late 2021, as the world struggled to get back to something approaching normal.

But there are exceptions to that general dip-and-surge pattern. In Russia, for instance, inflation rates rose steadily throughout the pandemic period before surging in the wake of its invasion of Ukraine. In Indonesia, inflation fell early in the pandemic and has remained at low levels. Japan has continued its years-long struggle with inflation rates that are too *low*. And in Saudi Arabia, the pattern was reversed: The inflation rate surged *during* the pandemic but then fell sharply in late 2021; it's risen a bit since, but still is just 1.6%.

Inflation doesn't appear to be done with the developed world just yet. An interim report from the OECD found that April's inflation rate ran ahead of March's figure in 32 of the group's 38 member countries.

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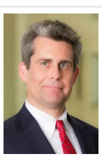

Drew DeSilver *is a senior writer at Pew Research Center.*

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EXHIBIT 15

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May 27, 2022

The Effect of the War in Ukraine on Global Activity and Inflation

Dario Caldara, Sarah Conlisk, Matteo Iacoviello, and Maddie Penn[1]

Global geopolitical risks have soared since Russia's invasion of Ukraine. Investors, market participants, and policymakers expect that the war will exert a drag on the global economy while pushing up inflation, with a sharp increase in uncertainty and risks of severe adverse outcomes.[2] As an example of these concerns, the April 2022 edition of the International Monetary Fund's World Economic Outlook contains more than 200 mentions of the word "war." Some economic effects are already materializing. The economies of Russia and Ukraine are contracting sharply as a direct result of the war and the sanctions imposed on Russia. Commodity markets are in turmoil and financial markets have been highly volatile since the start of the conflict. In light of these developments, a key question is: How much will geopolitical tensions weigh on economic activity in 2022 and beyond?

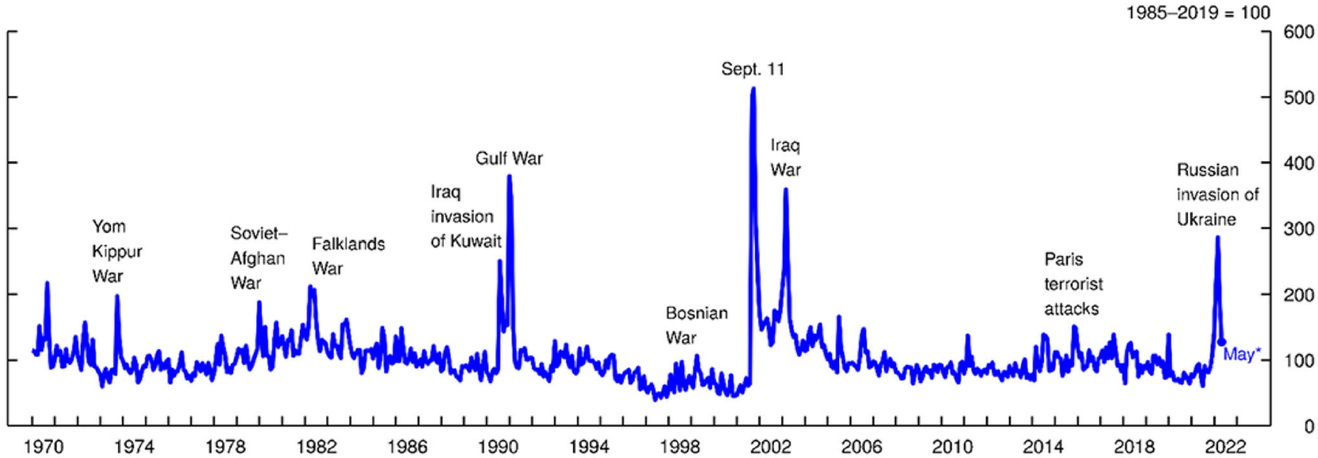
In this note, to answer this question, we first quantify the recent rise in geopolitical risks using two measures based on textual analysis: one focusing on newspapers articles, and another constructed from transcripts of firms' earnings calls. Armed with these numerical measures, we use an econometric model and recent data to provide empirical evidence on the global macroeconomic effects of movements in geopolitical risk.

Our main result suggests that the rise in geopolitical risks seen since the Russian invasion of Ukraine will have non-negligible macroeconomic effects in 2022. Relative to a no-war counterfactual, the model sees the war as reducing the level of global GDP about 1.5 percent and leading to a rise in global inflation of about 1.3 percentage points. The adverse effects of geopolitical risks in the model operate through lower consumer sentiment, higher commodity prices, and tighter financial conditions. Additionally, firm-level indicators suggest that a hit to the European economies will likely be greatest, especially in goods-producing industries.

Measurement of Geopolitical Risks

A key challenge to understanding and quantifying the effects of heightened geopolitical tensions pertains to their measurement. Our first measure is the Caldara-Iacoviello geopolitical risk (GPR) index, constructed using searches of newspaper articles that mention adverse geopolitical events and associated risks. The GPR index tracks references to wars, terrorist attacks, and any tensions among states and political actors that affects the course of international relations.[3] The index starts in 1900 and is based on automated text searches of the *Chicago Tribune,* the *New York Times,* the *Washington Post*, and, for recent years, seven additional newspapers from the U.S., U.K., and Canada. Figure 1 plots the GPR index since 1970: spikes in the index are associated with wars, risks of war, and major terrorist events. Of note, the index spiked in the aftermath of the Russian invasion of Ukraine—in March 2022, readings of the index reached one of the highest values in the past 50 years, comparable with similar peaks during the Gulf and Iraq Wars.

Figure 1. The Geopolitical Risk Index



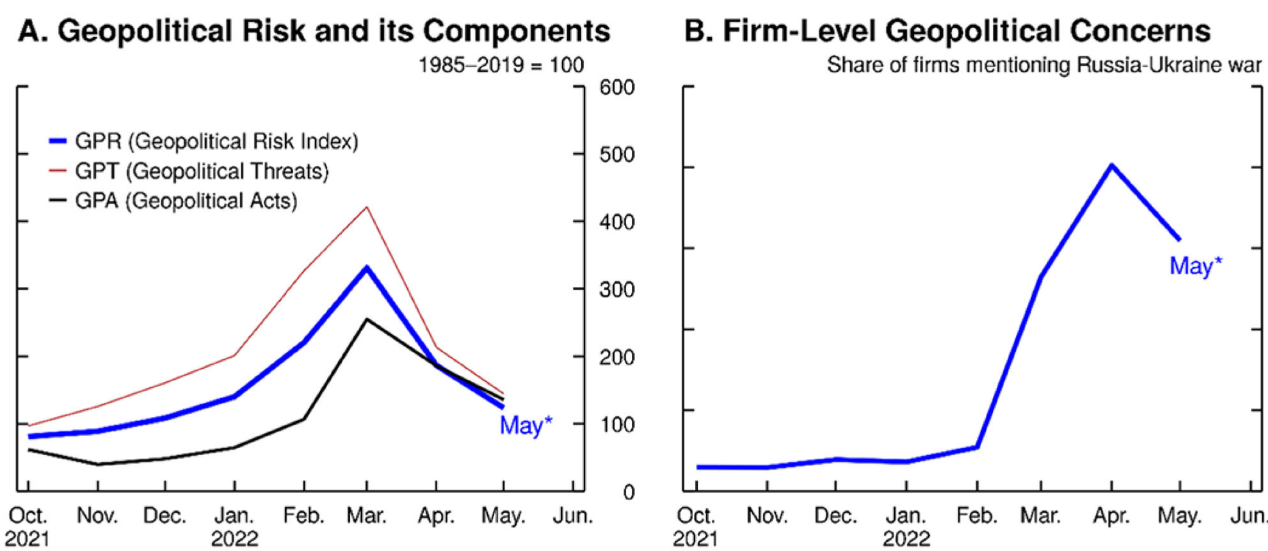
Note: The figure plots the Caldara-Iacoviello geopolitical risk (GPR) index from January 1970 through May 2022. The index is constructed merging the historical GPR index from 1970 through 1984, with the recent GPR index from 1985. The index is normalized to average 100 throughout the 1985-2019 period. Spikes are labeled with significant geopolitical events. *Preliminary Reading.

