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Against Manufacturing Doomerism

Why and How Making Stuff Matters

By Todd N. Tucker and Oskar Dye-Furstenberg

Roosevelt Institute

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Table of Contents

Executive Summary

Unless you are in the middle of the wilderness, almost everything you see is manufactured. Your laptop, pen, car, drywall, cabinet—anything that was not directly plucked from the ground or a tree is a manufactured product. And yet, in recent years, voices across the political spectrum have indulged in what we call "manufacturing doomerism"—the idea that it doesn't matter (and/or we can't change) what we make as a country, or even whether we make anything at all. One type of doomer goes beyond the old economic idea of comparative advantage (that countries shouldn't try to manufacture everything themselves, and that specializing in some goods and trading for others is beneficial) and instead questions whether we even need to worry about manufacturing goods or workers at all, since most workers are in the service industry. Other doomers value manufacturing, but believe that globalization has so hollowed out America's industrial base that we have ceded our manufacturing destiny to other economic superpowers like China.

This report argues against manufacturing doomerism, showing that the sector has greater importance to the US economy than a simple focus on its job numbers would suggest. Despite employing less than 10 percent of workers, the US manufacturing sector is still the second largest in the world, the second most important in domestic output, the leading funder of research and development (R&D), the top export sector, and the second largest employer of engineers. Manufacturing contributes more than other sectors on a per-job basis to value added (76 percent greater), exports (688 percent greater), and R&D spending (1,288 percent greater). Manufacturing has a particularly large employment multiplier: Every manufacturing job created supports four times as many jobs in communities and supply chains as do jobs created in other sectors. And while the so-called manufacturing wage premium has gone down (along with the prices of manufactured goods) over the globalization era, manufacturing jobs continue to pay more than other jobs on average, and are more likely to be unionized than jobs in other private-sector industries.

Finally, the manufacturing sector will be just as (if not more) important in the future, as the economy shifts from extracting energy to producing it in factories and as geopolitical tensions reduce the dependability of some trade partners we rely on to produce goods. As such, it is essential that the US continue to have an active manufacturing policy.

1. Introduction

Over the last century, manufacturing has by some measures gone the way of agriculture. Just as agriculture once employed the majority of Americans (an estimated 90 percent in 1790, compared to less than 0.9 percent today[1]), manufacturing has gone from a peak of employing 37.5 percent of Americans in the mid-20th century to a mere 7.5 percent in 2024.[2] In raw numbers, 19.4 million Americans worked in manufacturing in 1979,[3] compared to only 12.6 million today—even as the population grew from 225 million to 340 million.[4] Despite politicians' championing of manufacturing,[5] it seems that the service sector—the remaining sector of the economy in this three-part conception of the economy—is king, employing 91.4 percent of Americans.[6]

Understandably, this has led some observers to question whether manufacturing matters, and to ridicule those who say it does (or might). This is the first flavor of what we call "manufacturing doomerism." At *Vox*, Eric Levitz has written that pro-manufacturing allies of President Donald Trump

> believe that they can bend the arc of history back toward that golden age by dramatically increasing US manufacturing employment. But this is a fantasy. America can only return to the mid-century industrial economy in the sense that it can return to subsistence farming: It is technically possible to embrace an anachronistic mode of production, but only at immense economic cost.[7]

In 2024, Dylan Matthews at *Vox* ridiculed the Joe Biden administration's "foreign policy for the middle class" policy of tariffs on electric vehicles, writing:

> The idea that this policy helps the American middle class overall is laughable. Less than one percent of Americans work in auto or auto-parts manufacturing. But over 90 percent of American households have a car, and surging car prices

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[1] US Bureau of Labor Statistics, "Employment by Major Industry Sector," last modified August 28, 2025, https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm; *The Story of U.S. Agricultural Estimates* (US Department of Agriculture, 1969), https://nass.usda.gov/About_NASS/pdf/The%20Story%20of%20U.S.%20Agricultural%20Estimates.pdf, 1.
[2] US Bureau of Labor Statistics, "Employment by Major Industry Sector."
[3] Federal Reserve Bank of St. Louis, "All Employees, Manufacturing," April 3, 2026, https://fred.stlouisfed.org/graph/?g=1TqEq.
[4] Federal Reserve Bank of St. Louis, "Population, Total for United States," July 2, 2025, https://fred.stlouisfed.org/series/POPTOTUSA647NWDB.
[5] Tomasz M. Płudowski and Kim Mee Chong, "Campaign Rhetoric vs. Economic Reality: Analyzing Job Outsourcing and Reshoring Narratives in Donald Trump's 2016–2024 Campaigns," *Contemporary Economics* 19, no. 4 (2025): 464, https://doi.org/10.5709/ce.1897-9254.578.
[6] The remaining 0.2 percent is accounted for by mining. US Bureau of Labor Statistics, "Employment by Major Industry Sector."
[7] Eric Levitz, "Trump's Tariff and Trade War Is a Doomed Quest Fueled by Nostalgia," *Vox*, August 7, 2025, https://vox.com/politics/407025/trump-tariffs-reciprocal-trade-war-why-explanation-nostalgia.

were a huge contributor to the 2021–2023 rise in inflation. Barriers to importing cheap cars make inflation worse and reduce the real incomes of the middle class.[8]

Also at *Vox*, Constance Grady made a more sociopolitical argument, claiming that "the incels [involuntary celibates] supporting Trump's tariffs . . . read Trump's economic policy as a project of redistributing money and jobs away from women and back to men, ultimately for men's sexual gain."[9]

Some of this backlash is understandable, in light of fairly sweeping and provocative claims made in support of the supposed virtues of manufacturing. Shortly after Donald Trump's announcement of blanket tariffs in April 2025, on what he called "Liberation Day," right-wing provocateur Milo Yiannopoulos wrote that "men are depressed and addicted and broken because they have nothing to do. They get no stimulation or satisfaction from BS email jobs. I'm telling you, white Americans will love working in factories again. Making things, in the image and likeness of God the Maker."[10] Trump administration Commerce Secretary Howard Lutnick celebrated that "the army of millions and millions of human beings screwing in little screws to make iPhones, that kind of thing is going to come to America."[11] More concretely, in 2017 Trump trade advisor Peter Navarro said, "We envision a more Germany-style economy, where 20 percent of our workforce is in manufacturing."[12] The Biden administration, for its part, seemed to invite a focus on manufacturing jobs, circulating a fact sheet with

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[8] Dylan Matthews, "Chinese Electric Cars: Why Biden Is Keeping Cheap Cars from BYD Out," *Vox*, April 3, 2024, https://vox.com/climate/2024/3/4/24087919/biden-tariff-chinese-ev-byd-battery-detroit.

[9] Constance Grady, "The Incels Supporting Trump's Tariffs, Explained," *Vox*, April 14, 2025, https://vox.com/culture/408578/trump-tariffs-incels-misogyny-email-jobs. This comes after decades of similar comments, such as when Nike CEO Phil Knight once quipped that Americans don't want to make shoes, or when Barack Obama's chief economist, Christina Romer, faulted views that see producing "real things" as important. See Christina D. Romer, "Do Manufacturers Need Special Treatment?," Business, *New York Times*, February 4, 2012, https://nytimes.com/2012/02/05/business/do-manufacturers-need-special-treatment-economic-view.html.

[10] Milo Yiannopoulos (@Nero), "Men are depressed and addicted and broken because they have nothing to do," X, April 4, 2025, https://x.com/Nero/status/1908287716690977084.

