Economic
Policy
Institute

Aluminum producing and consuming industries have thrived under U.S. Section 232 import measures

Report • By Adam S. Hersh and Robert E. Scott • May 25, 2021

What this report finds: This report demonstrates that import measures imposed in 2018 under Section 232 of the Trade Expansion Act of 1962 enabled U.S. aluminum output, employment, and capital investment to rebound, while creating no adverse effects for aluminum-consuming industries such as motor vehicle parts, construction goods, and canned beverages. Despite dire predictions of import measure critics, aluminum-consuming industries and the broader U.S. economy thrived under these measures.

Why it matters: By 2017, the U.S. aluminum industry was hanging by a thread in the face of massive global overcapacity in aluminum production—driven by subsidies and other anti-competitive policies in China and other nations—that flooded U.S. and global markets with exports. In 2018, the United States imposed a 10% tariff and other trade remedies on aluminum imports under Section 232, finding that depressed global prices under conditions of chronic overcapacity posed material harm to U.S. aluminum production, and risked the U.S. industry's ability to maintain operations, grow, and invest in areas essential to national security and broader economic welfare.

What can be done about it: The Biden–Harris administration should continue and strengthen these measures on an interim basis until it can achieve a permanent, multilateral solution to the chronic problem of excess global aluminum production capacity.

SECTIONS

Executive summary

Four years ago, the U.S. primary aluminum industry was hanging on by a thread. Between 2010 and 2017, 18 of 23 domestic aluminum smelters shut down production, eliminating roughly 13,000 good jobs (Scott 2017). By 2016, the U.S. industry was down to three alumina refineries; by 2017, only one remained in operation. In 2017 the Commerce Department launched an investigation under Section 232 of the Trade Expansion Act of 1962 to determine whether aluminum (and steel) imports could pose a national security threat, leading to import restrictions on aluminum products in March 2018 from countries other than Canada and Mexico—initially a 10% tariff, and later import quotas for a selection of countries (Commerce 2018).[1]

This report demonstrates that U.S. aluminum producers rebounded following implementation of the Section 232 import measures, with negligible impact on consumers of downstream aluminum products. Domestic producers of both primary aluminum and downstream aluminum products have made commitments to create thousands of jobs, invest billions of dollars in aluminum production, and substantially increase domestic production.

Key conclusions of this report include:

- **Aluminum is essential for national defense and critical to the orderly operation of the broader economy.** Dwindling U.S. production capacity poses a high risk for costly supply disruptions. Currently there is only one operating U.S. smelter capable of producing high-purity aluminum required for military and aerospace applications—and it is the only one in a NATO country.
- **Projects, investments, jobs, and capacity are on the rise since the initiation of the Section 232 aluminum tariffs.** At least 55 new and expansion projects are in downstream aluminum industries producing extruded (rod and bar, pipe and tube, and extruded shapes) and rolled (sheet and plate) products. These new and expanded facilities will employ nearly 4,500 additional workers, generate $6 billion in new investments, and add nearly 1 million metric tons of annual rolling and extrusion capacity to the downstream domestic aluminum industry.
- **U.S. production of primary aluminum has increased.** In the two years from the March 2018 implementation of the Section 232 aluminum import measures to the February 2020 pre-COVID-19 economic peak, U.S. production of primary aluminum increased by 37.6% compared with the preceding two-year period. This increase was a result of restarts or production increases at five of the six remaining smelters. Domestic aluminum production reached 1.14 million metric tons at an annualized rate before the COVID-19 economic shock took hold, up from 741,000 metric tons in 2017.
- **U.S. and Canadian shipments of semi-finished products, industries that are closely intertwined with primary aluminum production, also rebounded.** Shipments of all extruded products increased 2.7% (281.2 million pounds), and total sheet and plate shipments increased 7% (1.2 billion pounds) relative to the preceding two-year period.
- **Section 232 measures led to an uptick in employment.** Since implementing the Section 232 import measures, U.S. employment in primary and downstream aluminum industries increased by 1,200 on net by February 2020, at the start of the COVID-19 crisis. Employment in the industry was buttressed by 5,570 jobs created by restarted and newly expanded primary aluminum production and secondary rolling and extrusion mills.
- **There is no evidence of a meaningful adverse effect of Section 232 on industries or consumers.** Econometric analysis of the causal relationship between primary aluminum prices and prices of aluminum-consuming end-use goods—including canned beer and other beverages, construction goods, furniture, and motor vehicle bodies—shows the effects are statistically zero to economically trivial. The lack of a meaningful causal relationship indicates Section 232 import measures had no adverse effect on downstream industries or consumers.

- **There also is no evidence of a causal relationship between primary aluminum prices and domestic industrial output of semi-finished aluminum products.** Price changes in raw aluminum exhibit no causal effect on production of aluminum extrusions or sheeting.
- **A booming domestic market offset falling exports for tariff-impacted U.S. whiskey.** The U.S. aluminum import policy elicited retaliatory tariffs by the European Union (EU) against U.S. whiskey and bourbon exports. While U.S. whiskey exports to the EU fell, exports to the rest of the world fell more. Waning U.S. whiskey exports to countries not imposing new tariffs indicates that producers diverted production to capitalize on the booming domestic market for "super premium" spirits, which grew 11% in 2019, or faster than any year since 2015.

When the tariffs on aluminum (and steel) imports were imposed, critics claimed that while the tariffs would save thousands of jobs in primary metals industries, hundreds of thousands of jobs would be eliminated in the rest of the economy. These critics referenced a 2018 study by the Trade Partnership, which wildly exaggerated the impacts of the tariffs (Francois and Baughman 2018; Scott 2018a). This report demonstrates that the negative effects claimed in the Trade Partnership study and feared by other critics have yet to be found in the U.S. economy.

In total, the U.S. manufacturing sector added 210,000 new jobs between February 2018, the month before the tariffs took effect, and February 2020, the month before the onset of the COVID-19 economic shock.[2] Outside of manufacturing, the economy added more than 4 million new jobs in this same period. Looking more specifically at the industries aluminum producers supply, there remains no evidence that the imposition of tariffs on aluminum have had the kinds of negative employment impacts—in downstream manufacturing or other parts of the economy—that were predicted by critics of those tariffs.

Introduction

In spring 2017, the U.S. aluminum industry was in a precarious position, prompting the U.S. Department of Commerce and the president to initiate a Section 232 National Security Investigation, authorized by the Trade Expansion Act of 1962, into threats posed by aluminum (and steel) imports. The root cause of this threat was, and continues to be, the growth of excess capacity and overproduction in China and other countries where government supports distort global markets and put the survival of U.S. aluminum production at stake.

The risks of a diminished aluminum industry extend far beyond the harm done to U.S. businesses and their workers. Aluminum is an essential input for military uses ranging from armor plating for vehicles and naval vessels, to aircraft and other aerospace applications. Currently, there is only one operating U.S. smelter capable of producing the high-purity aluminum required for defense applications (the other comparable smelters are located in China, Russia, and the United Arab Emirates). Dwindling U.S. aluminum capacity also poses a risk to broader economic security, should defense needs crowd out nondefense uses and disrupt production chains in other sectors essential to economic activity and governance, such as power transmission and transportation systems, manufacturing machinery, and construction.

The global excess capacity crisis began when China directed massive subsidies toward a significant expansion of its aluminum industry. Due to the economics of highly capital-intensive industries that require large economies of scale in production (Hersh and Scott 2021), China's moves forced other nations to follow suit, taking actions to support their own aluminum production in order to counter the adverse effects of China's expansion. Chinese primary aluminum production capacity increased more than 1,400% from 2000 to 2017 and is responsible for 83% of the total increase in global aluminum production capacity in this time (CRU 2021).

China's growth in aluminum production has been fueled both by massive subsidization delivered through concessional financing, tax and environmental regulatory forbearance, and access to key inputs like bauxite ore and electricity at below-market prices (WTO 2017a, 2017b). Additionally, Chinese trade measures restricting the export of primary aluminum and subsidizing semi-finished processed aluminum products with WTO-prohibited export tax rebates are succeeding in capturing a growing global market share of both the primary and secondary aluminum market, as well as advantaging other aluminum-consuming goods produced in China (OECD 2019).