Source: Federal Reserve Board staff calculations based on Dario Caldara and Matteo Iacoviello (2022), "Measuring Geopolitical Risk," American Economic Review.

Accessible version

The two building blocks of the overall GPR index are the geopolitical threats (GPT) index, which captures concerns about scope, duration, and ramifications of geopolitical tensions and conflicts, and the geopolitical acts (GPA) index, which captures events such as the start and the actual unfolding of wars.[4] As shown in the left panel of Figure 2, the GPT index, which surged between January and March, declined in April and May, consistent with the view that extreme outcomes of the war, such as direct involvement of more countries, are perhaps perceived as less likely. The GPA index also spiked in the aftermath of the invasion and is retracting, albeit more slowly.

Figure 2. Recent Geopolitical Concerns



Note: The left panel plots recent movements in the GPR index and its two sub-components, the geopolitical threats (GPT) and geopolitical acts (GPA) indexes. The right panel plots the evolution in the share of globally listed firms' earnings calls that mention concerns over conflict between Russia and Ukraine. Both panels extend from October 2021 to May 2022. *Preliminary Reading.

Source: Federal Reserve Board staff calculations; S&P Global market intelligence.

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We complement information from the GPR index with a second, alternative measure of geopolitical risks constructed by searching the transcripts of the earnings call of globally listed firms for mentions of the Russian invasion of Ukraine.[5] Concerns about the conflict have been pervasive in earnings conference calls across the globe, with 40 percent of all earnings calls held in April 2022 explicitly mentioning the conflict. As the right panel of Figure 2 shows, the geopolitical risk measure based on earnings calls shares very similar dynamics to the newspaper-based indexes, lending support to the notion that the newspaper-based GPR indexes are capturing information that is relevant to firms and investors.

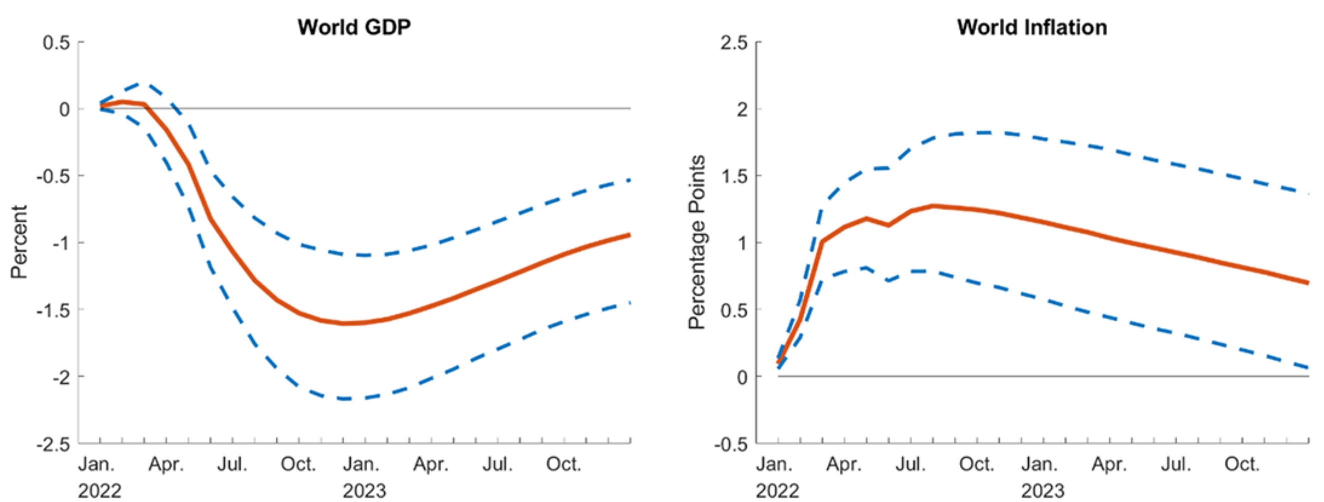
Quantifying the Effects of Higher Geopolitical Risks on GDP and Inflation

Historically, periods of elevated geopolitical risks have been associated with sizable negative effects on global economic activity.[6] Wars destroy human and physical capital, shift resources to less efficient uses, divert international trade and capital flows, and disrupt global supply chains. Additionally, changing perceptions about the range of outcomes of adverse geopolitical events may further weigh on economic activity by delaying firms' investment and hiring, eroding consumer confidence, and tightening financial conditions.

Our numerical measure of geopolitical risk allows us to quantify the effects of its recent spike on global economic activity. To this end, we estimate a structural vector autoregression (VAR) model and use the estimated model to quantify the effects over time of the recent spike in geopolitical tensions. The model includes monthly measures of world GDP, world inflation, global stock prices, real oil prices, the broad real dollar, commodity prices, global consumer confidence, and the geopolitical threats (GPT) and geopolitical acts (GPA) indexes.[7] The VAR model uses data from January 1974 through April 2022 and includes three lags.[8] We assume that changes in the GPT and GPA indexes drive all within-month fluctuations in the other economic variables, so that any contemporaneous correlation between geopolitical risks and financial variables, say, is assumed to reflect the effect of geopolitical risks on financial variables, rather than the other way around. But with a lag, each variable can affect all variables.

Figure 3 uses a historical decomposition of the estimated VAR results to simulate the effects over time on global GDP and inflation of the heightened geopolitical risks since January 2022. The rise in geopolitical risks observed thus far this year produce a drag on world GDP that builds throughout 2022, cumulating to a negative impact of around 1.7 percent on the level of global output. Similarly, the rise in geopolitical risks boosts prices, causing an increase in global inflation of 1.3 percentage points by the second half of 2022, after which the effects begin to subside.

Figure 3. Effects of the Recent Increase in Geopolitical Risk



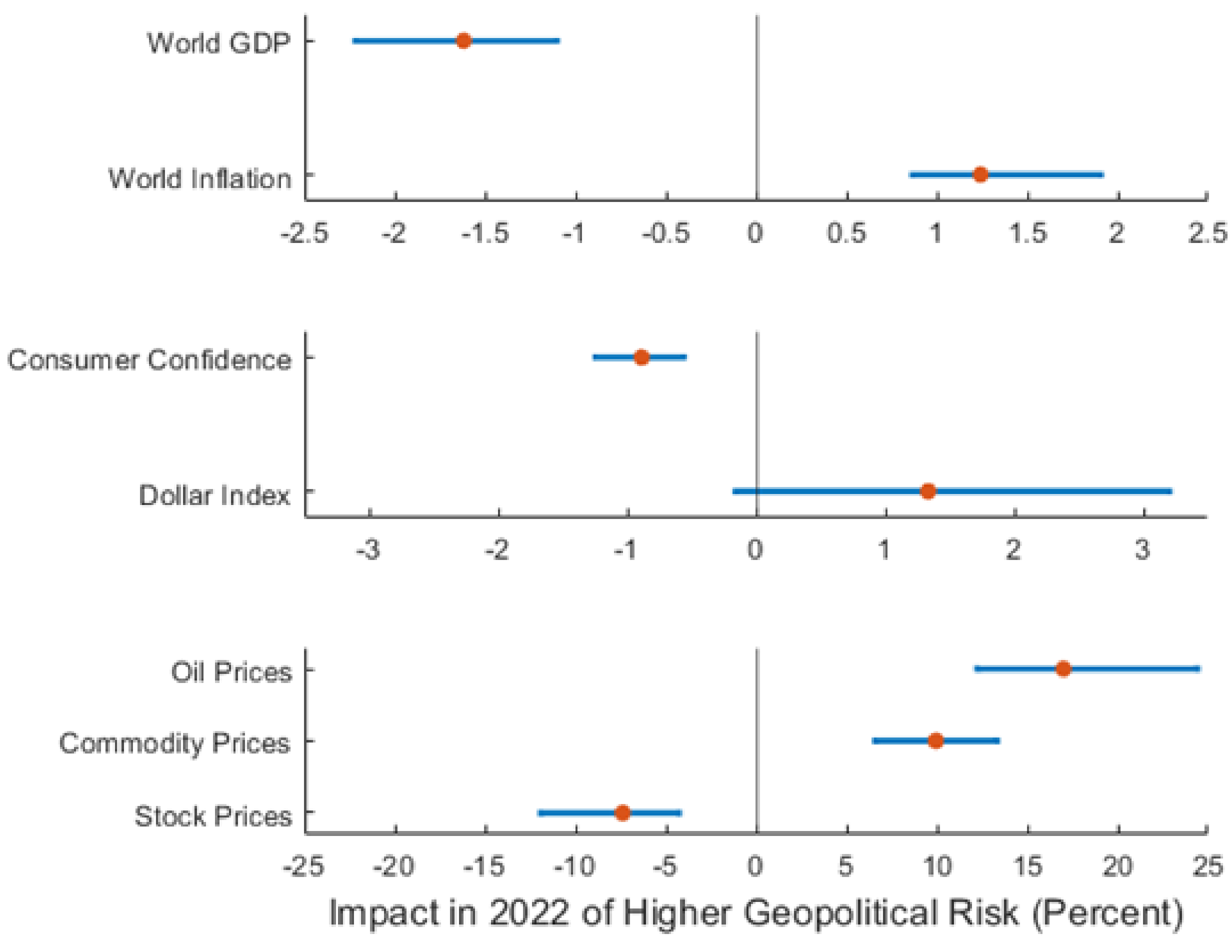
Note: The figure plots the response over time of world GDP (left panel) and world inflation (right panel) to a rise in geopolitical risks sized to mimic the increase occurred between January and April 2022. The solid red lines in the figure plot the central estimates. The dashed blue lines denote the 70 percent confidence intervals. The variables are plotted from January 2022 to December 2023 in deviation from a no-war baseline.