[11] Howard Lutnick, "Transcript: Commerce Secretary Howard Lutnick," interview by Margaret Brennan, *Face the Nation with Margaret Brennan*, CBS News, April 6, 2025, https://www.cbsnews.com/news/transcript-commerce-secretary-howard-lutnick-on-face-the-nation-with-margaret-brennan-april-6-2025,

[12] In Trump's second administration, the target now seems to be 16 percent. By either target, they are moving in the wrong direction: Over Trump's first term, the share of workers in manufacturing declined from 8.5 percent in 2016 to 8.3 percent in 2020. From the start of Trump's second term to the most recent numbers available, the number of workers has decreased by 100,000, from 8 percent to 7.9 percent. These are the lowest numbers since the US industrialized in the 19th century. See Matthew J. Belvedere, "Trump's Point Man on Trade: 'We Envision a More Germany-Style Economy,'" CNBC, January 25, 2017, http://cnbc.com/2017/01/25/trumps-point-man-on-trade-we-envision-a-more-germany-style-economy.html; Doug Palmer, "Navarro Says Manufacturing Job Gains Will Take Time," *Politico PRO*, October 17, 2025, https://subscriber.politicopro.com/article/2025/10/navarro-says-manufacturing-job-gains-will-take-time-00613730.

endorsements of its climate agenda that mentioned "jobs" 53 times and "manufacturing" 12 times, compared with 3 mentions of "emissions" and 2 mentions of "construction"—where the near-term job creation was concentrated.[13]

This takes us to the second flavor of doomer: those that see the impact of globalization as so totally destructive that US manufacturing is essentially dead. While they think that's a bad thing (unlike the first doomer variant), both reinforce the idea that manufacturing is America's past, not its present or future. As an example of the second type of doomer, consider centrist presidential candidate Ross Perot in 1992, who predicted that, if the North American Free Trade Agreement (NAFTA) were signed (as it was by President Bill Clinton a year later), there would be a "giant sucking sound going south" of all manufacturing to Mexico.[14] Or more recently, Representative Jared Golden (D-ME) wrote that "America must once again become a nation of producers, not just consumers. Decades of globalization have transformed our country from an industrial superpower to one that relies on other countries for basic goods."[15] If we are no longer a producing nation, then it might be understandable that policymakers and analysts could see reshoring as a lost (or very expensive) cause, especially when China is happy to provide endless, cheap products.

This report argues against such manufacturing doomerism. Manufacturing still matters,[16] and active government industrial policy can build more of it. Every country practices industrial policy, helping some industries survive and thrive while discouraging others. Even the World Bank—once the neoliberal citadel for industrial

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[13] This mirrored the president's main talking point on climate: Joe Biden (@JoeBiden), "When I hear 'climate,' I think jobs. Good-paying, high-quality jobs that will help speed our transition to a green economy of the future and unleash sustainable growth," X, June 15, 2022, https://x.com/joebiden/status/1537150703633850371. See "Biden-Harris Administration Celebrates Two Years of the Inflation Reduction Act," August 17, 2024 https://www.presidency.ucsb.edu/documents/what-they-are-saying-biden-harris-administration-celebrates-two-years-the-inflation.

[14] "THE 1992 CAMPAIGN; Transcript of 2d TV Debate Between Bush, Clinton and Perot," U.S., *The New York Times*, October 16, 1992, https://www.nytimes.com/1992/10/16/us/the-1992-campaign-transcript-of-2d-tv-debate-between-bush-clinton-and-perot.html.

[15] Jared Golden, *Golden Introduces Bill to Restore American Manufacturing with 10 Percent Tariff on All Imports* (U.S. House of Representatives Maine-02, 2024), http://golden.house.gov/media/press-releases/golden-introduces-bill-to-restore-american-manufacturing-with-10-percent-tariff-on-all-imports.

[16] Earlier interventions on this question include Stephen S. Cohen and John Zysman, *Manufacturing Matters: The Myth of the Post-Industrial Economy* (Basic Books, 1988); Adam Hersh and Christian E. Weller, "Does Manufacturing Matter?," *Challenge* 46, no. 2 (2003): 59–79, https://doi.org/10.1080/05775132.2003.11034193; Susan Helper et al., *Why Does Manufacturing Matter? Which Manufacturing Matters? A Policy Framework* (Brookings Institution, 2012), https://www.brookings.edu/articles/why-does-manufacturing-matter-which-manufacturing-matters; Antonio Andreoni and Mike Gregory, "Why and How Does Manufacturing Still Matter: Old Rationales, New Realities," *Revue d'économie Industrielle*, no. 144 (December 2013): 21–57, https://doi.org/10.4000/rei.5668; Jostein Hauge and Ha-Joon Chang, "The Role of Manufacturing versus Services in Economic Development," in *Transforming Industrial Policy for the Digital Age*, ed. Patrizio Bianchi et al. (Edward Elgar Publishing, 2019), https://elgaronline.com/edcollchap/edcoll/9781788976145/9781788976145.00007.xml.

policy skeptics—now suggests the tool can be highly useful for developing manufacturing and other capabilities.[17] While outside of the defense and agriculture sectors the US has struggled to have a consistent industrial planning process,[18] the beginnings of one for the manufacturing sector were developed during the Biden administration,[19] emulating and building on the practices of other advanced economies.[20] And it is worth remembering that while the US is no longer the world's top manufacturing nation (that role now belongs to China), it is today still the second largest—producing nearly three times as much manufacturing value added as the number-three country.

This report seeks to shed light on whether (and how) manufacturing matters. In Section 2, we define key terms and present descriptive statistics on the state of US manufacturing. In Section 3, we examine the economic importance of manufacturing for job quantity, job quality, affordability, national income growth, productivity, innovation, exports, and other sectors. In Section 4, we discuss five reasons to think manufacturing and manufacturing policy will continue to matter in the years ahead, including as a way to deal with the climate crisis and national security threats.

2. A Look at the Data: Defining and Describing the Manufacturing Landscape

The first step to answering "Does manufacturing matter?" is to define it. "Manufacturing" can be thought of as "anything you can make that you can drop on your foot." Look around your desk or out your window: Virtually everything you see that fills your house and neighborhood was manufactured by someone, somewhere. Manufacturing scholar Tim Minshall puts it thus: "What happens in all factories can be framed in seven words: they take some *inputs* to do some kind of *processing* (*people* follow some *method* using *machines* and *materials*) to convert them into valuable outputs."[21] The other two sectors that comprise the economy are agriculture (which