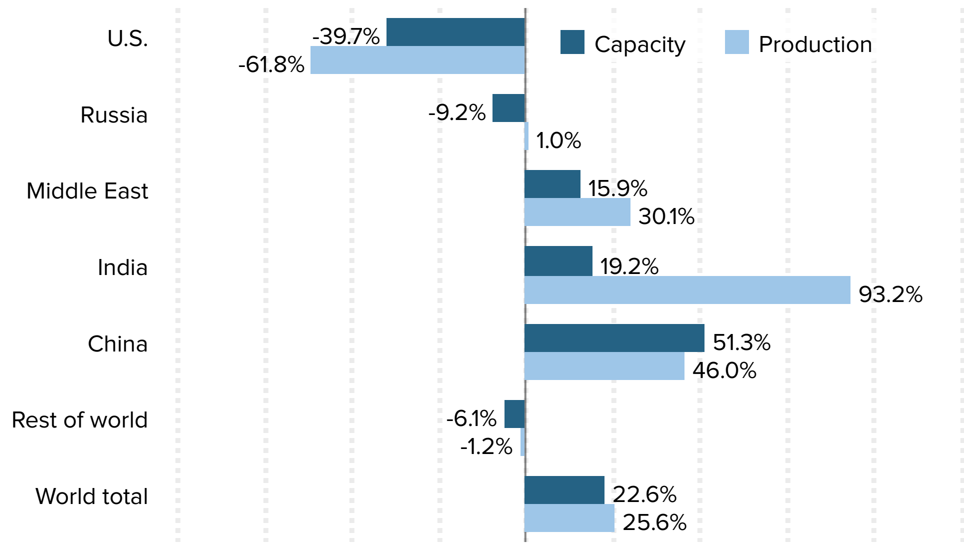
Though the largest offender, China is not alone in delivering subsidies that distort the global aluminum market. As the Chinese capacity mushroomed, primary aluminum producers in other regions, such as India and the Persian Gulf states, also expanded capacity with similar types of government supports. According to the Organisation for Economic Co-operation and Development (OECD), "[g]overnment interventions appear widespread all along the aluminum value chain," including subsidization valued at between $20 billion and $70 billion during 2013–2017 (OECD 2019). In addition to China, the OECD identified Bahrain, India, Oman, Qatar, Russia, and Saudi Arabia as providing significant subsidies to support their primary aluminum industries (**Figure A**). Unsurprisingly, capacity and production expansions have occurred primarily in the subsidizing countries. India's aluminum production nearly doubled from 2013 to 2017, while its production capacity increased by almost 20%. Over the same period, China's capacity expanded by 51% and its production increased by 46%; in absolute terms, China's aluminum capacity and production, as the world's largest industry, was still 11 times the size of India's. Amid such heavily subsidized growth, the U.S. aluminum industry bled capacity and production, contracting by 40% and 62%, respectively, from 2013 to 2017.

The continued expansion and maintenance of excess capacity both inside and outside of China suppressed global aluminum prices, transmitting injury directly to domestic aluminum producers in the United States. Aluminum is a global commodity, and prices are primarily driven by total global supply and demand and set on the London Metal Exchange (LME), regardless of where the aluminum is produced, sold, or stored. Thus, even if the United States does not experience direct changes in aluminum imports, the U.S. aluminum market effectively imports the adverse price and volume effects of subsidized production

Figure A

Subsidies drive global aluminum industry expansion

Change in capacity and production, 2013–2017



Source: EPI analysis of CRU Group (2021) data.

Economic Policy Institute

and surplus global capacity through changes in LME aluminum prices.

Collapsing prices have decimated U.S. primary aluminum production, capacity, and employment. The LME market price of aluminum fell 39% between 2007 and 2016. In an industry with high fixed costs, most domestic producers were unable to weather this long-term sustained price collapse. Between 2000 and 2017, 18 of 23 domestic smelters shut down, and more than 13,000 good domestic production jobs disappeared (Scott 2017).

On March 8, 2018, President Trump used Section 232 authority to impose a 10% tariff. The positive effects were notable. Following imposition of Section 232 import measures and prior to the global economic shock from the COVID-19 pandemic, domestic production in both the primary aluminum (including both alumina refining and secondary smelting and alloying of aluminum) and downstream aluminum rolling and extruding industries were up. Section 232 measures helped these producers hire workers and expand operations—adding capacity, making large investments, and increasing production, as is shown in this report. Then came the COVID-19 economic shock, which hit the aluminum industry as well. As the world recovers from the pandemic and looks to build back stronger and more resilient—and with growing attention to the need to build and support secure, reliable domestic supply chains—Section 232 measures remain a critical tool to counter surging overcapacity in countries with the worst-polluting producers of this critical commodity.

The resurgence of the U.S. aluminum industry—with minimal apparent knock-on effects in other parts of the economy—belies claims by critics, pundits, and representatives of many firms in downstream industries, who argued that the Section 232 tariffs would have a devastating negative impact on a wide range of domestic industries (Francois and Baughman 2018). For example, according to *Bloomberg*, Ford Motor Co. "began the year by warning that rising costs for raw materials like steel and aluminum, coupled with unfavorable exchange rates, would add $1.6 billion to its costs this year" (Naughton 2018). Of course, increases in the real value of the dollar, which gained nearly 8% from before the Section 232 measures until the start of the pandemic, raise the cost of everything that domestic automobile manufacturers import from the rest of the world (including finished vehicles and parts), and changes in the cost of metals are a tiny fraction of their overall costs (Scott 2018a). In fact, econometric evidence presented in this report shows that changes in primary aluminum prices have statistically insignificant or economically negligible causal impacts on downstream aluminum-using goods such as canned beverages, construction materials, motor vehicle parts, kitchen utensils, and furniture. Complementary data compiled here demonstrate that Section 232 aluminum measures have had no significant, industry-specific or economywide negative impacts on employment or output in U.S. manufacturing or other domestic industries.

Despite benefiting U.S. aluminum producers and having no discernible impact on aluminum consumers, country exemptions and excessive product-specific exclusions to Section 232 import measures increasingly undermine the efficacy of the policy—particularly for downstream products—significantly curtailing the quantity of aluminum goods covered by the measures and the benefits of these measures for the U.S. industry. That the quantity of aluminum products excluded from import measures far outstrips actual U.S. imports of aluminum products indicates how broken the exclusion process has become (**Figure B**). For example, the Trump administration granted exclusions for 12,873 MMT of aluminum sheet product imports when, in 2017, U.S. consumers imported a mere 1,102 MMT. The exclusions exempted 1,663 MMT of sheet imports from the European Union, even though U.S. consumers imported only 143 MMT of aluminum sheet goods from the European Union in 2017 (USITC 2021). Continually whittling away at the program with such excessive product exclusion requests destroys downstream demand for U.S. primary aluminum and undermines the effectiveness of the policy. Maintaining the Section 232 aluminum import measures remains critical to stabilizing and expanding U.S. aluminum production.

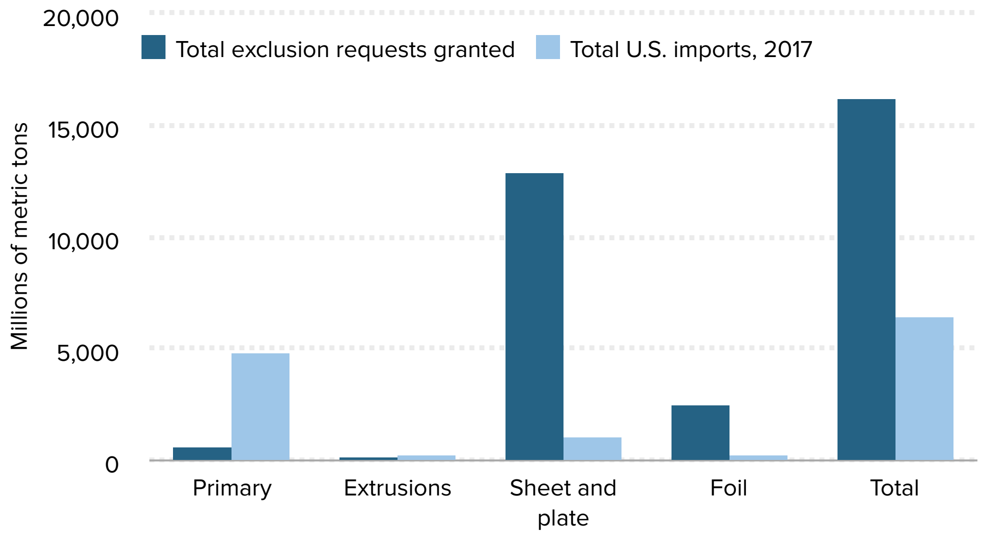
Section 232 tariffs yield positive impact on U.S. aluminum industries

After suffering decades-long declines, U.S. primary aluminum production shot up by 60% immediately after implementation of the Section 232 tariffs in March 2018 through January 2019 (**Figure C**). Thereafter, primary aluminum production remained stable until the COVID-19 economic shock weighed on demand for durable goods in the spring of 2020. While still far from historical capacity, improving market conditions under the Section 232 policy have led to substantial new investments to reopen or expand U.S. primary aluminum production facilities, as shown in **Table 1**. Combined, these projects restarted 530,000

Figure B

Importers abuse Section 232 exclusions

Granted exclusions vs. 2017 U.S. aluminum imports



Notes: Primary aluminum category is BIS code 7601, extrusions aluminum category is BIS code 7604, sheet and plate category is BIS code 7606, and foil category is BIS code 7607.

Source: EPI analysis of BIS (2021) and USITC (2021) data.

Economic Policy Institute

metric tons of primary aluminum capacity and brought back 1,095 jobs with new investments of $335 million in upgraded and expanded facilities and other fixed cofsts necessary to start production.

Critics of the Section 232 aluminum measures warned that tariffs would jeopardize downstream producers of secondary aluminum products—semi-finished extrusion, casting, and rolling operations that further transform raw aluminum for production in myriad aluminum-consuming industries. **Table 1** further shows this was not the case. U.S. producers of downstream semi-finished aluminum invested in restarts or expanded capacity at 55 facilities. These projects will create 4,475 new jobs, with a capital investment of $6.0 billion. In total, U.S. primary and secondary aluminum producers have committed $6.4 billion in new investments to restart and expand capacity, adding 5,570 new jobs.