Source: Federal Reserve Board staff calculations.

Accessible version

How are geopolitical risks transmitted to the global economy? With various channels controlled for, the structural VAR estimates leave us well-positioned to answer this question. Figure 4 presents a more detailed picture of the way the global economy responds to a geopolitical risk shock. The effects of elevated geopolitical risks in 2022 are associated with declining consumer confidence and stock prices, factors that weaken aggregate demand. The exchange value of the dollar appreciates, in line with the evidence that spikes in global uncertainty and adverse risk sentiment can trigger flight-to-safety international capital flows (Forbes and Warnock, 2012). Commodity prices and oil prices increase, putting downward pressure on global activity and upward pressure on inflation.

Figure 4. Transmission Mechanisms of Higher Geopolitical Risk on Macroeconomic Variables



Note: The figure plots the maximum impact in the first year of a rise in geopolitical risks sized to mimic the increase occurred between January and April 2022. For each variable, the red dots plot the central estimates of the maximum impact in the first year. The blue bars denote 70 percent confidence intervals. The effect is measured in percent deviation from a no-war baseline for all variables except inflation, for which it is measured in percentage points.

Source: Federal Reserve Board staff calculations.

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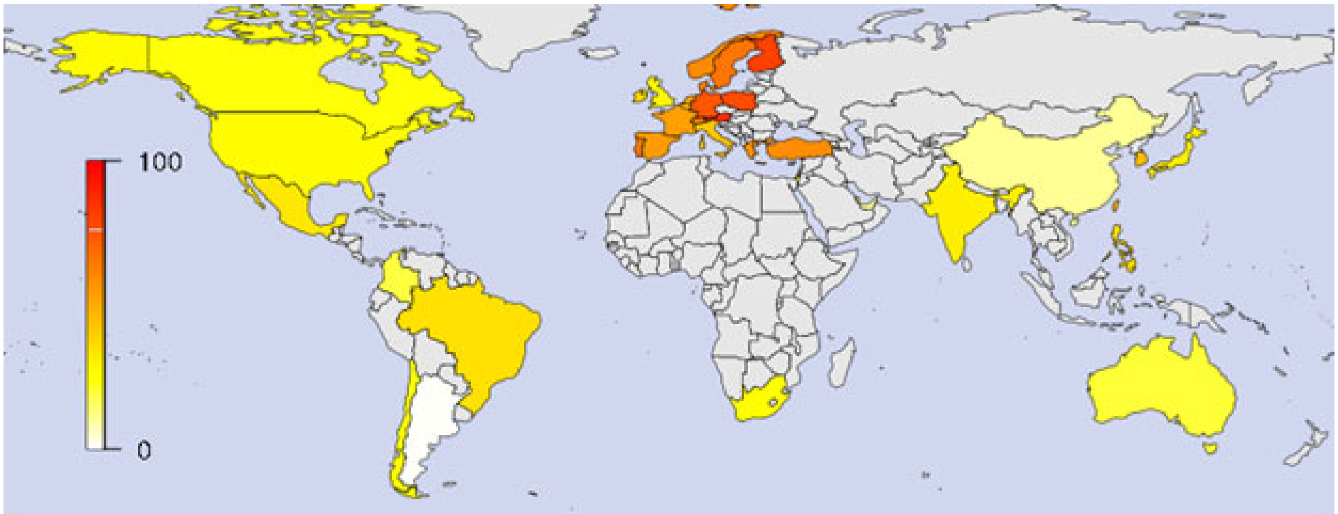
Country and Industry Exposure to the Conflict.

The regional nature of many geopolitical risks suggests that their economic repercussions may not be distributed evenly around the globe. We gauge the exposure of a country to the current conflict by calculating the share of firms that mention the Russian invasion of Ukraine in their quarterly earnings calls, based on the country where the firm is headquartered.[9] Figure 5 visualizes country exposure in a map of the world, with warmer colors denoting higher exposure. Countries in Europe, and especially those that are in proximity to the conflict, are the most exposed. Roughly 80 percent of firms in Finland and Poland, countries sharing a border with Russia or Ukraine, are concerned about the war. For Germany, a country with high exposure to the conflict through the import of energy from Russia, the fraction of firms mentioning the conflict is 75 percent. The rest of the world does not appear to be exposed as intensely.[10] All told, this evidence is suggestive of the risk that European countries may suffer relatively more from the economic fallout from the conflict.

Figure 5. Firm-Level Geopolitical Concerns by Country in 2022



Note: This chart depicts the exposure of a country to the Russia-Ukraine war, calculated using the share of firms' earnings calls mentioning the Russia–Ukraine war, based on the country where the firm is headquartered. Earnings calls' share is calculated for countries with at least 10 earnings calls between March 1, 2022, and May 13, 2022. Countries with no earnings calls or with less than 10 earnings calls are shown in gray. White indicates that no firm mentions concerns related to the conflict, while deep red indicates 100 percent of firms mentioning concerns related to the conflict.

Source: Federal Reserve Board staff calculations; S&P Global market intelligence.