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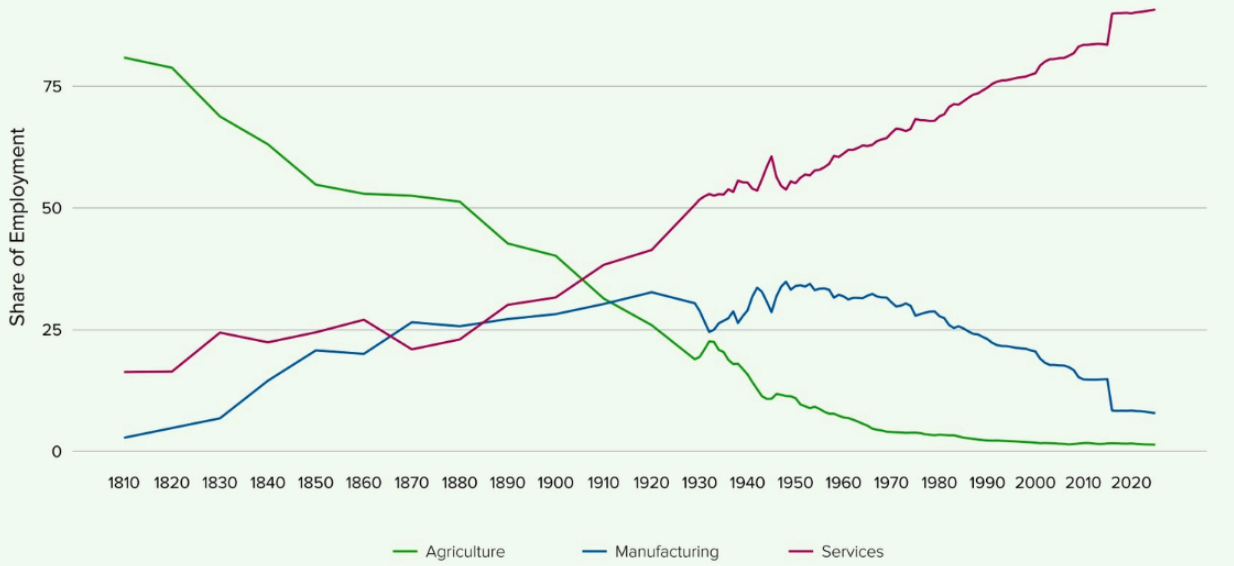
[17] Ana Margarida Fernandes and Tristan Reed, *Industrial Policy for Development: Approaches in the 21st Century*, Policy Research Reports (World Bank, 2026), https://openknowledge.worldbank.org/entities/publication/9f8098d5-fa1f-4c1b-97b5-f04262818bb3.
[18] Todd N. Tucker, *Industrial Policy and Planning: What It Is and How to Do It Better* (Roosevelt Institute, 2019), https://rooseveltinstitute.org/industrial-policy-and-planning.
[19] Todd N. Tucker, *Everything Is Climate Now: New Directions for Industrial Policy from Biden's Supply Chain Reports* (Roosevelt Institute, 2022), https://rooseveltinstitute.org/publications/reading-bidens-supply-chain-reports.
[20] Todd N. Tucker et al., *Industrial Policy 2025: Bringing the State Back In (Again)* (Roosevelt Institute, 2024), https://rooseveltinstitute.org/publications/industrial-policy-2025.
[21] Tim Minshall, *How Things Are Made: A Journey Through the Hidden World of Manufacturing* (Ecco, 2025): 64–65.

involves picking or growing, rather than making or assembling) and services (anything you can't drop on your foot).[22]

Figure 1a shows the relative importance of these three sectors in employment terms since 1810. As it shows, agriculture once employed the vast majority of Americans, but its employment share has declined every decade. The opposite trajectory is true of services, which has steadily increased its share of employment. Manufacturing, in contrast, has generally followed an inverse-U-shaped trajectory, expanding after the Civil War through the mid-20th century and declining since. The one disruption to this pattern was the New Deal era, when unprecedented public investments in manufacturing expanded the share of Americans working in the sector, as shown in Figure 1b. While the manufacturing employment share has been in a steady decline in the decades since, it is still far larger than agricultural employment.

Figure 1a: US Employment Shares, 1810–2025



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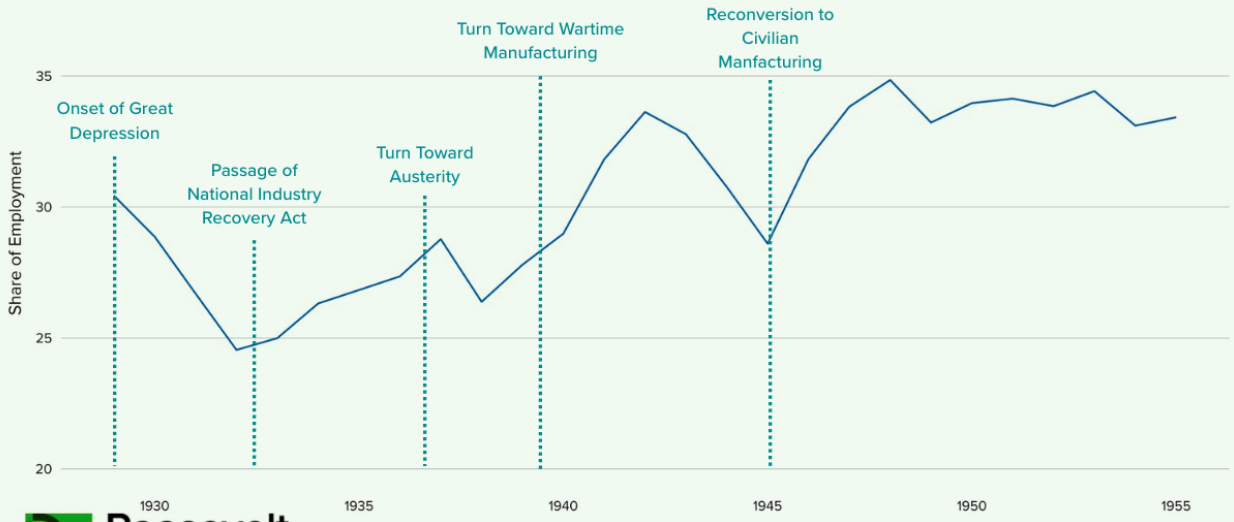
Source: Herrendorf et al., Growth and Structural Transformations (2014); Lebergott, Labor Force and Employment, 1800—1960 (1966); and BLS Series MANEMP, PAYEMS, and LNS12034560

[22] Some analysts vary these groupings slightly. Classical economists like Adam Smith paired agriculture with mining, fisheries, furs, and other activities that extract from the land in a category called "rude produce." See Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (W. Strahan and T. Cadell, 1776). The UN Industrial Development Organization, for its part, breaks the economy into five sectors: agriculture, manufacturing, nonmanufacturing industry (mining, utilities, and construction), modern services (transport, communication, finance, and business services), and other services. See *Industrial Development Report 2024: The New Era of Industrial Policy* (UN Industrial Development Organization, 2024): 38, https://unido.org/sites/default/files/unido-publications/2024-06/Industrial%20Development%20Report%202024.pdf.

Figure 1b: US Manufacturing Employment Was Highest in the New Deal Era

US Manufacturing Shares, 1929–1955



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Source: Herrendorf et al., Growth and Structural Transformations (2014); Lebergott, Labor Force and Employment, 1800—1960 (1966); and BLS Series MANEMP, PAYEMS, and LNS12034560

The "services" category aggregates a lot of distinct activities. Federal statistical agencies use the North American Industrial Classification System (NAICS) to sort sectors and industries at two-, three-, four-, five-, and six-digit levels of aggregation.[23] At the two-digit level (the highest level of aggregation), there are 20 sectors, including one each for manufacturing, agriculture, and mining; the remaining 17 sectors comprise services.[24] Table 1 shows the relative importance of each sector in employment and gross output terms. As can be seen on the leftmost columns, manufacturing is the sixth most important group overall, and the fifth most important private one. This is a significant change since 1979, when more workers worked in manufacturing (23.4 percent) than either the public sector (17.8 percent) or any other private industry.[25] Looking at employment measures alone, however, understates the economic importance of manufacturing. The rightmost columns compare the relative positions of economic sectors by gross output, a measure of the total sales or revenue received by an industry. In gross output terms, manufacturing ranks second, behind only finance. The arrows indicate those sectors that jump the most in ranking when comparing their importance for employment versus their gross output. (The appendix features a similar graphic (Table A-1) with value added, a separate measure of economic activity.)

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[23] US Census Bureau, "North American Industry Classification System: Introduction to NAICS," last accessed April 11, 2026, https://www.census.gov/naics/?58967?yearbck=2022.

[24] While there are 20 sectors, there are 24 two-digit NAICS codes: Manufacturing gets three NAICS two-digit codes (31, 32, and 33), and retail trade and transportation/warehousing each get two.

[25] "Other services" was the second highest, at 19.1 percent. See Lois M. Plunkert, "The 1980's: A Decade of Job Growth and Industry Shifts," *Monthly Labor Review* (Bureau of Labor Statistics, September 1990), https://bls.gov/opub/mlr/1990/09/art1full.pdf.