Figures D and **E** illustrate why U.S. primary and downstream producers are restarting or expanding operations: Demand for aluminum produced in the United States and Canada was growing prior to COVID-19.[3] Shipments of aluminum extruded products (**Figure D**) increased by 281 million pounds (2.7%) following implementation of Section 232 measures and up to February 2020, relative to the same period preceding the measures. Shipments in all segments in this market increased significantly, including rods and bars, up more than 54 million pounds (5.3%); pipes and tubes, up more than 19 million pounds (2.3%); and other extruded shapes, up nearly 208 million pounds (2.4%).

Figure C

Aluminum rebounds with Section 232 import measures

U.S. primary aluminum production, 2000–2021

Source: EPI analysis of Aluminum Association 2021a data.

Economic Policy Institute

Figure E shows that shipments also grew strongly in aluminum sheet and plate production as well in the same March 2018 to February 2020 time frame, relative to the equivalent period before Section 232 measures. Total sheet production has increased more than 1.2 billion pounds (7.0%). Non-heat-treatable sheet increased 586.1 million pounds (10.1%) and "other" sheet and plate (including heat-treatable) increased a whopping 1.1 billion pounds (35.1%). The only segment of the industry that declined was aluminum can stock, in which shipments decreased by 6.4%; however, this appears to be the result of increasing import penetration largely due to the excessive aluminum sheet product exclusions discussed above.

Figures D and E report trends on shipments of downstream aluminum products from plants throughout the United States and Canada. More detailed data from the Federal Reserve (2021) on U.S.-only industrial production of aluminum and aluminum products also show the aluminum industry rebounding after implementation of Section 232 measures for aluminum imports. These data provide estimates of real output, based on measures of physical output, or (where output data are not available) total production-worker hours, by industry. Overall, U.S. production in the primary and secondary industries increased by 16.3% through December 2018. In the following year, production waned with relaxation of the Section 232 import measures, but by December 2019 U.S. output still remained more than 6% above the level prior to implementation of Section 232. In contrast, U.S. production of nonferrous metals other than aluminum declined by 2.5% over the same time period, offering a parallel case without the support of Section 232 measures against which to compare effects on the U.S. aluminum industry (Federal Reserve 2021).

Table 1

U.S. aluminum restarts and expansions since Section 232 implementation

Count	Company	Location (state)	Investment (millions$)	Jobs added	Capacity added (metric tons)	Description
			Primary production			
1	Alcoa	IN	$35	275	160,000	Restart of primary aluminum production
2	Century Aluminum	SC	$50	70	60,000	Restart half of second potline
3	Century Aluminum	KY	$150	300	150,000	Restart of primary aluminum production; sole remaining U.S. plant capable of producing military-grade aluminum
4	Magnitude 7 Metals	MO	$100	450	160,000	Smelter restart
Subtotal (primary)			$335	1,095	530,000	
			Secondary production			
1	Aleris	KY	$400	N/A	N/A	Rolling mill expansion
2	Alexandria Industries	MN	$16	14	N/A	Aluminum extrusion expansion
3	Arconic	TN	$100	70	N/A	Aluminum sheet plant expansion
4	Arconic	TX	$14	35	N/A	Rolling mill restart
5	Ardagh Metal Beverage	OH	N/A	200	N/A	Facility coversion to beverage can manufacturing
6	Ardagh Metal Beverage	NC	N/A		N/A	Expansion of Winston-Salem facility of beverage cans
7	Ardagh Metal Beverage	MS	N/A	80	N/A	Two new production lines of beverage cans
8	Ball Corporation	AZ	$240	120	N/A	Greenfield aluminum packaging facility
9	Ball Corporation	PA	$360	230	N/A	Greenfield aluminum packaging plant
10	Ball Corporation	GA	$200	180	N/A	Greenfield aluminum packaging plant
11	Benada Aluminum	FL	N/A	35	N/A	Aluminum extrusion expansion
12	Bharat Forge Aluminum USA	NC	$127	304	N/A	Greenfield aluminum forging plant
13	Bodine Aluminum	MO	$62	N/A	N/A	Expansion of aluminum casting plant
14	Bodine Aluminum	TN	$50	13	N/A	Aluminum casting plant expansion
15	Bonnell Aluminum	MI	$18	N/A	3,600	Aluminum extrusion expansion
16	BR Metal Products	TN	$0	32	N/A	Expansion and upgrade of aluminum castings foundry
17	Braidy Industries	KY	$1,500	600	N/A	Greenfield construction of rolling mill
18	Central Motor Wheel of America	KY	$112	145	N/A	Aluminum wheel plant expansion
19	Century Aluminum	KY	$7	30	90,000	Casthouse expansion for billet production
20	Crown Holdings	VA	$145	126	N/A	New beverage can manufacturing facility
21	Crown Holdings	KY	$148	126	N/A	New beverage can manufacturing facility
22	Crown Holdings	WA	N/A	N/A	N/A	Crown to construct a third line at Olympia, Wash., facility to manufacture specialty cans
23	Dajcor Aluminum	KY	$20	265	N/A	Greenfield aluminum extrusion and fabrication plant
24	Elixir Extrusions	GA	$8	100	N/A	Aluminum extrusions expansion
25	Ellwood Group	PA	$72	34	70,000	Greenfield secondary billet casthouse
26	Florida Can Manufacturing	FL	$120	160	N/A	Greenfield aluminum packaging plant
27	Gateway Extrusions	MO	$15	N/A	N/A	Aluminum extrusion expansion

Table 1 (cont.)

Count	Company	Location (state)	Investment (millions$)	Jobs added	Capacity added (metric tons)	Description
28	Granco Clark	MI	N/A	15	N/A	Aluminum extrusion expansion
29	Gränges	TN	$33	N/A	25,000	Expanded casting operations; investment in buildings and a new casting production line
30	Gränges	AR	$26	100	20,000	Restart rolling mill (idled since 2016)
31	Gränges	TN	$110	100	N/A	Rolling mill expansion
32	Hydro	PA	$100	60	N/A	Greenfield automotive extrusion facility
33	Jupiter Aluminum	WV	$12	60	N/A	Expansion of aluminum sheet plant
34	JW Aluminum	SC	$300	50	80,000	Rolling mill expansion
35	JW Aluminum	AR	$33	N/A	N/A	Foil processing plant upgrade
36	Kobelco Aluminum Products & Extrusions	KY	$51	129	N/A	Aluminum forge expansion
37	Kobelco Aluminum Products & Extrusions	KY	$42	90	N/A	Aluminum extrusion expansion
38	Logan Aluminum	KY	$125	60	N/A	Brownfield rolling mill expansion
39	Magnode	OH	$13	50	3,300	Aluminum extrusion expansion
40	Matalco	KY	$54	60	135,000	Brownfield remelt rolling ingot facility
41	Matalco	WI	$80	80	N/A	Greenfield extrusion facility
42	Matalco	Various	N/A	N/A	340,000	Greenfield billet and slab secondary casthouses, multiple locations
43	Mid-States Aluminum	WI	$20	37	3,100	Aluminum extrusion expansion
44	Nippon Light Metal Georgia	GA	$50	110	N/A	Greenfield aluminum forging plant
45	Northern Indiana Anodize	IN	$7	48	N/A	Greenfield aluminum anodizing plant
46	Novelis	KY	$300	125	200,000	Greenfield rolling mill
47	Novelis	GA	$36	N/A	N/A	Aluminum recycling plant expansion
48	Owl's Head Alloys	KY	$3	17	N/A	Expanded recycling smelter
49	Pennex Aluminum	OH	$25	45	N/A	Brownfield extrusion expansion
50	Service Center Metals	VA	$45	60	N/A	Aluminum extrusion expansion
51	Sundaram-Clayton Limited	SC	$40	100	N/A	Aluminum cast products expansion
52	Superior Extrusion	MI	$11	30	2,000	Aluminum extrusion expansion
53	Texarkana Aluminum	TX	$766	150	N/A	Rolling mill expansion
54	Western Extrusion	TX	N/A	N/A	N/A	Brownfield extrusion expansion
55	Western Extrusion	TX	N/A	N/A	5,100	Aluminum extrusion expansion
Subtotal (secondary)			$6,015	4,475	977,100	
Total (primary and secondary)			$6,350	5,570	1,507,100	

Sources: See table notes at the end of this report.