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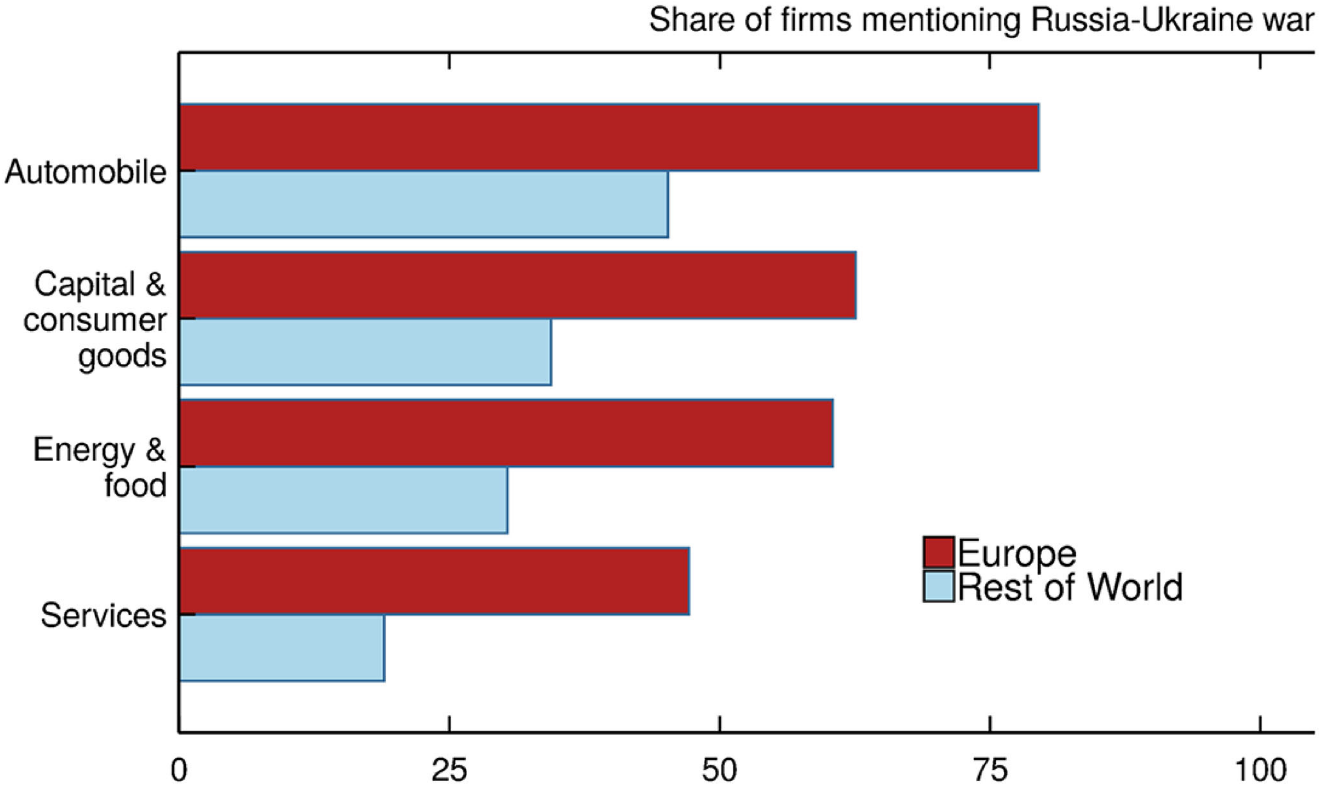
The economic effects of the conflict are also likely to be heterogeneous by type of industry. Figure 6 calculates the share of firms that mention the Russian invasion of Ukraine in their quarterly earnings calls based on their industry of operation. The effect of the current conflict appears more concentrated in goods-producing industries that reportedly had been experiencing bottlenecks even before the Russian invasion, with an incidence of around 80 percent among European automobile companies. Meanwhile, industries that are less affected by supply disruptions—such as services—are less likely to express concerns over the war.

Figure 6. Firm-Level Geopolitical Concerns by Industry in 2022



Note: This chart illustrates the share of firms' earnings calls mentioning the Russia–Ukraine war between March 1, 2022, and May 13, 2022, based on firms' industry of operation and geographic location. Industry classifications are based on the Global Industry Classification Standard (GICS). Note: Russian and Ukrainian firms are excluded from the Europe region. Aggregation from the GICS is as follows: Automobile includes Automobile & Components. Capital & consumer goods includes Capital Goods, Consumer Durables & Apparel, Semiconductors & Semiconductor Equipment, Software & Services, and Technology Hardware & Equipment. Energy & Food includes Energy, Food & Staples Retailing, Food, Beverage & Tobacco, Household & Personal Products, and Materials. Services includes Banks, Commercial & Professional Services, Diversified Financials, Health Care Equipment & Services, Insurance, Media & Entertainment, Pharmaceuticals, Biotechnology & Life Sciences, Retailing, and Telecommunication Services.

Source: Federal Reserve Board staff calculations; S&P Global market intelligence.

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Concluding Remarks.

The increased geopolitical risks induced by the Russian invasion of Ukraine will weigh adversely on global economic conditions throughout 2022. Such effects are estimated in our model to reduce GDP and boost inflation significantly, exacerbating the policy trade-offs facing central banks around the world. While sizeable, these effects do not appear to be large enough to derail the global recovery from the pandemic. However, the future of the war is highly uncertain, and unforeseen developments in the conflict could generate further changes to geopolitical risk and worsen its economic effects.

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1. Federal Reserve Board, Division of International Finance. All errors and omissions are responsibility of the authors. The views expressed in this paper are solely the responsibility of the authors and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of anyone else associated with the Federal Reserve System. Return to text

2. See, for example, the discussion on the likely effects of the war in Federal Reserve Chair Jerome Powell's press conference after the May 3-4, 2022, meeting of Federal Open Market Committee. Transcript available at https://www.federalreserve.gov/mediacenter/files/FOMCpresconf20220504.pdf. Anayi et al (2022) show that the Russian invasion of Ukraine has led to an increase in several measures of economic uncertainty. Return to text

3. For a more detailed description, see Caldara and Iacoviello (2022). Return to text

4. The GPT index searches phrases in newspaper articles that are related to war, military, nuclear, and terrorist threats. The GPA index searches phrases referring to the beginning or the escalation of wars or to the occurrence of terrorist events. Return to text

5. At the firm level, we construct geopolitical concerns related to the current conflict by counting mentions of war-related words (such as "war" or "invasion") together with "Russia" or "Ukraine." Analogous, broader measures of firm-level geopolitical concerns (based on searches that do not necessarily include the words "Russia" or "Ukraine") show a similar pattern. Return to text

6. Caldara and Iacoviello (2022) show that, across countries and over time, higher geopolitical risks are associated with higher probability of economic disasters, lower expected GDP growth, and higher downside risks to GDP growth. Return to text

7. We measure stock prices with the FTSE World Dollar index, commodity prices with the S&P Goldman Sachs Commodity Index, confidence with the Organization for Economic Co-operation and Development's Consumer Confidence Index, and oil prices with the West Texas Intermediate Index. Inflation is from Global Financial Data. Monthly GDP is based on purchasing power parity and is constructed using the methodology described in Cuba-Borda, Mechanick and Raffo (2018). Return to text

8. Caldara and Iacoviello (2022) estimate a quarterly VAR model of the US economy to look at the dynamic effects of geopolitical risks. Our VAR here extends their work by using a longer sample (we start in 1970 instead of 1985), using monthly data, and looking at global rather than US effects, with a focus on inflation. Return to text

9. Caldara and Iacoviello (2022) show that high firm-level geopolitical risk—calculated using similar textual analysis techniques described in this note—reduces firm-level investment. Return to text

10. Recent work by Federle et al. (2022) highlights the spatial dimension of the economic spillovers from the Ukraine war. They identify a 'proximity penalty' in equity returns: the closer a country is to Ukraine, the more pronounced the decline in its equity market around the time the war started. Return to text

Please cite this note as:

Caldara, Dario, Sarah Conlisk, Matteo Iacoviello, and Maddie Penn (2022). "The Effect of the War in Ukraine on Global Activity and Inflation," FEDS Notes. Washington: Board of Governors of the Federal Reserve System, May 27, 2022, https://doi.org/10.17016/2380-7172.3141.

Last Update: May 27, 2022

EXHIBIT 16

PETERSON INSTITUTE FOR INTERNATIONAL ECONOMICS

PIIE CHARTS

US-China phase one tracker: China's purchases of US goods

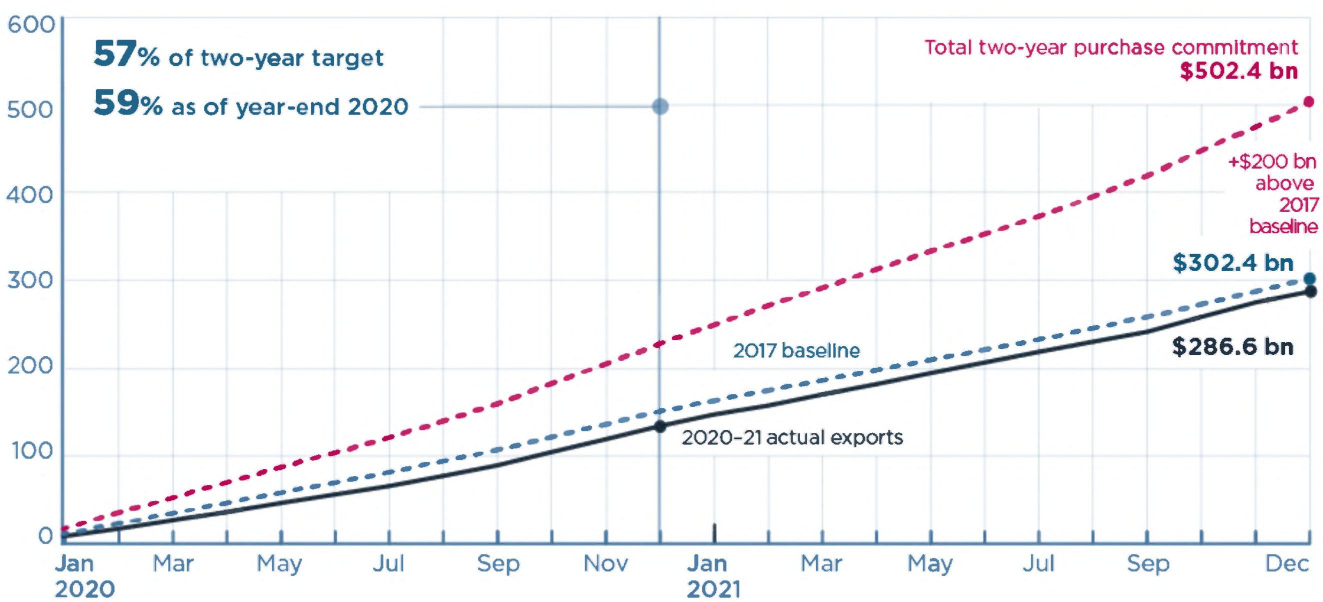
With combined goods and services purchases for 2020 through 2021