Table 1. Employment and Output by Sector, 2023

Industry Ranked by Employment	Employment (thousands)	Industry Ranked by Gross Output	Gross Output (Billions)
Educational services, health care, and social assistance	25,494	Finance, insurance, real estate, rental, and leasing	$9,423.40
Government	25,064	Manufacturing	$7,142.60
Professional and business services	22,757	Professional and business services	$5,573.10
Arts, entertainment, recreation, accommodation, and food services	16,587	Government	$5,134.70
Retail trade	15,830	Educational services, health care, and social assistance	$3,742.80
Manufacturing	12,842	Wholesale trade	$2,864.00
Finance, insurance, real estate, rental, and leasing	9,199	Retail trade	$2,753.10
Construction	8,133	Information	$2,536.80
Other services, except government	7,108	Construction	$2,389.10
Transportation and warehousing	6,670	Arts, entertainment, recreation, accommodation, and foo	$2,197.60
Wholesale trade	6,136	Transportation and warehousing	$1,751.20
Information	2,986	Other services, except government	$1,023.80
Agriculture, forestry, fishing, and hunting	1,406	Mining	$724.60
Mining	584	Utilities	$641.70
Utilities	576	Agriculture, forestry, fishing, and hunting	$632.00

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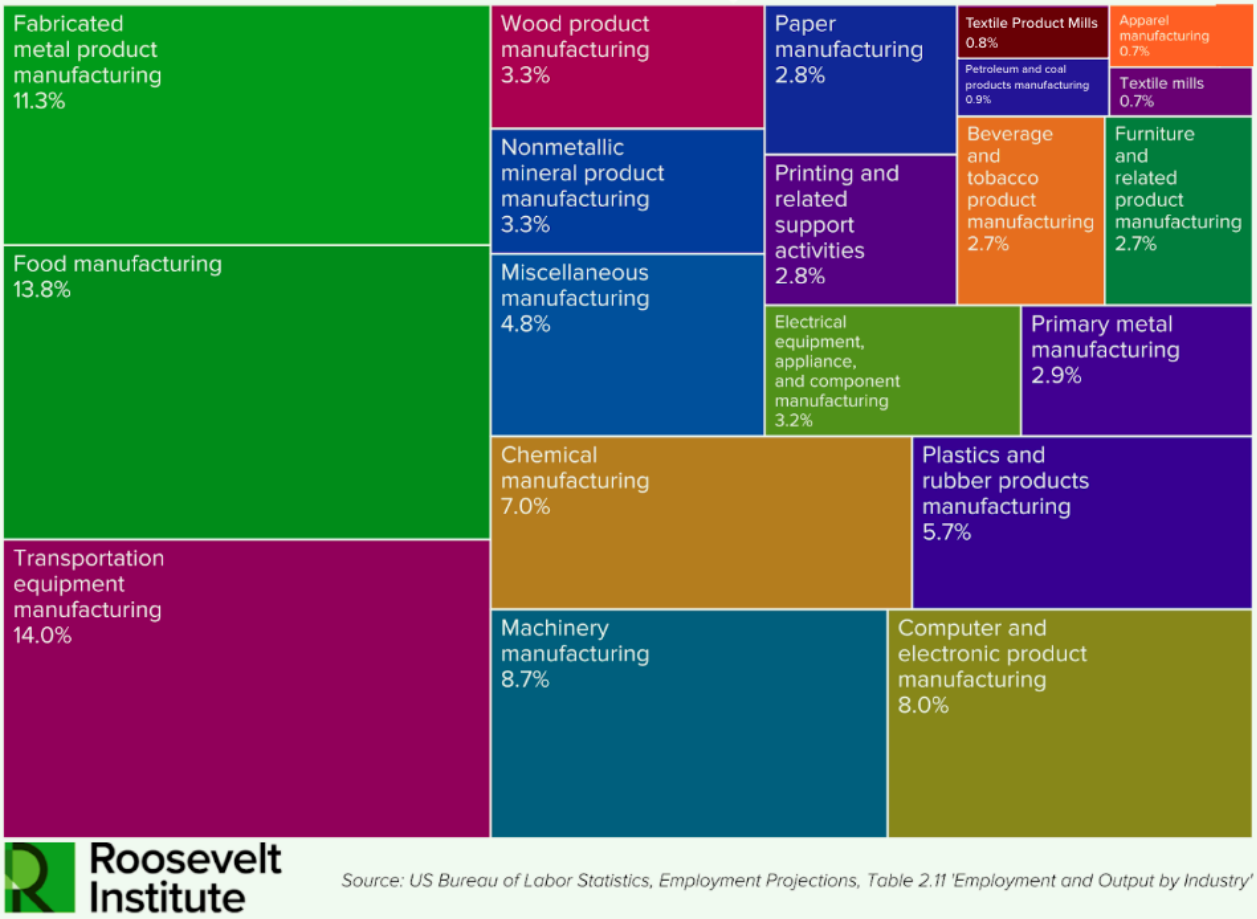
Source: US Census Bureau. "Manufacturing: Summary Statistics for Industry Groups and Industries for Employer Firms in the U.S.." Economic Surveys, ECNSVY Annual Integrated Economic Survey Summary Statistics, Table AIES31BASIC01, 2026.

Let's look further below the hood of the manufacturing sector. The NAICS data show that not all manufacturing matters equally in output and employment terms. Figure 2 breaks up the manufacturing sector into its 21 two-digit subsectors, from food manufacturing (code 311) to furniture and related products manufacturing (code 337). Transportation equipment (including auto, aerospace, boat, tank, and bicycle manufacturing) is the single largest manufacturing subsector, followed by food manufacturing and fabricated metal products.

Figure 2: Manufacturing Subsectors, Share of Employment, 2024



NAICS divides industries up still further, from the 21 manufacturing subsectors to 86 sub-subsectors, to 176 sub-sub-subsectors, to the full list of 346 manufacturing industries, ranging from dog- and cat-food manufacturing (code 311111) to burial casket manufacturing (code 339995). Table 2 lists the top 20 manufacturing sub-sub-subsectors for both output and jobs. Note that in employment terms, plastics, motor vehicle parts, and animal slaughtering and processing are the most important. In terms of gross output, petroleum and coal products and motor vehicle manufacturing are at the top, reflecting in part the high value of intermediate inputs in these industries. As can be seen in value-added terms in the appendix, pharmaceutical and medicine ranks at the top of the list, while petroleum and coal products come second—still high in the ranking but with a significant drop in dollar terms from their gross value.

Table 2. Top Twenty NAICS 4 Manufacturing Industries by Employment and Output, 2023

Manufacturing Industries Ranked by Employment	Employment (thousands)	Manufacturing Industries Ranked by Gross Output	Gross Output (Billions)
Plastics product manufacturing	662,969	Petroleum and coal products manufacturing	768,756,721
Motor vehicle parts manufacturing	584,479	Motor vehicle manufacturing	480,872,707
Animal slaughtering and processing	550,120	Motor vehicle parts manufacturing	292,729,934
Aerospace product and parts manufacturing	433,159	Animal slaughtering and processing	291,122,471
Architectural and structural metals manufacturing	427,240	Basic chemical manufacturing	284,913,629
Navigational, measuring, electromedical, and control instruments manufacturing	402,719	Pharmaceutical and medicine manufacturing	249,363,341
Printing and related support activities	371,273	Aerospace product and parts manufacturing	239,248,154
Machine shops; turned product; and screw, nut, and bolt manufacturing	363,631	Plastics product manufacturing	239,241,116
Other general purpose machinery manufacturing	318,768	Navigational, measuring, electromedical, and control instruments manufacturing	190,232,654
Bakeries and tortilla manufacturing	315,905	Architectural and structural metals manufacturing	153,427,290
Pharmaceutical and medicine manufacturing	300,822	Other food manufacturing	147,822,683
Motor vehicle manufacturing	296,707	Other general purpose machinery manufacturing	134,968,354
Medical equipment and supplies manufacturing	295,690	Converted paper product manufacturing	134,370,905
Beverage manufacturing	278,293	Resin, synthetic rubber, and artificial synthetic fibers and filaments manufacturing	121,212,322
Semiconductor and other electronic component manufacturing	274,926	Beverage manufacturing	119,676,291
Other wood product manufacturing	256,425	Agriculture, construction, and mining machinery manufacturing	119,435,701
Converted paper product manufacturing	254,811	Semiconductor and other electronic component manufacturing	117,182,036
Other food manufacturing	252,613	Medical equipment and supplies manufacturing	97,945,221
Other fabricated metal product manufacturing	248,342	Printing and related support activities	90,008,178
Other miscellaneous manufacturing	237,444	Machine shops; turned product; and screw, nut, and bolt manufacturing	84,007,533