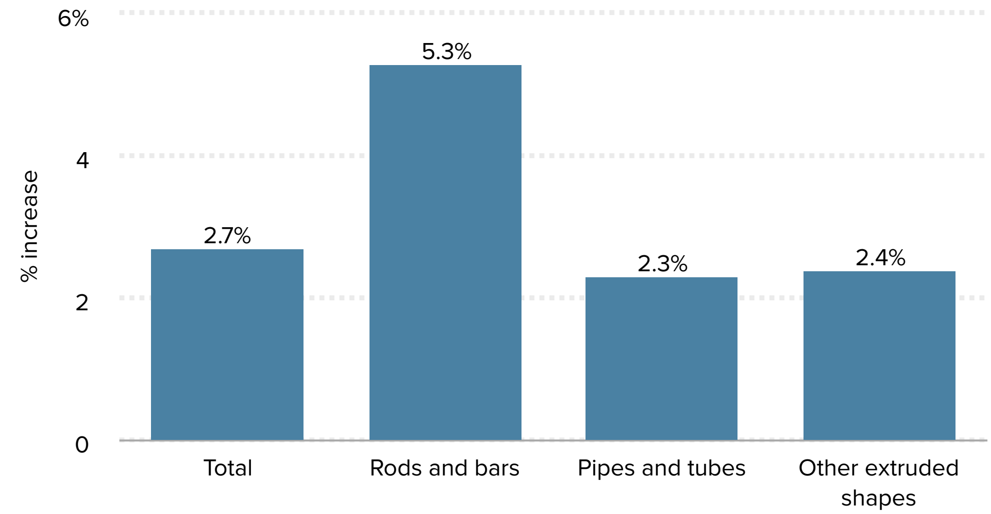
Economic Policy Institute

Beer industry making bogus claims

The beer industry has cried foul regarding the effect of the Section 232 duties on beer sales, but it's the industry's deceptive analysis of basic economic trends in the processed

Figure D

Production of U.S. and Canadian semi-finished aluminum extrusions rebounded with Section 232 measures



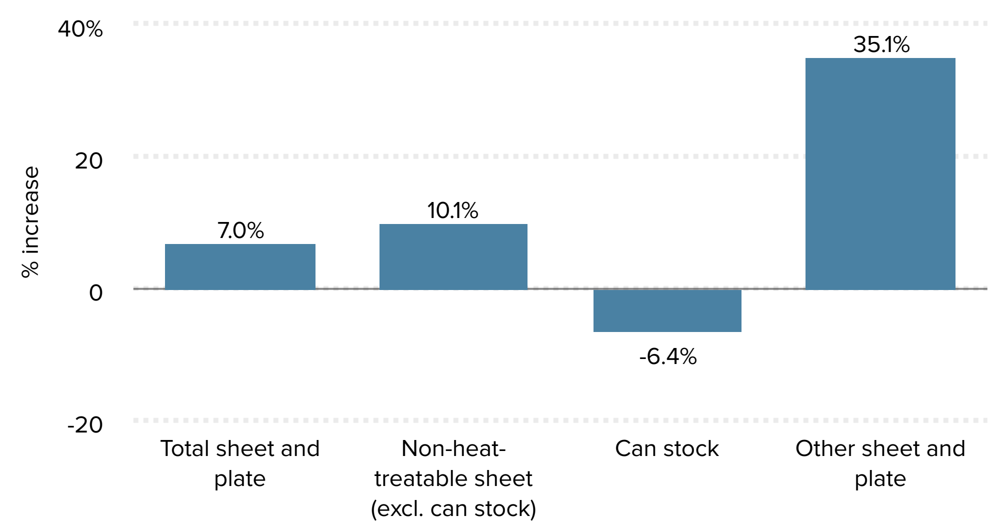
Note: Data present the increase in total production from March 2018 to February 2020—the two years prior to the COVID-19 shock—relative to the preceding two years.

Source: EPI analysis of Aluminum Association 2021a data.

Economic Policy Institute

Figure E

U.S. and Canadian aluminum sheet production rebounded with Section 232 measures



Note: Data present the increase in total production from March 2018 to February 2020—the two years prior to the COVID-19 shock—relative to the preceding two years.

Source: EPI analysis of the Aluminum Association 2021b data.

Economic Policy Institute

food and beverage industries that smells rotten. The Section 232 duties have had virtually no impact on the beer industry or other canned beverage industries and, as discussed in further detail below, careful statistical analysis shows that the price of aluminum has no discernible causal effect on the price of canned beer and other beverage products. A private consulting study prepared for the beer industry reports that the aluminum used in beverage cans represents only 5.7% of the manufacturers' cost of beer in cans (John Dunham & Associates 2018).[4] In other words, even assuming that a 10% tariff passes entirely through to the costs of cans, that would equal less than 0.6% of beer production costs—immaterial in an industry that spends tens of billions of dollars annually on marketing and sponsorships. Price data compiled by the Bureau of Labor Statistics (BLS 2021d) show that in the two years after Section 232 measures were implemented, canned beer prices increased less than 0.5% annually—far below overall consumer price inflation—while sales maintained a stable, rising trend (Census 2021).

The beer industry's ongoing strength is reflected in the steady growth of employment overall in breweries, wineries, and distilleries since the end of the Great Recession in 2009. In fact, **Figure F** shows that employment in the industry more than doubled to 155,300 in February 2018—before the Section 232 aluminum import measures took effect—from 72,700 in June 2009. Following the aluminum import measures, trend growth in breweries, wineries, and distilleries was unbroken, increasing by a further 17%, or 26,500 more jobs. Examining the beer industry claims of harm from the aluminum tariffs in more detail, most of the job losses claimed in the industry's private consultant report were in downstream distribution sectors, with 91% of the 20,300 jobs lost in "retailing, supplier and induced" segments (John Dunham & Associates 2018). As shown below, there is no evidence of job losses to date in these broader segments of the economy. Much like the aggregate modeling analysis by the Trade Partnership, referenced above, such models bear no relationship to observed impacts of the aluminum tariffs on the domestic economy to date (see our analysis of Francois and Baughman 2018, below). This report concludes with an examination of these broader claims about the impacts of the Section 232 import measures on the U.S. economy.

If anything, the beer industry has been a victim of its own continued success during the pandemic. While robust consumption has continued, there was a sudden shift toward consumption of beer and other beverages in cans, displacing demand for beer in glass bottles and stainless steel kegs (Beverage Information Group 2018). A recent *Washington Post* article makes clear this has little to do with Section 232 import measures, and everything to do with demand for canned beverages far outpacing supply from can manufacturers that can't scale production capacity fast enough (Reiley 2020).

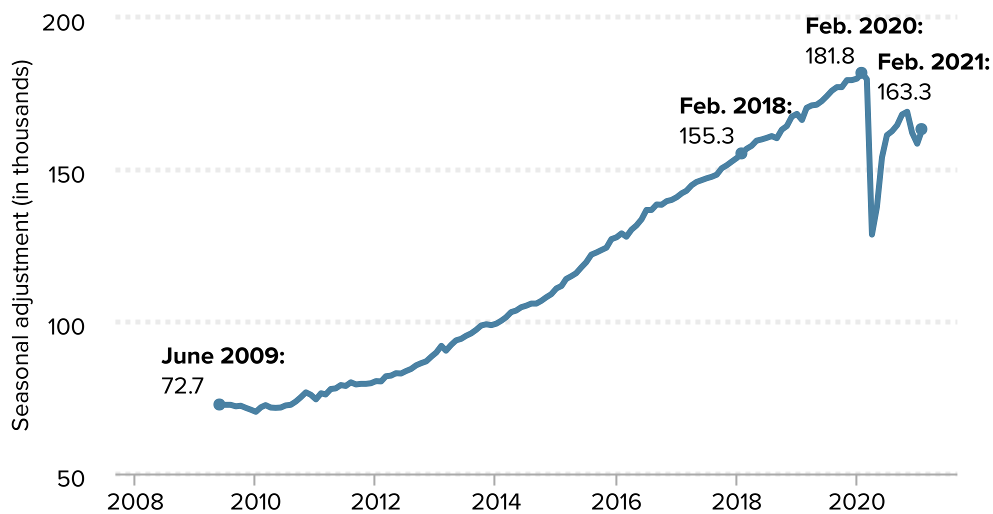
Aluminum consumers face negligible effects from Section 232 measures

An important concern in assessing the impacts of Section 232 measures on imported aluminum products is how these measures affect downstream industries and consumers of products that use aluminum inputs. Harm to downstream industries would occur if Section 232 measures significantly increased aluminum prices, causing increased costs

Figure F

A steady pour of new jobs until COVID-19

Employment in U.S. breweries, wineries, and distilleries, 2009–2021



Source: EPI analysis of Bureau of Labor Statistics' Current Employment Statistics public data series.

Economic Policy Institute

for producers or consumers of primary aluminum-embodying 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 aluminum 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. 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 (variable 1) includes the effects of Section 232 tariffs and quotas, the results of the statistical test are not limited to the effects of Section 232 measures, but rather evaluate whether a change in prices resulting from any factor causes a change in the price of the aluminum-using good (variable 2). Technical discussion of this methodology and detailed results are presented in the appendix.

In this case, we model (1) the price of primary aluminum products, (2) the price of aluminum-consuming products, and (3) the effective federal funds interest rate.[5] Results of the statistical relationships are reported in **Appendix Table 1**. The end-use products investigated represent the U.S. industries consuming the largest volume of aluminum products as a share of their overall value added, including beverage manufacturing, construction materials, motor vehicle bodies and parts, kitchen utensils, and furniture. First, our results find no discernible statistical relationship between a change in the price of primary aluminum and changes in the prices of canned beer and ale case goods, aluminum cans and can components, or beverage manufacturing. Even though aluminum inputs make up 10% of the value added in beverage manufacturing, according to input-output tables produced by the Bureau of Labor Statistics (BLS 2021b), aluminum prices do not have a causal effect on beverage prices.