Chad P. Bown (PIIE)
March 11, 2022

Figure 1

US-China phase one tracker: China's purchases of US goods and services in 2020 and 2021

US monthly goods and services exports to China covered by the phase one deal, billions USD, January 2020 through December 2021



Note: Data refer to end of month cumulative totals. 2017 baseline refers to the 2017 export values, which were to be expanded by $200 billion under the phase one agreement and is repeated for comparison purposes. Numbers may not sum to total due to rounding. Products and services covered by the "purchase commitment" are set out in Annex 6.1 of Economic and Trade Agreement between the United States of America and the People's Republic of China. Prorating the 2020 and 2021 year-end targets to a monthly basis is for illustrative purposes only. Nothing in the text of the agreement indicates China was required to meet anything other than the year-end targets. Quarterly services data apportioned to monthly values. Monthly purchase commitments are seasonally adjusted based on 2017 data.

Sources: Figure 2 of Chad P. Bown, 2022, "China bought none of the extra $200 billion of US exports in Trump's trade deal," RealTime Economic Issues Watch (March 8), Washington: Peterson Institute for International Economics.

On February 14, 2020, the *Economic and Trade Agreement Between the United States of America and the People's Republic of China: Phase One* went into effect. Under the deal, China agreed to expand purchases of certain US goods and services by $200 billion for the two-year period from January 1, 2020, through December 31, 2021, above 2017 baseline levels.

In the end, China purchased only 57 percent of the total US goods and services exports over 2020-21 that it had committed to buy under the agreement. Put differently, China bought none of the additional $200 billion of US exports committed under the deal (figure 1). A more complete analysis of which US goods and services exports China did (and did not) purchase, as well as why, is found here.

Over the course of 2020-21, this PIIE Chart tracked China's monthly purchases of US *goods only* covered by the agreement. (Because services data were only available at a considerable time lag and not at the monthly frequency, they were not reported in these updates.) Following the text of the legal agreement, tracking goods purchases required relying on data from both Chinese customs (China's imports) and the US Census Bureau (US exports). The chart then compared those goods purchases with the legal agreement's annual commitments, prorated on a monthly basis based on seasonal adjustments, above two baseline scenarios (see methodology section IV below). As set out in the legal agreement, one 2017 baseline scenario allowed for use of US export statistics and the other allows for Chinese import statistics.

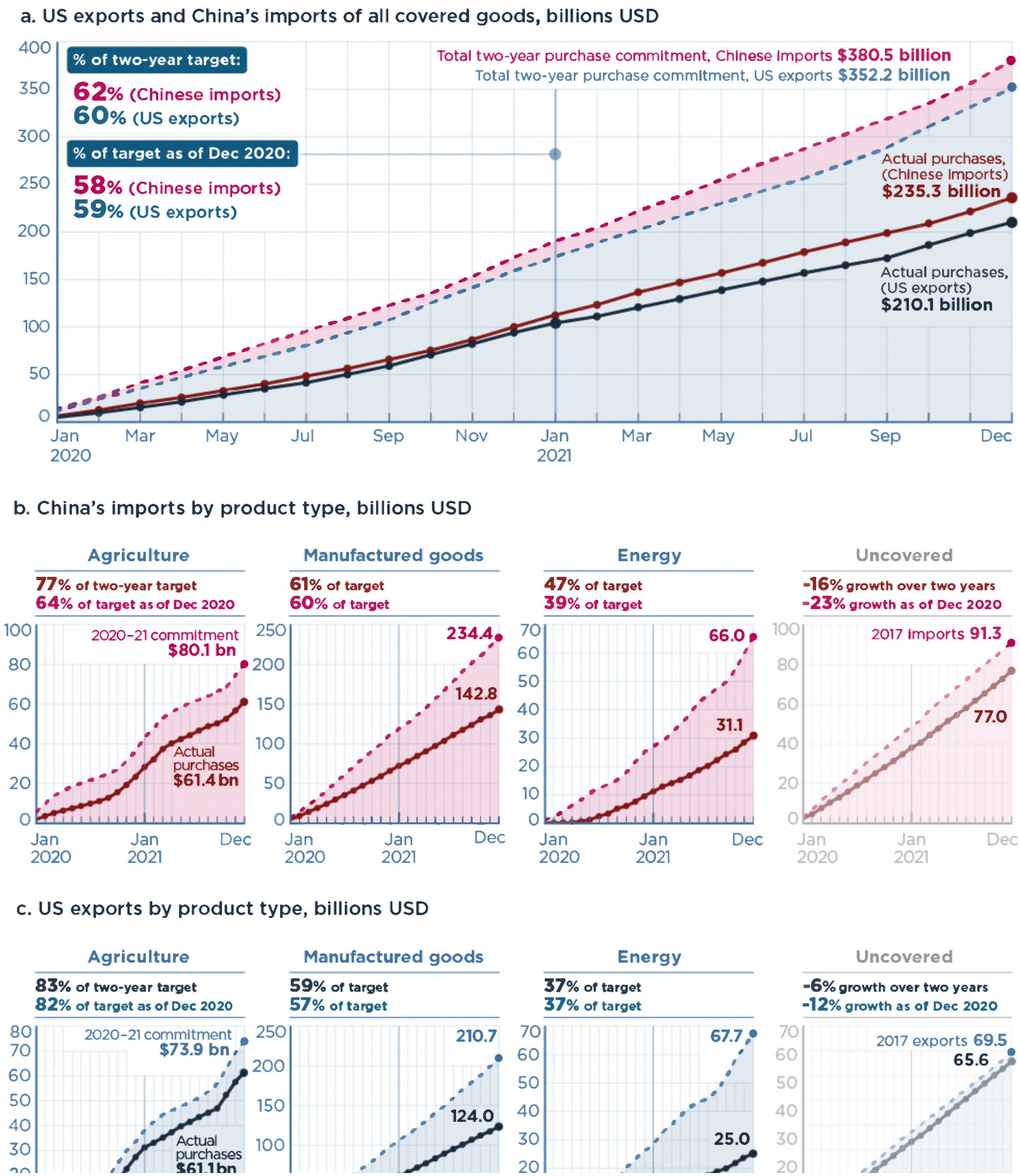
I. CHINA'S PURCHASES OF US GOODS, 2020-21

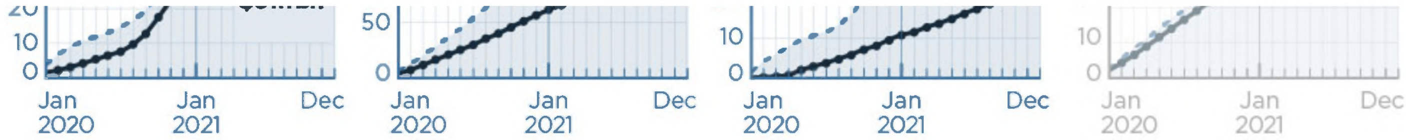
From January 1, 2020, to December 31, 2021, China committed to purchase no less than an additional $162.1 billion of covered goods from the United States relative to these 2017 baselines (figure 2). Defining the 2017 baseline using US export statistics implied a two-year purchase commitment of $352.2 billion. Defining the 2017 baseline using Chinese import statistics implied a two-year commitment of $380.5 billion.