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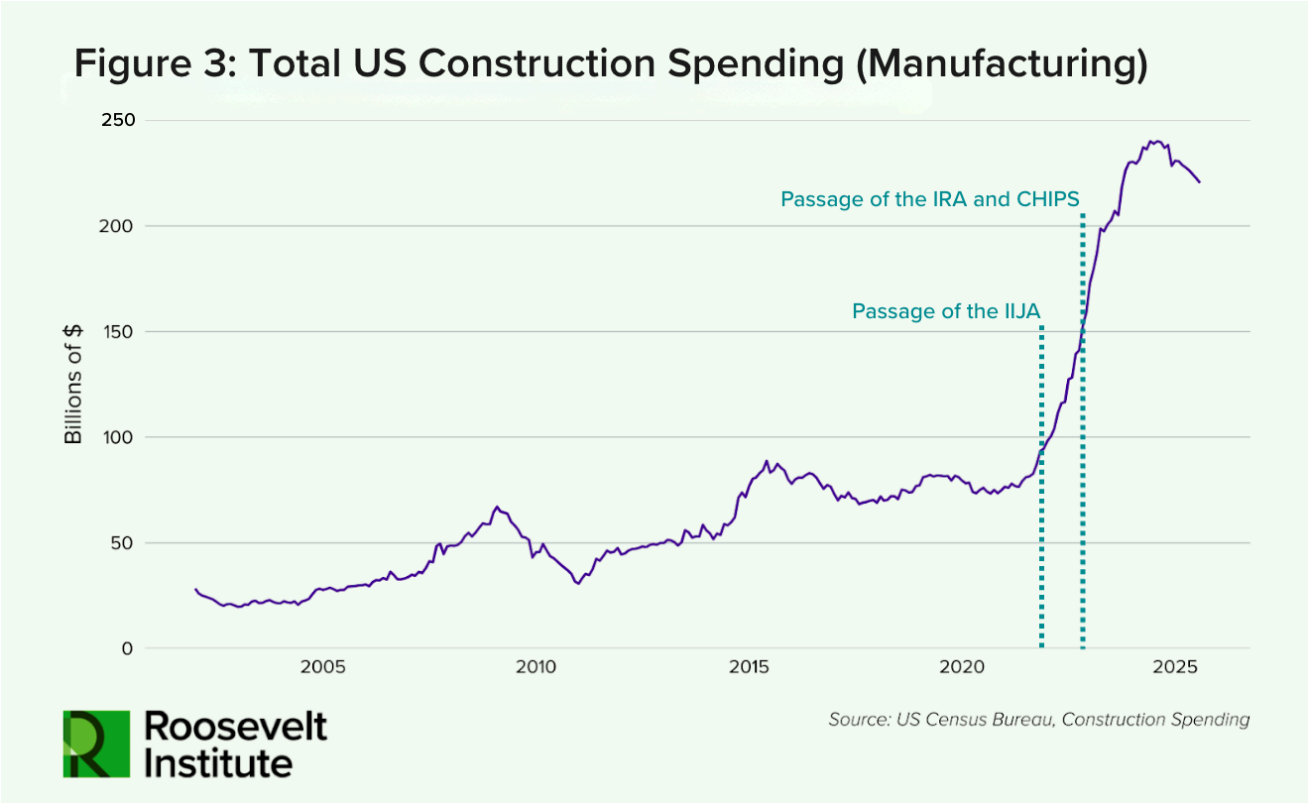
Source: Source: US BEA National Accounts, GDP and Personal Income, Table 6.4D, "Full Time and Part Time Employees by Industry."

By some indicators, manufacturing had some of its best years over 2021 to 2024. Annual spending on the construction of manufacturing facilities increased nearly threefold between 2021 and the end of 2024, as shown in Figure 3. As explored in more detail in

another recent Roosevelt Institute report, this increase was driven by federal incentives under the Biden administration, including the Inflation Reduction Act and the CHIPS and Science Act.[26] However, this construction has not yet resulted in major new numbers for manufacturing employment, as factories must be constructed before they can start employing people and churning out products.[27]



[26] See Betony Jones and Joe Peck, "The Receipts: The Untold and Underappreciated Outcomes of Biden's Clean Energy Strategy," Roosevelt Institute, 2026 https://rooseveltinstitute.org/publications/the-receipts-the-untold-and-underappreciated-outcomes-of-bidens-clean-energy-strategy ; Skanda Amarnath, "Did the CHIPS Act Trigger the Manufacturing Construction Boom?," *Factory Settings*, March 9, 2026, https://factorysettings.org/p/did-the-chips-act-trigger-the-manufacturing.

[27] Though for some positive early indications in semiconductor manufacturing and associated employment, see Bilge Erten et al., "Employment Impacts of the CHIPS Act," Working Paper 34625 (National Bureau of Economic Research, January 2026), https://www.nber.org/papers/w34625.

3. The Economic Importance of Manufacturing

From the previous section, we can see that manufacturing employment is in decline, even if other indicators show a more robust health. Should policymakers care, and take steps to reverse or slow the job losses? Or, conversely, are there other reasons to support manufacturing beyond employment? This section evaluates traditional economic arguments to show why manufacturing matters. We focus on several channels: job quantity, job quality, affordability, national income/productivity, innovation, exports, and multiplier effects on other sectors.

a) Job Quantity

Many discussions of manufacturing focus on its promise (or lack thereof) as a source of employment. For instance, Jason Furman of the Peterson Institute and Harvard Kennedy School wrote that the Biden administration's economic policies were a "delusion" and that his "hoped-for manufacturing renaissance has not materialized, at least not yet. The proportion of people working in manufacturing has been declining for decades and has not ticked back up, and overall domestic industrial production remains stagnant."[28] Adam Posen of the Peterson Institute deems Biden's and Trump's manufacturing policies to be based on "profound analytic fallacies" and "shortsighed self-dealing,"[29] and has said that "the fetish for manufacturing is part of the general fetish for keeping white males of low education outside the cities in the powerful positions they're in in the US."[30] Robert Z. Lawrence, also of the Peterson Institute, wrote a book-length treatment on whether manufacturing can "provide inclusive growth" and defines the inquiry narrowly so that the main variable of interest is the manufacturing share of employment, which he predicts will not rebound.[31]