Similarly, we find no causal effect of aluminum prices on motor vehicle body manufacturing—where aluminum accounts for 14% of the value chain—nor do we find a causal effect for nonresidential construction goods (6%) or commercial furniture (3%). The econometric results indicate that any change in primary aluminum prices is expected to result in no change in the price of the end-use product. We do find evidence of a causal relationship between primary aluminum prices and motor vehicle parts, as well as for aluminum kitchen utensils. However, while these results are statistically significant, the magnitude of the effect is, in essence, economically negligible. In both cases, a 1% increase in the price of primary aluminum is expected to elicit a less than 0.1% change in the price of the end-use good.

Second, we test whether the price of primary aluminum production has a causal effect on industrial production of secondary aluminum products that transform raw aluminum into intermediate semi-finished aluminum products—the extrusions, castings, sheets, and plates illustrated in Figures B and C above. Evidence of a causal relationship between primary prices and measures of secondary aluminum production would indicate that Section 232 aluminum import measures could be harming downstream segments of the U.S. aluminum industry. However, here too we find no statistically significant relationships (see Appendix Table 1).

Finally, if Section 232 aluminum import measures were skewing primary aluminum prices, we would expect to see effects in the market prices for scrap aluminum products, which would be in higher demand. However, our results definitively indicate no statistically causal relationship between primary prices and the price of aluminum base scrap, or the price of used beverage can scrap.

To recap, economic injury from Section 232 aluminum import measures could be caused if price increases passed through to prices of goods produced in downstream industries, causing other businesses to lose profitability or cut back on production, or for consumers to pay higher prices or curtail purchases. Analysis of the data does not support such conclusions. 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.[6] In most cases, there is no statistically significant causal relationship between prices or production in the industries downstream from primary aluminum; where there is evidence of a relationship, the effect is so small as to be economically trivial. It is also possible that increasing prices of primary aluminum inputs could induce downstream consumers to increase their productivity, offsetting costs by becoming more efficient. This would be a positive outcome, too, though we have insufficient evidence to draw such a conclusion.

Aluminum tariffs show no impact on broader U.S. employment

The lack of a causal relationship between primary aluminum prices and downstream industries is reflected in the fact that employment outcomes show no indication of the negative effects predicted by Section 232 critics. **Table 2** compares two studies (Francois and Baughman 2018; Francois, Baughman, and Anthony 2018) produced for the Trade Partnership, a special interest group, that projected expected employment impacts of the steel and aluminum tariffs against the actual performance of the economy between February 2018 and February 2020—the eve of the COVID-19 economic shock, and equivalent to the time horizon for the 2018 projections.[7] The table covers total U.S. employment in 27 detailed and four aggregate industries, and overall nonfarm employment in the domestic economy.[8]

An earlier critique of the first study explained why the actual impacts of the tariffs would be quite minor and why the study should be treated as an outlier in studies of tariffs, not as a guide to policy decision (Scott 2018b). In particular, the study's modeling exercise deviates from standard assumptions that the economy always adjusts rapidly to maintain full employment via realignment of prices in response to tariffs or other trade measures. These standard assumptions are not grounded in reality, but the alternative assumptions chosen by modelers for the Trade Partnership err in the other direction, presuming hyper labor market inflexibility with the result that the model necessarily predicts massive employment dislocations—also not grounded in reality, particularly in an economy that had grown steadily for the preceding eight years, pushing the unemployment rate well below 4% prior to the COVID-19 shock (Scott 2018a; BLS 2021c). Finally, the macroeconomic effects of tariffs on aggregate demand are ambiguous, not clearly contractionary, as the Trade Partnership report implies.

These two reports are representative of the anti-tariff hysteria that often pervades policy debates. Now, with the benefit of hindsight, history reveals the hyperbole of such claims. The Trade Partnership studies claimed that while the tariffs would save thousands of jobs in primary metals industries, several hundred thousand jobs would be lost in the rest of the economy. In fact, the U.S. economy added nearly 4.3 million jobs on net. A majority of the actual job gains, 3.8 million, came from service-sector industries, although the Trade Partnership studies estimated that a majority of their projected job losses, nearly 377,000, would occur in the service sector. The Trade Partnership projections were no more accurate when it came to manufacturing employment. In the real world, the U.S. economy added 210,000 manufacturing jobs following Section 232 import measures, whereas the Trade Partnership predicted manufacturing would lose nearly 20,000 jobs.

The actual employment results in Table 2 show the extent of anti-tariff hyperbole. The Trade Partnership also vastly overestimated the employment costs to downstream industries reliant on inputs of primary metals. The Trade Partnership predicted job losses in industries like fabricated metals (-12,877) and motor vehicles and parts (-4,917), as well as in sectors of the economy farther afield from metals and manufacturing like personal

Table 2

Employment impacts of steel and aluminum tariffs (jobs gained or lost)

	Predicted changes		Actual change
	Trade partnership (tariffs only), Mar. 2018	Trade partnership (retaliation impacts), Jun. 2018	Change in employment, Feb. 2018–Feb. 2020
Primary agriculture	**-285**	**-6,782**	**N/A**
Primary energy	**-669**	**974**	**67,524**
Manufacturing	**-2,612**	**-19,931**	**210,000**
Processed food	-1,173	-7,339	52,000
Beverages and tobacco	-365	-2,316	N/A
Petroleum and coal products	-5	-220	-2,900
Chemicals, rubber and plastics	-1,220	-1,247	3,800
Iron and steel, including ferrous foundries+	29,998	23,424	1,900
Alumina and aluminum++	3,466	2,856	1,200
Fabricated metals	-12,802	-12,877	19,100
Motor vehicles and parts	-5,052	-4,917	12,100
Other transportation equipment	-2,180	-4,440	N/A
Electronic equipment	-1,579	1,246	40,400
Other machinery	-5,247	-4,160	9,000
Textiles	-195	401	-10,900
Clothing	-37	1,064	-10,700
Footwear and leather**	-3	259	N/A
Wood, paper	-2,142	-3,954	6,600
Other goods	-4,075	-7,712	88,500
Services*	**-142,305**	**-376,706**	**3,826,000**
Construction*	-28,313	-63,930	454,000
Air transport	-353	78	18,600
Water transport	-32	-94	3,600
Other transport	1,484	-1,052	255,600
Trade and distribution	-34,065	-98,088	83,500
Communications	-3,675	-8,767	100,000
Financial services	-5,105	-11,145	344,000
Insurance	-1,934	-3,983	174,300
Business and professional services	-22,375	-26,590	690,000
Personal and recreational services	-10,312	-35,033	1,778,000
Other services	-37,625	-128,102	-75,600
Total	**-145,870**	**-402,445**	**4,264,000**
Total nonmanufacturing	**-143,258**	**-382,514**	**4,054,000**

* Construction employment included in "Services," as in Francois and Baughman (March 2018); does not match BLS total for service employment.

** Footwear and leather was included in miscellaneous goods and other, under industry code 32-32900.

+ Iron and steel includes NAICS 3311, 3312, and 33151 (ferrous foundries).

++ Includes primary alumina production, secondary aluminum smelting and alloying, and rolled and extruded products (NAICS 3313-13, -14 and -18).

Notes: Actual change (column 3) covers only nonfarm employment. Farmed employment is marked N/A (data not available).

Sources: Francois and Baughman 2018; Francois, Baughman, and Anthony 2018; BLS 2021c.

Economic Policy Institute

and recreational services (-35,033); in actuality, these industries added 19,100, 12,100, and 1.78 million respectively. Among other flaws in these predictions, the Trade Partnership did not take account of how appreciation of the international value of the U.S. dollar and extensive exclusions to the Section 232 measures granted to U.S. importers of steel and aluminum eroded the effectiveness of the policy. The employment results presented in this table make two things clear. First, such predictions, though compelling in public debates, were wildly off base. Second, the Section 232 measures worked as intended without harm to other segments of the U.S. economy.

Cry me a whiskey river

In response to the U.S. Section 232 aluminum measures, the European Union imposed retaliatory tariffs on imports of U.S.-made whiskies, bourbon, and rye. While the industry has voiced opposition to the Section 232 measures, there is little evidence that EU retaliation is dampening the party for U.S. whiskey producers. As the Distilled Spirits Council of the United States (2021), an industry lobbying group, put it, “America’s native spirit has been enjoying a resurgence in recent years.” In fact, sales of American whiskey, by volume, grew at an annualized rate of 6.8% from 2017 to 2020, notably faster than the growth of 6% the industry registered in the preceding three years (2014 to 2017).

Figure G shows that, indeed, exports of U.S.-made whiskey, bourbon, and rye fell after June 2018. But exports to the rest of the world—which, unlike the EU, did not impose retaliatory tariffs—fell even more. We can conclude from the common trend seen in disparate export markets in Figure G that this did not result from tariffs, but from some other common factor. It is possible the entire world experienced a shift in preferences away from American whiskey all at the same time. But a more plausible explanation would be that U.S. whiskey producers found more profitable uses in domestic markets for the whiskey they were already producing. Because whiskey improves and increases in value with aging, producers cannot quickly adjust the quantity produced to respond to changing market conditions. They can, however, change the quality of the product to compete in higher-value market segments with higher profit margins, chasing the booming “super premium” market. In 2019, revenues from sales of U.S. super premium whiskeys grew 11% year over year, compared with 6.7% growth in 2018 (Distilled Spirits Council 2021). The COVID-19 pandemic slowed super premium growth as it disrupted global supply chains, but at 8.2% in 2020, sales of U.S. super premium whiskeys still grew faster than in any other year since 2015.