Figure 2

US-China phase one tracker: China’s purchases of US goods in 2020 and 2021

US exports and China’s imports of all goods covered by the phase one deal, January 2020 through December 2021





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Note: Data refer to end of month cumulative totals. Numbers may not sum to total due to rounding. "Uncovered" products refer to China's imports from the United States not addressed by Annex 6.1. Data for the '2017 actual purchases' series is repeated for comparison purposes. Prorating the 2020 and 2021 year-end targets to a monthly basis is for illustrative purposes only. Nothing in the text of the agreement indicates China was required to meet anything other than the year-end target. Monthly purchase commitments are seasonally adjusted based on 2017 data.

Sources: Constructed by Chad P. Bown with US export data from US Bureau of the Census, Chinese import data from International Trade Centre (Trademap) for 2017 and from Chinese customs for for 2020 and 2021, and product categories set out in Annex 6.1 of Economic and Trade Agreement between the United States of America and the People's Republic of China.

From January 2020 through December 2021, China's **total imports of covered products** from the United States were $235.3 billion (figure 2, red in panel a) and US exports to China were $210.1 billion (blue in panel a). In the end, China's purchases of all covered products reached 62 percent (Chinese imports) or 60 percent (US exports) of the phase one commitment.

For **covered agricultural products**, China committed to an additional $32.0 billion of purchases combined over 2020 and 2021 above 2017 levels, implying a two-year commitment of $80.1 billion (Chinese imports, panel b) and $73.9 billion (US exports, panel c). From January 2020 through December 2021, China's imports of covered agricultural products from the United States were $61.4 billion and US exports were $61.1 billion. In the end, China's purchases of covered agricultural products reached 77 percent (Chinese imports) or 83 percent (US exports) of the phase one commitment.

For **covered manufactured products**, China committed to an additional $77.7 billion of purchases combined over 2020 and 2021 above 2017 levels, implying a two-year commitment of $234.4 billion (Chinese imports) and $210.7 billion (US exports). From January 2020 through December 2021, China's imports of covered manufactured products from the United States were $142.8 billion and US exports to China were $124.0 billion. In the end, China's purchases of covered manufactured products reached 61 percent (Chinese imports) or 59 percent (US exports) of the phase one commitment.

For **covered energy products**, China committed to an additional $52.4 billion of purchases combined over 2020 and 2021 above 2017 levels, implying a two-year commitment of $66.0 billion (Chinese imports) and $67.7 billion (US exports). From January 2020 through December 2021, China's imports of covered energy products from the United States were $31.1 billion and US exports to China were $25.0 billion. In the end, China's purchases of covered energy products reached 47 percent (Chinese imports) or 37 percent (US exports) of the phase one commitment.

For **all uncovered products**—making up 29 percent of China's total goods imports from the United States and 27 percent of US total goods exports to China in 2017—the phase one agreement did not include a legal commitment. From January 2020 through December 2021, China's imports of all uncovered products from the United States were $77.0 billion, 16 percent lower than in 2017 (taken twice). From January 2020 through December 2021, US exports of all uncovered products to China were $65.6 billion, 6 percent lower than in 2017 (taken twice).

II. CHINA'S PURCHASES OF US GOODS IN 2021 IN ISOLATION

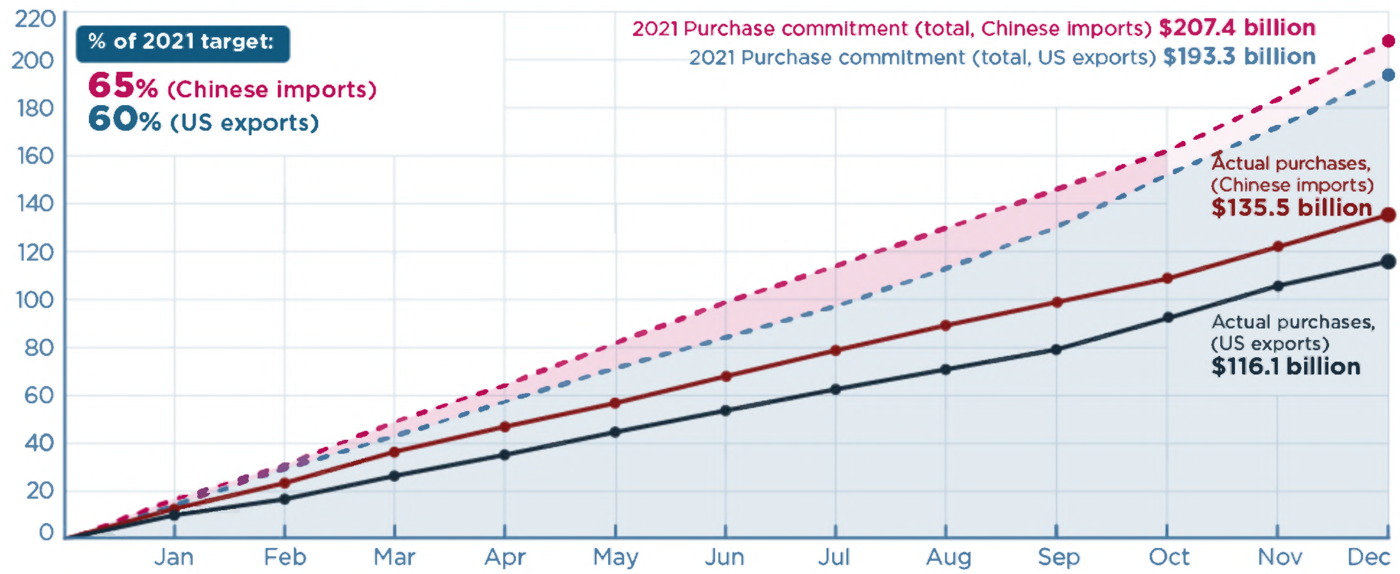
In 2021, China committed to purchase no less than an additional $98.2 billion of covered goods from the United States relative to these 2017 baselines (figure 3). Defining the 2017 baseline using US export statistics implied a 2021 purchase commitment of $193.3 billion. Defining the 2017 baseline using Chinese import statistics implied a 2021 commitment of $207.4 billion.

Figure 3

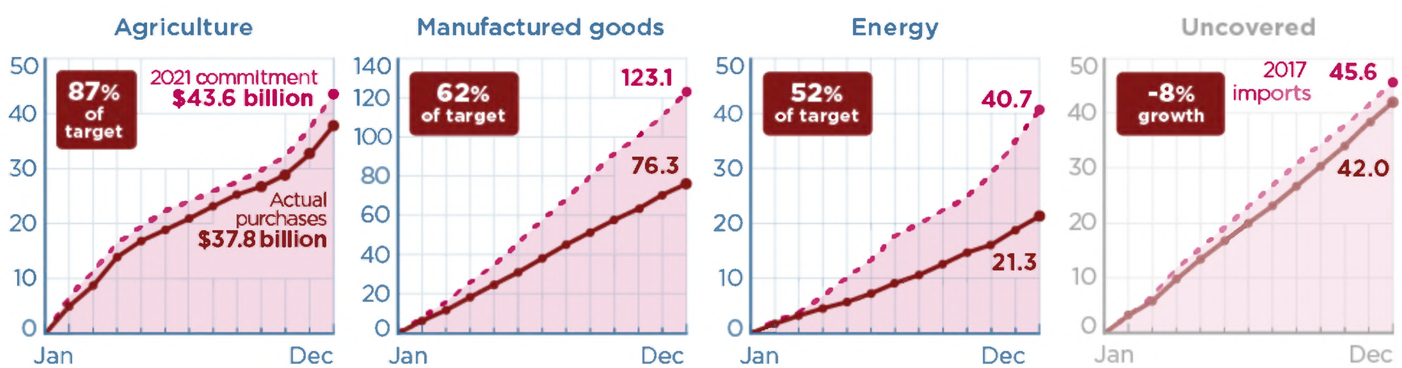
US-China phase one tracker: China's purchases of US goods in 2021

US exports and China's imports of all goods covered by the phase one deal, January 2021 through December 2021