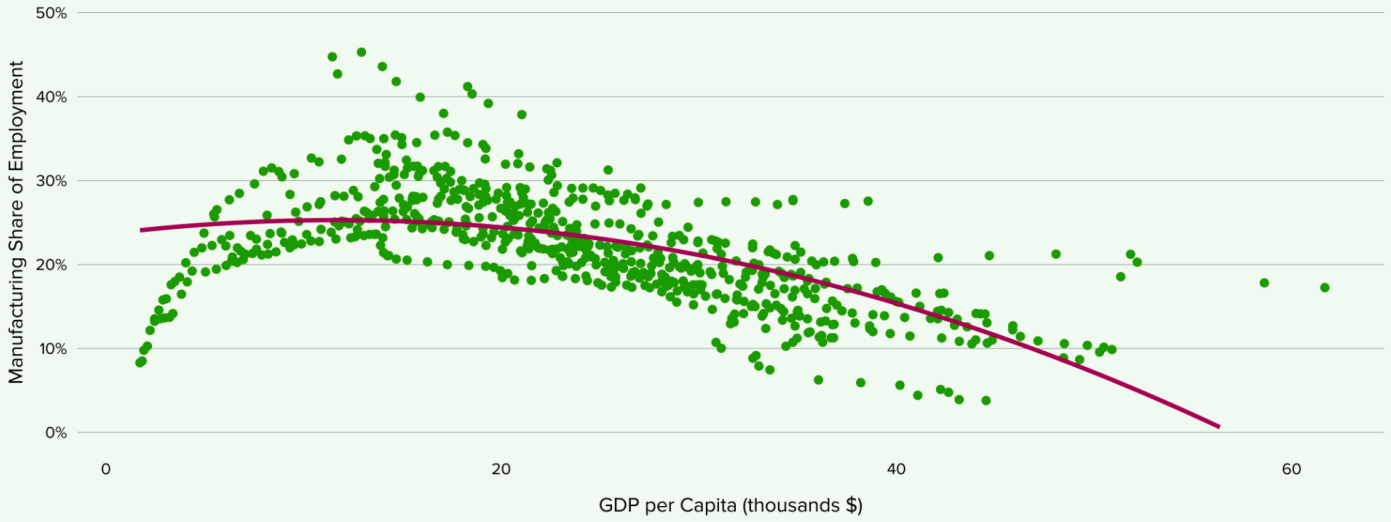
Even economists who are often on the opposite side of the Peterson Institute when it comes to the desirability of industrial policy have echoed these assessments. Mariana Mazzucato of the University College–London wrote: "A strategy focused on making physical things gives inadequate attention to the sectors in which most Americans work, including retail, health care, education, and care work."[32] And for Dani Rodrik of

[28] Jason Furman, "The Post-Neoliberal Delusion," *Foreign Affairs*, February 10, 2025, https://foreignaffairs.com/united-states/post-neoliberal-delusion.
[29] Adam Posen, "America's Zero-Sum Economics Doesn't Add Up," *Foreign Policy*, March 24, 2023, https://foreignpolicy.com/2023/03/24/economy-trade-united-states-china-industry-manufacturing-supply-chains-biden.
[30] Matthew Stoller (@matthewstoller), "Another astonishing clip from the Cato Institute event today, this one from the influential Adam Posen, head of the Peterson Institute. He says a focus on domestic manufacturing is simply a 'fetish . . . ,'" X, October 6, 2022, https://x.com/matthewstoller/status/1578130142655905816.
[31] Robert Lawrence, *Behind the Curve: Can Manufacturing Still Provide Inclusive Growth?* (Peterson Institute for International Economics, 2024).
[32] Mariana Mazzucato, "Making Industrial Strategy Great Again," *Foreign Affairs*, January 28, 2026, https://foreignaffairs.com/united-states/making-industrial-strategy-great-again.

the Harvard Kennedy School, "Bidenomics was economic populism of the wrong kind . . . In an economy where only 8% of workers are employed in manufacturing, a policy that promises to restore the middle class by bringing manufacturing back home is not only unrealistic; it also rings hollow."[33]

The manufacturing skeptics have much data on their side. As Section 2 showed, the share of workers in manufacturing continues to shrink. This is not just a US but a global phenomenon. As countries get richer, workers move out of manufacturing and into services. According to estimates from Lawrence, today's developed countries maxed out on their manufacturing employment share at approximately 30 percent when the GDP was at a bit under $20,000 per capita, falling to 10 percent by the time the GDP per capita reached $64,000. This reverse-U-shaped curve is shown in Figure 4.[34]

Figure 4: Income Level versus Manufacturing Employment Share, 1960—2011
For Select Advanced Economies



Roosevelt Institute

Source: Lawrence, Behind the Curve (2024)

Among the reasons economists have offered for the declining manufacturing share of employment are the following.

Recessions and declines in investment. When a country goes through a downturn in the business cycle or an episode of austerity policy, consumers have less money to

[33] Dani Rodrik, "Why Bidenomics Did Not Deliver at the Polls," Economics & Finance, *Project Syndicate*, December 4, 2024, https://project-syndicate.org/commentary/democrats-biden-wrong-kind-of-economic-populism-by-dani-rodrik-2024-12.

[34] The countries included here are USA, Germany, Netherlands, Italy, UK, France, Spain, Denmark, Sweden, Japan, Taiwan, Singapore, South Korea, Hong Kong.

spend, so they reduce their spending on manufactured goods. For example, banking crises cause a 2.5 percent contraction in advanced economies' manufacturing sectors—an impact that was even higher during the global financial crisis of 2008–09.[35] This would explain temporary declines in the need for manufacturing workers, but not permanent changes.

Economic development. The level of a country's economic development can explain the lower share of workers in goods production. Manufacturing has what economists call a low income elasticity of demand, compared to services. This means that if a country's income doubles, its consumers do not necessarily need or want double the number of goods. Once the average household has a single oven, they aren't likely to get a second or third just because they can afford to. In contrast, as they get more disposable income, they are likely to start demanding services like massages, psychotherapy, or gourmet restaurant meals. And the richer households get, the more they demand these services. This makes services the growing job sector as countries develop.

However, while income elasticity helps explain why a lower *share* of workers work in manufacturing, it does not necessarily explain deindustrialization, or the phenomenon of fewer manufacturing workers *in absolute terms*. After all, workers are still needed to produce the one oven that households demand. Deindustrialization requires other explanations.

Labor productivity, technology, and automation. The quality of economic development—in particular, changes to labor and capital—can also explain a falling manufacturing employment share. As we explore later in this section, the rate of productivity increase in manufacturing is higher than in services, which means that factories can make the same amount of goods with fewer workers every year they operate. In autos, for example, the work hours necessary to produce a vehicle fell from nearly 35 in 1993 to about 25 in 2007.[36] This is one reason that services tend to outpace manufacturing in absorbing workers.

On the capital side, manufacturing workers on factory floors are rapidly being displaced by robots. A leading study found that from 1990 to 2007, an increase in robotization lowered the employment rate in manufacturing more severely than in any other industry. Construction and transportation faced less severe declines, while education, health, and agriculture actually saw increases in employment when robots were introduced.[37] While the authors of a 2023 meta-study on the effects of automation found that overall,

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[35] Carlos Madeira, *The Impact of Financial Crises on Industrial Growth: Lessons from the Last 40 Years*, Working Papers No. 1214 (Bank of International Settlements, 2024), https://bis.org/publ/work1214.htm.
[36] Soledad Giardili et al., "Leadership and Productivity: A Study of US Automobile Assembly Plants," SSRN (April 8, 2022), https://ssrn.com/abstract=4069025.
[37] Daron Acemoglu and Pascual Restrepo, "Robots and Jobs: Evidence from US Labor Markets," *Journal of Political Economy* 128, no. 6 (2020), https://economics.mit.edu/sites/default/files/inline-files/Robots%20and%20Jobs%20-%20Evidence%20from%20US%20Labor%20Markets.pdf.

technological change had a positive net effect on employment, they admit a negative effect on manufacturing: "Our results also suggest that low-skill, production, and manufacturing workers have been adversely affected by technological change."[38]

Given the tendency for automation in the sector, it seems likely that manufacturing employment will continue to fall, in the absence of a reversal in consumer demand away from services and toward manufactured goods. However, the pace and trajectory of this decline are uncertain.[39]

Trade. For any number of reasons (rising incomes, changing tastes), consumers may shift from buying domestic goods to buying foreign imports. If the substitution to imports occurs in labor-intensive industries, jobs will be displaced. While economists sometimes characterize this as a natural outcome of commerce or development, it is heavily influenced by policy decisions, including the degree and speed of cutting tariffs in the importing country, the export-promotion policies of the exporting country, and how regulation affects firms' location decisions. These policies can lead to "premature deindustrialization"—the loss of manufacturing more quickly than is economically optimal.[40]

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[38] Kerstin Hötte et al., "Technology and Jobs: A Systematic Literature Review," *Technological Forecasting and Social Change* 194, 2023, https://doi.org/10.1016/j.techfore.2023.122750.