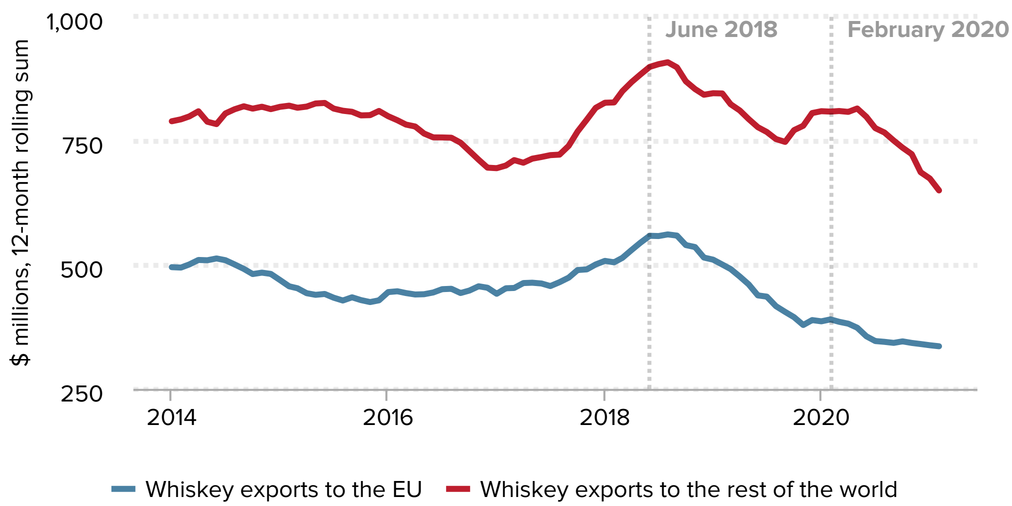
Conclusion: Section 232 tariffs have aided aluminum producers

This report has demonstrated that, to date, the aluminum tariffs have had their intended effect: The domestic producers of both primary aluminum and downstream aluminum products have made commitments to create thousands of jobs, invest billions of dollars in

Figure G

Global trends, not EU tariffs, drive U.S. whiskey exports

12-month rolling sum of whiskey exports to the EU and the rest of the world, 2014–2021



Source: EPI analysis of U.S. Census Bureau (2021) data.

Economic Policy Institute

aluminum production, and substantially increase domestic production since Section 232 tariffs were imposed on March 8, 2018.

Acknowledgments

The authors thank Jori Kandra for technical and research assistance and Colleen O'Neill for editing assistance. This research was made possible by support from the American Primary Aluminum Association.

About the authors

Adam S. Hersh, PhD, is a Visiting Economist at the Economic Policy Institute. Previously, Hersh was a research associate at the Political Economy Research Institute, University of Massachusetts Amherst; chief economist for the Congressional Joint Economic Committee, Democratic staff; senior economist at the Franklin and Eleanor Roosevelt Institute and the Center for American Progress; a visiting scholar at Columbia University's Initiative for Policy Dialogue and the Shanghai University of Finance and Economics; and a research fellow at the University College, London's Institute for Innovation and Public Purpose. He is a contributing author with Joseph Stiglitz of *Rewriting the Rules of the American Economy: An Agenda for Growth and Shared Prosperity* (2015).

Robert E. Scott joined the Economic Policy Institute in 1996 and is currently director of trade and manufacturing policy research. His areas of research include international economics, trade, and manufacturing policies and their impacts on working people in the United States and other countries; the economic impacts of foreign investment; and the macroeconomic effects of trade and capital flows. He has published widely in academic journals and the popular press, including *The Journal of Policy Analysis and Management*, *The International Review of Applied Economics*, and *The Stanford Law and Policy Review*, as well as *The Los Angeles Times*, *Newsday*, *USA Today*, *The Baltimore Sun*, *The Washington Times,* and other newspapers. He has also provided economic commentary for a range of electronic media, including NPR, CNN, Bloomberg, and the BBC. Mr. Scott has a PhD in economics from the University of California, Berkeley.

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

This appendix outlines the methodological approach for assessing how Section 232 measures on imported primary aluminum products may affect downstream industries and consumers of products that use aluminum inputs. Harm to downstream industries and consumers could occur if Section 232 measures caused an increase in prices for aluminum products paid by U.S. users of aluminum and those price increases pass through to producer or consumer prices for aluminum-embodying goods. In order to assess this possibility, we evaluate a more basic question: Do changes in the price of primary aluminum cause changes in aluminum-using products? This question asks whether any change in aluminum price is a significant determinant of prices for goods that use aluminum as an intermediate input, irrespective of what factors cause a change in 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 primary aluminum, (2) prices for aluminum-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. 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). Separately, we also test whether primary aluminum prices and the federal funds rate have a causal relationship with industrial production of secondary, semi-finished aluminum products and aluminum scrap prices.

Data are observed monthly and drawn from the Federal Reserve Bank of St. Louis's FRED Economic Data, spanning January 2005 to January 2020. 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 variabfles (Johansen 1995), and the system can be modeled with a VAR, as opposed to a vector error correction model.

The VAR model consists of

$$\begin{bmatrix} \Delta p_t^1 \\ \Delta p_t^2 \\ \Delta i_t \end{bmatrix} = \boldsymbol{\alpha}_0 + \boldsymbol{A}_1 \begin{bmatrix} \Delta p_{t-1}^1 \\ \Delta p_{t-1}^2 \\ \Delta i_{t-1} \end{bmatrix} + \cdots + \boldsymbol{A}_k \begin{bmatrix} \Delta p_{t-k}^1 \\ \Delta p_{t-k}^2 \\ \Delta i_{t-k} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1,t} \\ \varepsilon_{2,t} \\ \varepsilon_{3,t} \end{bmatrix}$$

where p_t^1 is the natural log of price at time t of primary aluminum, p_t^2 is the natural log of the price of the aluminum-using product, and p_t^2 is the natural log of the effective federal funds interest rate. The model estimates parameters α_0, $\boldsymbol{A}_1$to $\boldsymbol{A}_k$, 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 $\boldsymbol{k}$ lags of the dependent and independent variables specified varies for each set of aluminum product and aluminum-consuming goods modeled, and 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 $\triangle p_{t-1}^1, \cdots, \triangle p_{t-k}^1$ are jointly statistically significant in determining $\triangle p_t^2$ 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 $\triangle p_t^1$ Granger-causes $\triangle p_t^2$. 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.

Appendix Table 1 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 (or industrial production). For the majority of end-use products considered, we find no statistical evidence that primary aluminum prices affect the price of end-use products (<95% probability). This means that a change in aluminum prices is expected to have zero effect on the price of end-use goods. We do find statistically significant causal effects (>95% probability) of the aluminum price on the prices of motor vehicle parts, and stamped and spun aluminum kitchen utensils. For these goods, we estimate the impact of a 1% increase in aluminum input prices using an orthogonalized impulse response function, with results summarized in the final column of Appendix Table 1. For each end-use good, the shock from an initial change in aluminum prices reaches its maximum impact on end-use prices in the following one to three 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 interest rate has a causal effect on aluminum price levels, by moderating aggregate demand, as theory would predict.

Table A1

Granger causality test results

Effects of steel prices on end-use goods prices

End-use product	k-lags	Cointegrated relationship	Causal relationship	Primary aluminum content	χ^2	Probability of statistical significance	Estimated effect of 1% aluminum price increase after three months
Beverage industry							
Beverage manufacturing (PCU31213121)	1	N	N	10%	0.857	64.6%	0.0%
Beverages and beverage materials (WPS026)	2	N	N		0.388	46.7%	0.0%
Canned beer and ale case goods (PCU3121203121201)	1	N	N		0.897	65.6%	0.0%
Aluminum cans (PCU3324313324313)	1	N	N		1.240	73.5%	0.0%
Aluminum cans and can components (WPU10310331)	1	N	N		0.857	64.6%	0.0%
Architectural and Structural Metals							
Nonresidential construction, goods (WPUIP2312001)	1	N	N	6%	0.893	65.5%	0.0%
Kitchen Utensils							
Stamped and spun kitchen utensils, aluminum (WPU12680101)	3	N	Weak	4%	3.038	91.9%	<0.1%
Motor vehicle parts							
Motor vehicle body manufacturing (PCU336211336211)	1	N	N	14%	0.197	34.3%	0.0%
Motor vehicles parts (WPU1412)	3	N	Y	1%	20.81	99.9%	<0.1%
Furniture							
Commercial furniture (WPU122)	1	N	N	3%	0.016	10.0%	0.0%
Industrial production							
Secondary smelting and alloying of aluminum (NAICS = 331314) (IPN331314S)	3	N	N	NA	0.049	17.6%	0.0%
Misc. aluminum materials (NAICS = 331315)	2	N	N	NA	0.303	41.8%	0.0%
Aluminum extruded product (NAICS = 331318)	3	N	N	NA	2.515	88.7%	0.0%

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

Economic Policy Institute

Table notes

Table 1, U.S. aluminum restarts/expansions since Section 232 implementation, February 2018–April 2021

The sources for each plant announcement are as follows:

Primary aluminum plants

Alcoa (Warrick, Indiana): Business Facilities, "Alcoa Restarting Indiana Aluminum Smelting Operations," July 12, 2017.