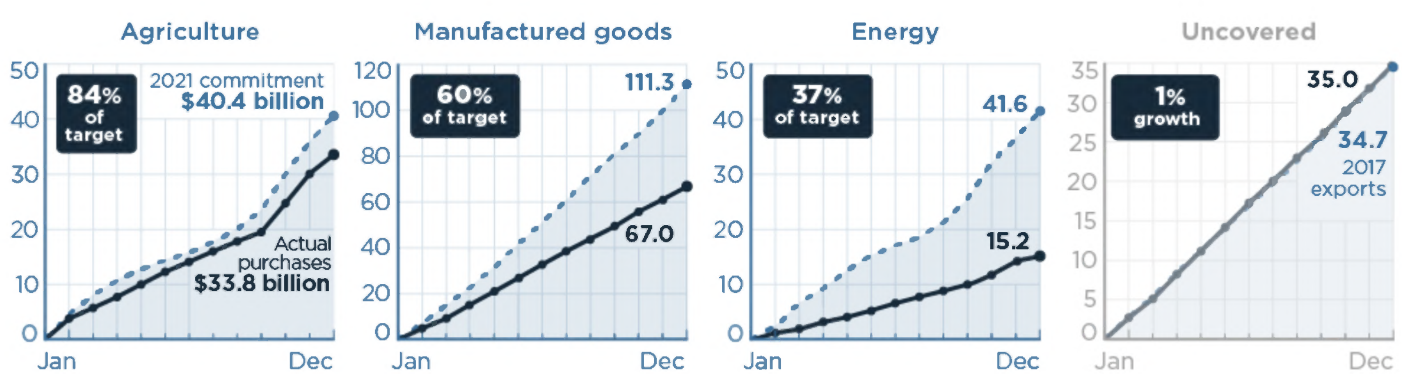
a. US exports and China's imports of all covered goods, billions USD



b. China's imports by product type, billions USD



c. US exports by product type, billions USD



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Note: Numbers may not sum to total due to rounding. "Uncovered" products refer to China's imports from the United States not addressed by Annex 6.1. Prorating the 2021 year-end target to a monthly basis is for illustrative purposes only. Nothing in the text of the agreement indicates China was required to meet anything other than the year-end target. Monthly purchase commitments are seasonally adjusted based on 2017 data.

Sources: Constructed by Chad P. Bown with US export data from US Bureau of the Census, Chinese import data from International Trade Centre (Trademap) for 2017 and from Chinese customs for 2021, and product categories set out in Annex 6.1 of Economic and Trade Agreement between the United States of America and the People's Republic of China.

From January 2021 through December 2021, China's **total imports of covered products** from the United States were $135.5 billion (figure 3, red in panel a) and US exports to China were $116.1 billion (blue in panel a). In 2021, China's purchases of all covered products reached 65 percent (Chinese imports) or 60 percent (US exports) of the annual commitment.

For **covered agricultural products**, China committed to an additional $19.5 billion of purchases in 2021 above 2017 levels, implying an annual commitment of $43.6 billion (Chinese imports, panel b) and $40.4 billion (US exports, panel c). In 2021, China's imports of covered agricultural products from the United States were $37.8 billion and US exports to China were $33.8 billion. In 2021, China's purchases of covered agricultural products reached 87 percent (Chinese imports) or 84 percent (US exports) of the annual commitment.

For **covered manufactured products**, China committed to an additional $44.8 billion of purchases in 2021 above 2017 levels, implying an annual commitment of $123.1 billion (Chinese imports) and $111.3 billion (US exports). In 2021, China's imports of covered manufactured products from the United States were $76.3 billion and US exports to China were $67.0 billion. In 2021, China's purchases of covered manufactured products reached 62 percent (Chinese imports) or 60 percent (US exports) of the annual commitment.

For **covered energy products**, China committed to an additional $33.9 billion of purchases in 2021 above 2017 levels, implying an annual commitment of $40.7 billion (Chinese imports) and $41.6 billion (US exports). In 2021, China's imports of covered energy products from the United States were $21.3 billion and US exports to China were $15.2 billion. In 2021, China's purchases of covered energy products reached 52 percent (Chinese imports) or 37 percent (US exports) of the annual commitment.

For **all uncovered products**—making up 29 percent of China's total goods imports from the United States and 27 percent of US total goods exports to China in 2017—the phase one agreement did not include a legal commitment. In 2021, China's imports of all uncovered products from the United States were $42.0 billion, 8 percent lower than in 2017. Over the same period, US exports of all uncovered products to China were $35.0 billion, 1 percent higher than in 2017.

III. CHINA'S PURCHASES OF US GOODS IN 2020 IN ISOLATION

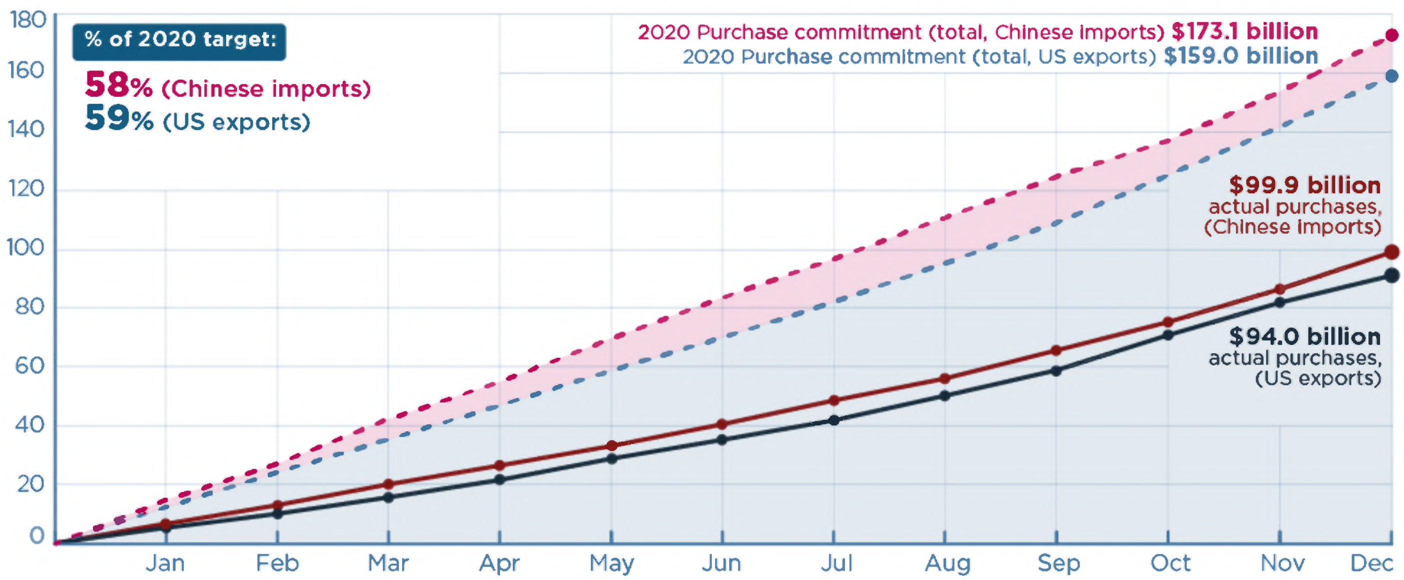
From January 2020 to December 2020, China committed to purchase no less than an additional $63.9 billion of covered goods from the United States relative to the 2017 baselines (figure 4). Defining the 2017 baseline using Chinese import statistics implied a 2020 purchase commitment of $173.1 billion. Defining the 2017 baseline using US export statistics implied a 2020 commitment of $159.0 billion.