[39] The introduction of new technologies and automation is even affecting global development trajectories. Today's late-developing countries may deindustrialize faster than earlier-developing ones, as the former benefits from the labor-saving technology developed by the latter. While today's rich countries had peak manufacturing shares often exceeding 30 percent, the peak for today's developing countries is often below 20 percent. See Dani Rodrik, "Unconditional Convergence in Manufacturing," *The Quarterly Journal of Economics* 128, no. 1 (2013): 165–204; Jesus Felipe et al., *Manufacturing Matters . . . but It's the Jobs That Count*, Working Paper No. 420, ADB Economics (Asian Development Bank, 2014), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2558904.

[40] See Sukti Dasgupta and Ajit Singh, "Manufacturing, Services and Premature Deindustrialization in Developing Countries: A Kaldorian Analysis," in *Advancing Development*, ed. George Mavrotas and Anthony Shorrocks (Palgrave Macmillan UK, 2007), https://doi.org/10.1057/9780230801462_23. Related to the idea that deindustrialization can be a choice, the development economist Ajit Singh defined "an efficient manufacturing sector" as

> one which [currently as well as potentially] not only satisfies the demand of consumers at home at least cost, but is also able to sell enough of its products abroad to pay for the nation's import requirements. This is, however, subject to the qualification that **an 'efficient manufacturing sector' must be able to achieve these objectives at socially acceptable levels of output, employment and exchange rate.** The latter restrictions are extremely important, since at low enough levels of output and employment, or more arguably at a sufficiently low exchange rate, almost any manufacturing sector may be able to meet this criterion of efficiency. (The exchange rate should be regarded here as an indicator of the socially acceptable levels of inflation and inequality of income distribution.) It is also necessary to emphasise the significance of the condition that, to be efficient, the manufacturing sector must be able to fulfil the above requirements not merely currently, but also in the long run" (emphasis added).

See Ajit Singh, "Third World Competition and De-Industrialisation in Advanced Countries," *Cambridge Journal of Economics* 13, no. 1 (1989): 103–20, 111.

The leading study on the "China Shock"—the period from 1999 to 2012 when China went from having around 7 percent of the global manufacturing value added to almost 25 percent after acceding to the World Trade Organization (WTO)—estimates that the US lost 2.4 million jobs due to displacement by Chinese imports.[41] This was equal to nearly 60 percent of all manufacturing jobs lost over the period, and virtually all of those workers became part of the long-term unemployed, increasing government spending on social services. Despite benefiting from lower prices (on which we have more below), 6.3 percent of the US population experienced net income losses from these increased imports.[42]

b) Job Quality

Even if manufacturing is unlikely to generate a high quantity or share of jobs in the future, it could create high-quality jobs—especially for marginalized communities and demographics. This section looks at ways the manufacturing sector has been historically associated with higher wages and union density, with some particular benefits for workers of color.

Several studies have reported the existence (and decline) of a "manufacturing wage premium," which describes the phenomenon of higher wages in the manufacturing sector relative to the rest of the economy.[43] Figures 5a and 5b show that manufacturing continues to command a wage premium relative to other sectors, but the degree varies by education and occupation group. For each year shown, worker characteristics that can impact earnings—such as race, sex, age—are controlled for. In Figure 5b, education level is controlled for as well. Also controlled for is whether or not a worker is a member of a union or otherwise covered by a union contract, which is especially important as unionization impacts earnings and unionization rates differ substantially across sectors. Lastly, state-level differences in earnings are taken into account.

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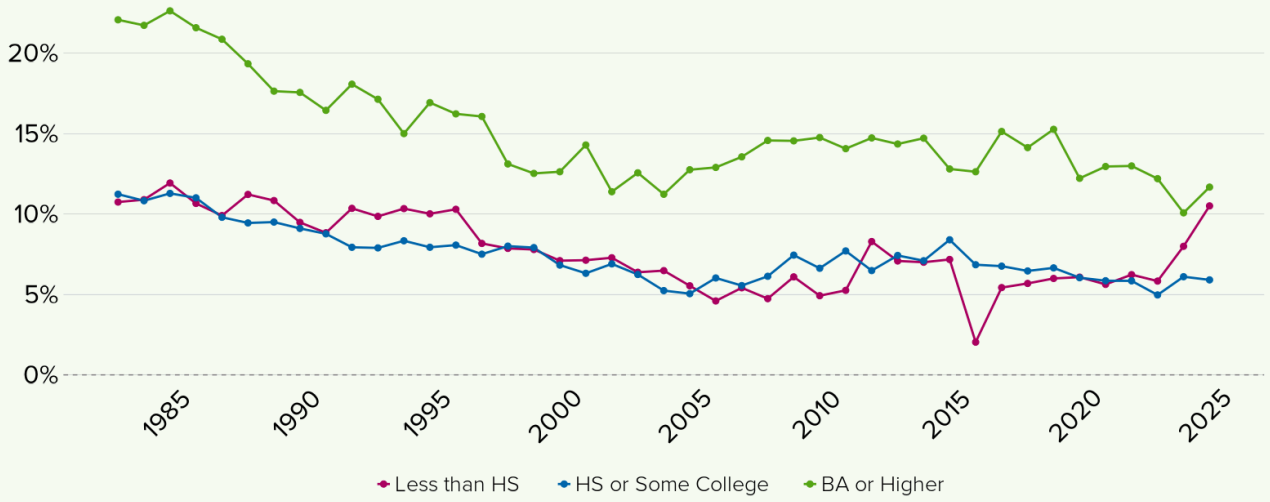
[41] David H. Autor et al., "The China Shock: Learning from Labor-Market Adjustment to Large Changes in Trade," *Annual Review of Economics* 8 (2016): 205–40.
[42] David H. Autor et al., "On the Persistence of the China Shock," Working Paper No. 29401 (National Bureau of Economic Research, October 2021), https://nber.org/papers/w29401.
[43] For a diversity of ways of constructing this estimate, see Susan Helper, Timothy Krueger, and Howard Wial, "Why Does Manufacturing Matter? Which Manufacturing Matters?" The Brookings Institution, February 22, 2012. https://www.brookings.edu/articles/why-does-manufacturing-matter-which-manufacturing-matters; Joel A. Elvery and Julianne Dunn, *Manufacturing Wage Premiums Have Diverged between Production and Nonproduction Workers*, Regional Policy Report (Federal Reserve Bank of Cleveland, 2021), https://doi.org/10.26509/frbc-rpr-20211109; Kimberly Bayard et al., *Are Manufacturing Jobs Still Good Jobs? An Exploration of the Manufacturing Wage Premium*, Finance and Economics Discussion Series (Federal Reserve Board, 2024), 1–53, https://doi.org/10.17016/feds.2022.011r1.