Century Aluminum Company (Mount Holly, South Carolina): Terri Errico Griffis, "Century Aluminum rebuilds with 3-year power agreement," *Charleston Regional Business Journal,* March 3, 2021.

Century Aluminum Company (Sebree, Kentucky): Michelle Fox, "Trump's tariffs allow us to invest $100 million and hire hundreds: Century Aluminum CEO," *CNBC Online*, March 1, 2018.

Magnitude 7 Metals (Marston, Missouri): David Jenkins, "Magnitude 7 Metals CEO praises reinstatement of import tax," *Standard Democrat*, August 7, 2020.

Secondary aluminum facilities

Aleris (Lewisport, Kentucky): Lane Report, "Aleris opens $40M aluminum rolling mill expansion in Hancock County," November 16, 2017.

Alexandria Industries (Alexandria, Minnesota): Dee DePass, "Minnesota aluminum plant breaks ground on $16 million expansion," *Star Tribune,* May 14, 2019.

Arconic (Knoxville, Tennessee): Jim Gaines, "Arconic to bring 70 new jobs to Alcoa plant," *Knox News,* February 13, 2019.

Arconic (Texarkana, Texas): Junius Stone, "Arconic to add 35 jobs next year," *Texarkana Gazette,* August 7, 2018.

Ardagh Metal Beverage (Huron, Ohio): Michael Harrington, "Company to create 200 jobs in Huron," *Sandusky Register,* December 10, 2020.

Ardagh Metal Beverage (Winston-Salem, North Carolina): Ardagh Group, "Ardagh Group S.A.—fourth quarter and full year 2020 results," n.d.

Ardagh Metal Beverage (Olive Branch, Mississippi): Area Development News Desk, "Ardagh Group expands manufacturing at Olive Branch, Mississippi factory," November 11, 2020.

Ball Corporation (Goodyear, Arizona): City of Goodyear Arizona Economic Development, "Largest capital investment in Goodyear's history," July 30, 2018.

Ball Corporation (Pittston, Pennsylvania): Melina Druga, "Ball Corporation to build packing plant in Pittston," *Pennsylvania Business Report,* September 4, 2020.

Ball Corporation (Rome, Georgia): Staff reports, "Aluminum packaging manufacturer to expand Rome operation," *Albany Herald,* October 16, 2019.

Benada Aluminum (Sanford, Florida): Bill Zimmerman, "Benada expands Sanford aluminum plant, says tariffs boost demand," *Orlando Sentinel,* July 18, 2018.

Bharat Forge Aluminum USA (Sanford, North Carolina): North Carolina Department of Commerce, "Global automotive parts manufacturer selects Lee County for major aluminum forging facility in North Carolina," September 17, 2019.

Bodine Aluminum (Troy , Missouri): John Raby and Bruce Schreiner, "Toyota investing $750 million at 5 U.S. plants, including its Troy aluminum plant," *St. Louis Post-Dispatch,* March 14, 2019.

Bodine Aluminum (Jackson, Tennessee): John Raby and Bruce Schreiner, "Toyota investing $750 million at 5 U.S. plants, including its Troy aluminum plant," *St. Louis Post-Dispatch,* March 14, 2019.

Bonnell Aluminum (Niles, Michigan): Business Wire, "Bonnell Aluminum announces start-up of new extrusion line," June 14, 2017.

BR Metal Products (Livingston, Tennessee): Tennessee Department of Economic & Community Development, "Governor Less, Comissioner Rolfe announce BR Metal Products to expand Livingston operations," September 21, 2020.

Braidy Industries (Ashland, Kentucky): Morgan Watkins, "Braidy Industries breaks ground on Bevin-backed, $1.5B aluminum mill," *Courier Journal,* June 1, 2018.

Central Motor Wheel of America (Paris, Kentucky): Lane Report, "CMWA announces $112M expansion in Paris, Ky.; 145 full-time jobs," June 27, 2019.

Century Aluminum (Sebree, Kentucky): Global News Wire, "Central Aluminum announces expansion of Sebree casthouse," November 28, 2018.

Crown Holdings (Henry Count, Virginia): Crown, "Crown holdings to build new beverage can plant in Henry County, Virginia," January 28, 2021.

Crown Holdings (Bowling Green, Kentucky): Business Facilities, "Crown Holdings begins building $148M plant in Kentucky," May 15, 2020.

Crown Holdings (Olympia, Washington): Zacks Equity Research, "Here's why should you retain Crown Holdings at the moment," *NASDAQ* September 15, 2020.

Dajcor Aluminum (Perry County, Kentucky): KAM, "Dajcor aluminum to create 265 full-time jobs in eastern Kentucky," May 13, 2019.

Elixir Extrusions (Douglas-Coffee County, Georgia): Area Development News Desk, **"**Elixir Extrusions expands Douglas-Coffee County, Georgia, plant," August 23, 2018.

Ellwood Group (Hubbard, Pennsylvania): *Business Journal Daily*, "Ellwood Group to build $60M aluminum plant in Hubbard," September 19, 2018.

Florida Can Manufacturing LLC (Winter Haven, Florida): Kevin Bouffard, "Winter Haven clears way for can manufacturing plant—110 jobs," December 6, 2019.

Gateway Extrusions (Union, Missouri): The USGlass News Network, "Gateway Extrusions marks expansion and 15th year," October 10, 2018.

Granco Clark (Belding, Michigan): Brandon Schreur, "'Misunderstood industry': Lt. Gov. Brian Calley visits Belding's Granco Clark in light of expansion," *The Daily News,* May 26, 2018.

Gränges (Huntingdon, Tennessee): Brian Taylor, "Gränges to expand aluminum casting capacity in Tennessee," *Recycling Today,* March 26, 2021.

Gränges (Huntingdon, Tennessee): Brian Taylor, "Gränges to expand aluminum casting capacity in Tennessee," *Recycling Today,* March 26, 2021.

Gränges (Newport, Arkansas): George Jared, "Gränges to restart Newport plant, hire 100 new employees," *Talk Business & Politics,* May 3, 2018.

Gränges (Huntingdon, Tennessee): Gränges Innovative Aluminum Engineering, "Gränges to invest USD 110 million in US capacity expansion," September 15, 2017.

Hydro (Schuylkill, Pennsylvania): Stacey Wescoe, "Aluminum manufacturer announces $100M expansion; 60 jobs could be added," *Lehigh Valley Business,* September 28, 2018.

Jupiter Aluminum (Brooke County, West Virginia): Connor Griffith, "Jupiter Aluminum announces expansion of Brooke County presence," *West Virginia News,* March 27, 2019.

JW Aluminum (Goose Creek, South Carolina): Aluminum Insider, "First phase of JW Aluminum's US$300MM expansion at SE South Carolina plant nearing completion," August 28, 2019.

JW Aluminum (Russellville, Arkansas): Global News Wire, "JW Aluminum to invest over $30 million in equipment upgrades for foil production," September 20, 2018.

Kobelco Aluminum Products & Extrusions (Bowling Green, Kentucky): Team Kentucky, "Newly opened Kobelco Aluminum plant in Bowling Green to grow by $42 million," December 19, 2018.

Kobelco Aluminum Products & Extrusions (Bowling Green, Kentucky): Don Sergent, "Kobelco Aluminum expanding, adding 90 employees," *Big Daily News,* December 19, 2018.

Logan Aluminum (Logan County, Kentucky): Sydny Anderson, "Tri-Arrows Aluminum to invest $125 million in Logan County Facility," *91.3WKMS Murray State's NPR Station,* May 25, 2017.

Magnode (Butler County, Ohio): Eric Schwartzberg, "It's already been a big month for this 70-year-old Butler County company, and a $13M expansion is coming," *Journal-News,* January 24, 2018.

Matalco (Franklin, Kentucky): Brian Taylor, "Matalco to add Kentucky location," *Recycling Today,* March 22, 2021.

Matalco (Wisconsin Rapids, Wisconsin): Caitlin Shuda, "Aluminum manufacturer Matalco to build plant in Wisconsin Rapids, hire 80 full-timers," *Wisconsin Rapids Daily Tribune,* January 30, 2019.

Matalco (Various): Matalco Inc, "Matalco Inc announces multiple Greenfield aluminum plants for production in Q-3, 2019," March 6, 2018.

Mid-States Aluminum (Fond du Lac, Wisconsin): Mid-States Aluminum Corp., "Mid-States Aluminum invests in new press line and expands facility," December 6, 2017.

Nippon Light Metal Georgia (Adairsville, Georgia): Georgia Office of the Governor, "Nippon Light Metal Georgia to build facility, create 110 jobs in Bartow Co.," November 21, 2019.

Northern Indian Anodize (Fort Wayne, Indianna): 96.3 XKE Fort Wayne's Classic Rock, "Startup aluminum company will create up to 48 new jobs," June 20, 2018.

Novelis (Guthrie, Kentucky): Novelis, "Guthrie, Kentucky," n.d.