Figure 4

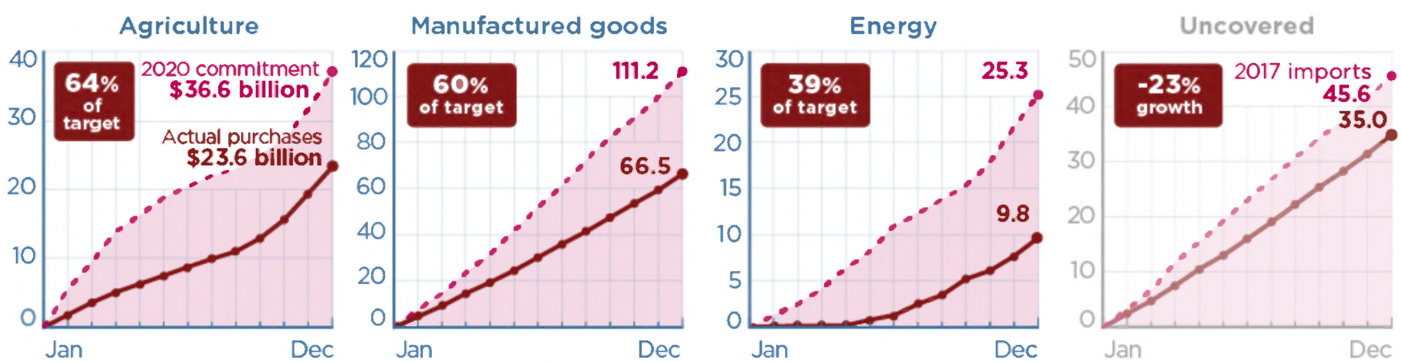
US-China phase one tracker: China's purchases of US goods in 2020

US exports and China's imports of all goods covered by the phase one deal, January 2020 through December 2020

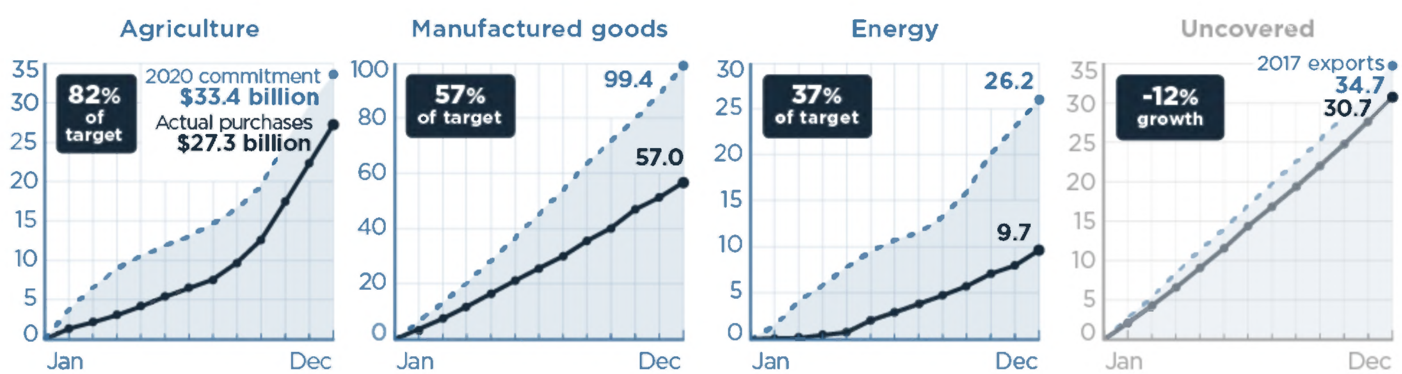
a. US exports and China's imports of all covered goods in 2020, billions USD



b. China's imports by product type, billions USD



c. US exports by product type, billions USD



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Note: Numbers may not sum to total due to rounding. "Uncovered" products refer to China's imports from the United States not addressed by Annex 6.1. Prorating the 2020 year-end target to a monthly basis is for illustrative purposes only. Nothing in the text of the agreement indicates China was required to meet anything other than the year-end target. Monthly purchase commitments are seasonally adjusted based on 2017 data.

Sources: Constructed by Chad P. Bown with US export data from US Bureau of the Census, Chinese import data from International Trade Centre (Trademap) for 2017 and from Chinese customs for 2020, and product categories set out in Annex 6.1 of Economic and Trade Agreement between the United States of America and the People's Republic of China.

From January 2020 through December 2020, China's **total imports of covered products** from the United States were $99.9 billion (figure 4, red in panel a) and US exports to China were $94.0 billion (blue in panel a). In the first year of the agreement, China's purchases of all covered products reached 59 percent (US exports) or 58 percent (Chinese imports) of the annual commitment.

For **covered agricultural products**, China committed to an additional $12.5 billion of purchases in 2020 above 2017 levels, implying an annual commitment of $36.6 billion (Chinese imports, panel b) and $33.4 billion (US exports, panel c). In 2020, China's imports of covered agricultural products were $23.6 billion and US exports to China were $27.3 billion. In the first year of the agreement, China's purchases of covered agricultural products reached 82 percent (US exports) or 64 percent (Chinese imports) of the annual commitment.

For **covered manufactured products**, China committed to an additional $32.9 billion of purchases in 2020 above 2017 levels, implying an annual commitment of $111.2 billion (Chinese imports) and $99.4 billion (US exports). In 2020, China's imports of covered manufactured products were $66.5 billion and US exports to China were $57.0 billion. In the first year of the agreement, China's purchases of covered manufactured products reached 57 percent (US exports) or 60 percent (Chinese imports) of the annual commitment.

For **covered energy products**, China committed to an additional $18.5 billion of purchases in 2020 above 2017 levels, implying an annual commitment of $25.3 billion (Chinese imports) and $26.2 billion (US exports). In 2020, China's imports of covered energy products were $9.8 billion and US exports to China were $9.7 billion. In the first year of the agreement, China's purchases of covered energy products reached 37 percent (US exports) or 39 percent (Chinese imports) of the annual commitment.

For **all uncovered products**—making up 29 percent of China's total goods imports from the United States and 27 percent of US total goods exports to China in 2017—the phase one agreement did not include a legal commitment. In 2020, China's imports of all uncovered products from the United States were $35.0 billion, 23.3 percent lower than in 2017. Over the same period, US exports of all uncovered products to China were $30.7 billion, 11.7 percent lower than in 2017.

IV. METHODOLOGICAL APPROACH

Assessing China's progress toward meeting the phase one purchase commitments for goods trade required information from both US export statistics and Chinese import statistics, given that the agreement's Chapter 6, Article 6.2.6 states "Official Chinese trade data and official US trade data shall be used to determine whether this Chapter has been implemented." One implication was that there were two sets of monthly data to track (Chinese imports and US exports). A second was that there are two different annual, and hence monthly, targets, since the 2017 baseline level of Chinese imports differs from the 2017 baseline level of US exports. Finally, the products covered by the purchase commitments were set out at the 4-, 6-, 8-, or 10-digit level in the agreement's Attachment to Annex 6.1; these were then mapped to the US or Chinese trade statistics for 2017 and for 2020 and 2021. Starting with our update of this PIIE Chart on October 26, 2020, we included US export product 8800 (in addition to 8802, aircraft) in "covered manufacturing" and the total, shifting it out of the "uncovered" category.

Each month's purchase target was seasonally adjusted to reflect that month's relative weight for those products in the 2017 trade data. Note that prorating the year-end commitment to a monthly target was for illustrative purposes only. Nothing in the text of the agreement indicated China was required to meet anything other than the year-end commitments.

For US goods exports, the agreement was estimated to cover products that made up $95.1 billion, or 73 percent, of total US goods exports to China ($129.8 billion) in 2017. Of the 2017 total exports of covered products, exports worth $20.9 billion were in agriculture, $66.5 billion were in manufacturing, and $7.6 billion were in energy. Products uncovered by the agreement—and thus with no commitments for 2020 or 2021—made up 27 percent ($34.7 billion) of total US goods exports to China in 2017.

For Chinese goods imports, the deal was estimated to cover products that made up $109.2 billion, or 71 percent, of total Chinese goods imports from the United States ($154.9 billion) in 2017. Of the 2017 total imports of covered products, imports worth $24.1 billion were in agriculture, $78.3 billion were in manufacturing, and $6.8 billion were in energy. Uncovered products made up 29 percent ($45.6 billion) of total Chinese goods imports from the United States in 2017.

For both the US export data and the Chinese import data, the 2020 phase one commitments of *additional* trade (on top of 2017 baseline) were $12.5 billion (agriculture), $32.9 billion (manufactured goods), and $18.5 billion (energy). The 2021 phase one commitments of *additional* trade (on top of 2017 baseline) were $19.5 billion (agriculture), $44.8 billion (manufactured goods), and $33.9 billion (energy). These commitments are listed in the agreement's Annex 6.1.

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