Novelis (Greensboro, Georgia): PR Newswire, "Novelis invest $36 million to expand, upgrade aluminum recycling capabilities in Greensboro, Ga.," October 30, 2019.

Owl's Head Alloys (Bowling Green, Kentucky): Nicole Burton and Jack Mazurak, "Owl's Head, aluminum recycler, expanding in Bowling Green," *Columbia Magazine,* February 22, 2018.

Pennex Aluminum (Columbiana County, Ohio): Tom Giambroni, "Pennex Aluminum moves ahead with expansion," *Morning Journal News,* September 30, 2019.

Service Center Metals (Prince George County, Virginia): John Reid Blackwell, "Prince George-based Service Center Metals plans $45 million expansion, creating 58 jobs," *Richmond Times-Dispatch,* January 11, 2018.

Sundaram-Clayton Limited (Dorchester County, South Carolina): Business Facilities, "Sundaram-Clayton Limited investing $40M in South Carolina expansion," November 29, 2018.

Superior Extrusion (Gwinn, Michigan): Lisa Bowers, "U.P. company solidies expansion plans with $10.5 million investment," *The Mining Journal,* September 28, 2017.

Texarkana Aluminum (Texarkana, Texas): Rob Sitterley, "Texarkana Aluminum highlights record facility investment," *ARTX Regional Economic Development Inc. (REDI),* October 17, 2019.

Western Extrusion (Carrollton, Texas): Light Metal Age, "Western Extrusions order complete billet casthouse," August 22, 2019.

Western Extrusion (Carrollton, Texas): Western Extrusion, "Western Extrusion announces expansion to include new 5,100 ton 14-inch press," January 24, 2018

Endnotes

1. Section 232 provisions allow for the imposition of tariffs if the Commerce Department finds that imports are threatening America's industrial base. See Commerce (2018).

2. Employment effects data in this report measure February 2018 through February 2020, except as otherwise noted.

3. Data are reported jointly for U.S. and Canadian shipments of semi-finished aluminum products, due to the closely integrated nature of the North American industry; however, U.S. production of semi-finished goods far outstrips Canadian production, and market shares have remained in stable proportion in recent years. See USITC (2017), Tables 2.4-2.7.

4. In fact, the consultant's finding of 5.7% aluminum content in the canned beer industry is lower than the 10% content reported in official U.S. industry input-output analysis data. Still, we find zero statistical evidence of a causal relationship in assessing whether aluminum prices lead to price increases in canned beer and other products.

5. 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.

6. In fact, the market for secondary semi-finished aluminum products—extrusions and sheet that will be consumed as inputs to further downstream manufactured products—are typically produced at a "conversion price," a fixed rate above the market price for aluminum combining the global London Metal Exchange (LME) price and the U.S. Midwest premium. Although increases in primary aluminum pass through to semi-finished products mechanically due to this market structure, the evidence presented here shows negligible effects on downstream consumers of these intermediate aluminum products.

7. The Trade Partnership produced two studies of the effects of the steel and aluminum tariffs. The first, published in March, covered the tariffs only, and the second, published in June, considered the possible impacts of retaliation on U.S. employment, by industry.

8. Estimates of agricultural employment are only available on an annual basis. No comparative data are available yet for trends in farm employment. Employment data for some sectors (NAICS four-digit and lower) is only available through September 2018, as shown in Table 2.

References

Aluminum Association. 2021a. "U.S. and Canadian Producer Shipments of Aluminum Extruded Products." [Excel file] Accessed April 4, 2021.

Aluminum Association. 2021b. "U.S. and Canadian Producer Shipments of Aluminum Sheet and Plate." [Excel file] Accessed April 4, 2021.

Beverage Information Group. 2018. "Beer Volume Declines Continue, Despite Gains in Craft and Imported Brews" (press release). October 10, 2018.

Board of Governors of the Federal Reserve System (Federal Reserve). 2021. *Industrial Production and Capacity Utilization–G.17*. Last updated April 15, 2021.

Taylor, John. 1993. "Discretion Versus Policy Rules in Practice." *Carnegie-Rochester Series on Public Policy* 39:195–214.

Bureau of Labor Statistics (BLS). 2021a. *Employment, Hours, and Earnings from the Current Employment Statistics Survey (National)*. Accessed April 4, 2021.

Bureau of Labor Statistics (BLS). 2021b. "Inter-Industry Relationships (Input-Output Data for the U.S. Economy for the Historical Years 1997–2019, and for the Projected Year 2029 Matrix)" [zipped Excel file]. Accessed April 4, 2021.

Bureau of Labor Statistics (BLS). 2021c. *Labor Force Statistics from the Current Population Survey*. Accessed April 4, 2021.

Bureau of Labor Statistics (BLS). 2021d. "Producer Price Index by Commodity: Processed Foods and Feeds: Canned Beer and Ale." *Federal Reserve Bank of St. Louis.* Accessed April 29, 2021.

Bureau of Industry and Security (BIS). 2021. "232 Exclusions Portal: Published Exclusion Requests." Accessed May 1, 2021.

Census Bureau (Census). 2021. "Monthly Wholesale Trade: Sales and Inventories." *Federal Reserve Bank of St. Louis.* Accessed April 29, 2021.

Cheung, Yin-Wong, and Kon S. Lai. 1995. "Lag Order and Critical Values of a Modified Dickey-Fuller Test." *Oxford Bulletin of Economics and Statistics* 57:411–419.

Commerce Department (Commerce). 2018. "Secretary Ross Releases Steel and Aluminum 232 Reports in Coordination with White House" (press release)." February 16, 2018.

CRU Group (CRU). 2021. "Primary Aluminium Production by Region, by Country and by Smelter." Accessed April 4.

Distilled Spirits Council of the United States. 2021. "On America's Whiskey Trail." February 2021.

Francois, Joseph, and Laura M. Baughman. 2018. *Does Import Protection Save Jobs? The Estimated Impacts of Proposed Tariffs on Imports of U.S. Steel and Aluminum*. Trade Partnership. March 2018.

Francois, Joseph, Laura M. Baughman, and Daniel Anthony. 2018. *'Trade Discussion' or 'Trade War'? The Estimated Impacts of Tariffs on Steel and Aluminum*. Trade Partnership. June 2018.

Granger, Clive. 1969. "Investigating Causal Relations by Econometric Models and Cross-Spectral Methods." *Econometrica* 37, no. 3 (August): 424–438.

Hersh, Adam, and Robert Scott. 2021. *Why Global Steel Surpluses Warrant U.S. Section 232 Import Measures*. Economic Policy Institute. March 24.

Johansen, Soren. 1995. *Likelihood-Based Inference in Cointegrated Vector Autoregressive Models.* Oxford: Oxford University Press.

John Dunham & Associates. 2018. *The Impact of Potential Aluminum Import Tariffs or Quotas on America's Malt Beverage Industry*. Prepared for the Beer Institute, Washington, D.C. March 2018.

Lütkepohl, Helmut. 2005. *New Introduction to Multiple Time Series Analysis.* New York: Springer.

Naughton, Keith. 2018. "Ford Calls Rising Steel, Aluminum Prices 'Significant Headwind.'" *Bloomberg*. August 8, 2018.

Neilsen, Brent. 2001. "Order Determination in General Vector Autoregressions." *Economics Papers 2001–W10,* Economics Group, Nuffield College, University of Oxford.

Organisation for Economic Co-operation and Development (OECD). 2019. *Measuring Distortions in International Markets: The Aluminum Value Chain.* OECD Trade Policy Papers No. 218. January 2019.

Reiley, Laura. 2020. "We Have Too Much Beer (and Soda, and Seltzer), and Not Enough Cans." *Washington Post*. October 8, 2020.

Scott, Robert E. 2017. "Testimony Before the U.S. Department of Commerce on Aluminum Imports." Washington, D.C. June 22, 2017.

Scott, Robert E. 2018a, *Aluminum Tariffs Have Led to a Strong Recovery in Employment, Production, and Investment in Primary Aluminum and Downstream Industries.* Economic Policy Institute. December 2018.

Scott, Robert E. 2018b. *Estimates of Jobs Lost and Economic Harm Done by Steel and Aluminum Tariffs Are Wildly Exaggerated*. Economic Policy Institute. March 2018.

Sims, Christopher. 1980. "Macroeconomics and Reality." *Econometrica* 48: 1–48. January 1980.

U.S. International Trade Commission (USITC). 2017. *Aluminum: Competitive Conditions Affecting the U.S. Industry.* Publication Number: 4703; Investigation Number: 332–557, June 2017.

U.S. International Trade Commission (USITC). 2021. "Section 232 Steel and Aluminum: Published Exclusion Requests." Accessed May 3, 2021.

World Trade Organization (WTO). 2017a. "DS519: China — Subsidies to Producers of Primary Aluminum." January 12, 2017.

World Trade Organization (WTO). 2017b. Role of Subsidies in Creating Overcapacity and Options for Addressing This Issue in the Agreement on Subsidies and Countervailing Measures." G/SCM/W/572/Rev.1, April 24, 2017.

Zellner, Arnold, and Henri Theil. 1962. "Three-Stage Least Squares: Simultaneous Estimation of Simultaneous Equations." *Econometrica* 29:54–78. January 1962. https://doi.org/10.2307/1911287.