Figure 5a: Manufacturing Wage Premium by Education Group

Controlling for sex, race, age, union coverage, and state fixed effects

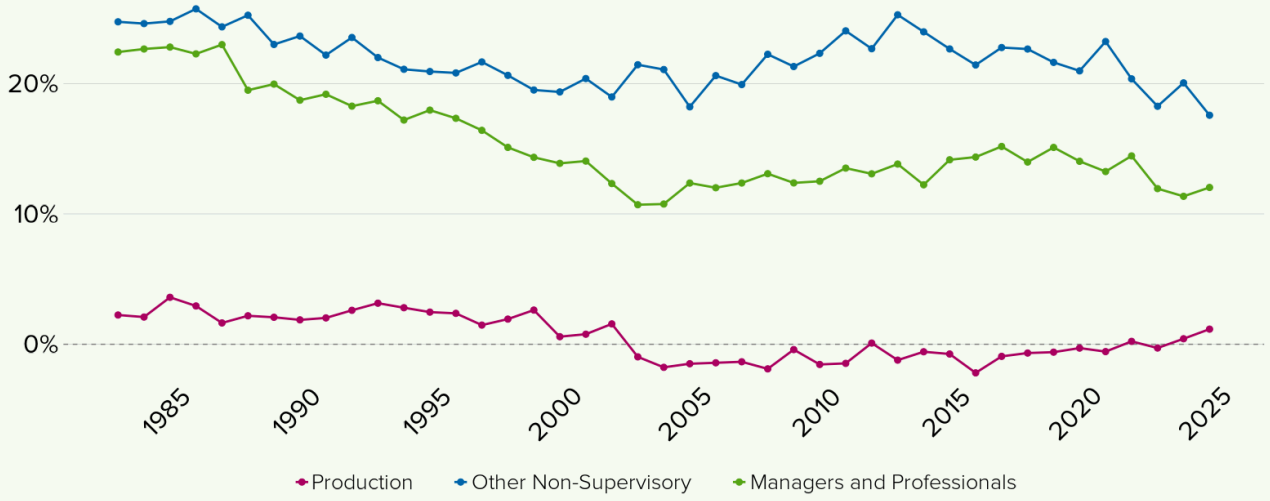


Roosevelt Institute

Source: Author's calculations based on Economic Policy Institute. 2026. Current Population Survey Extracts (Outgoing Rotation Group)

Figure 5b: Manufacturing Wage Premium by Occupation Group

Controlling for sex, race, age, education, union coverage, and state fixed effects



Roosevelt Institute

Source: Author's calculations based on Economic Policy Institute, 2026, Current Population Survey Extracts (Outgoing Rotation Group)

In the early 1980s, manufacturing workers with less than a full bachelors' degree were paid about 10 percent more than their nonmanufacturing counterparts, shrinking to closer to 5 percent in recent years. Manufacturing workers *with* a bachelors' degree saw their wage premium go from 20 percent to closer to 10 percent over the same time period. Turning to occupational group, production workers in manufacturing have basically been even in pay with their nonmanufacturing peers, while managers and professionals in manufacturing command a little over a 10 percent wage premium, and other nonsupervisory, non-production workers earn closer to 20 percent more in manufacturing than in nonmanufacturing sectors.[44]

The types of workers that make up the manufacturing workforce have also changed over time. The sector has become much more professionalized and educated, as shown in Figures 6a and 6b. Managers, professionals, and those with a college degree have doubled their share of jobs in manufacturing since the 1980s—now constituting just under 40 percent of the workforce. This on its own more or less tracks the trend of the economy as a whole. In terms of education levels, both manufacturing and nonmanufacturing have seen their share of workers with less than a high school degree drop by more than half. While the share of workers without a high school degree was 38 percent higher in manufacturing than in nonmanufacturing in the 1980s, today the shares of such workers are even in both sectors. What continues to set manufacturing apart is that about half of its workers are in production as opposed to what might be deemed desk jobs—more than twice the share in nonmanufacturing sectors.[45]

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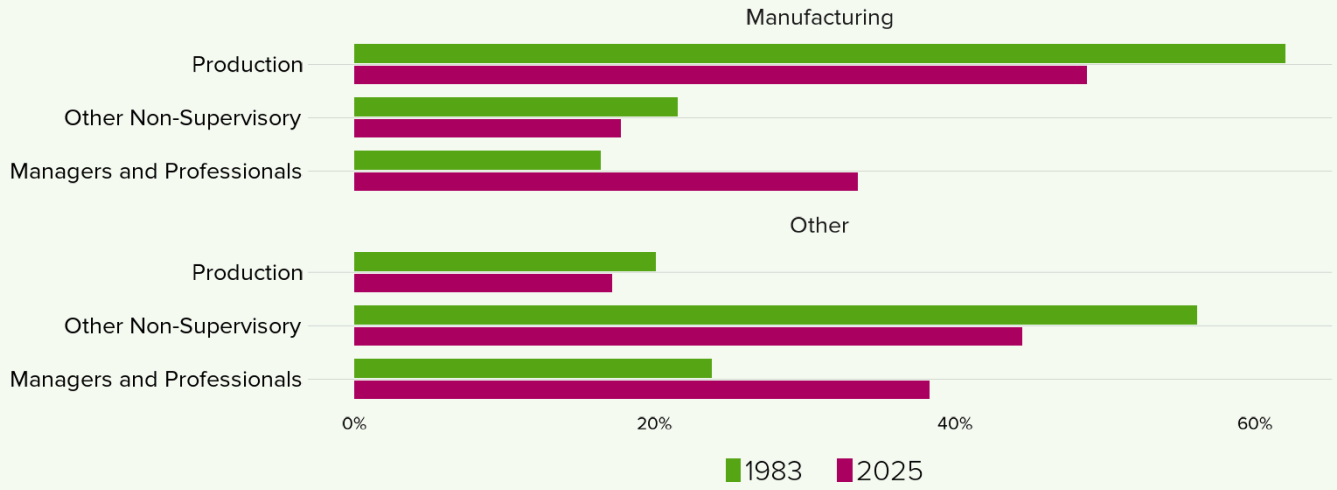
[44] In a recent opinion column, economist Jason Furman claimed: "Manufacturing jobs also used to pay more than nonmanufacturing jobs with similar skill requirements. Not anymore: Today people in nonmanagerial manufacturing jobs average $30 an hour as compared with $32 for truck drivers, $33 for wholesale trade workers and $38 for construction workers. Trying to push more people into manufacturing jobs is therefore more likely to harm the middle class than help it." See Jason Furman, "Every President Tries It. It Never Works.," Opinion, *The New York Times*, April 2, 2026, https://www.nytimes.com /2026/04/02/opinion/trump-manufacturing-industry-liberation-day.html. He uses the Current Employment Survey rather than what we use here (the Current Population Survey). However, in the dataset he uses (and not controlling for sex, race, age, union coverage, and state fixed effects, as we do in Figures 5a and 5b), production workers in manufacturing have not seen a premium for the last two decades.

[45] Despite some images of manufacturing as being dominated by white males, this is not entirely accurate according to data from the Current Population Survey. The share of white Americans in manufacturing has shrunk from over 80 percent to just over 60 percent between the 1980s and today, as the share of Latinos in manufacturing has grown from just over 6 to nearly 20 percent, roughly equivalent to their shares in the overall population. The share of Black Americans in manufacturing has not changed significantly, but is still a few percentage points lower than their overall population share (13.7 percent). It is for sex where the real disparities lie: with women making up less than 30 percent of the share of manufacturing workers, versus over 50 percent of non-manufacturing workers. This disparity, however, has been consistent since the 1980s. Notably, a major surge of women into manufacturing happened during the Roosevelt administration. See Evan K. Rose, "The Rise and Fall of Female Labor Force Participation during World War II in the United States," *The Journal of Economic History* 78, no. 3 (2018): 673–711.

Figure 6a: Change in Worker Share, 1983–2025

By Occupation Group

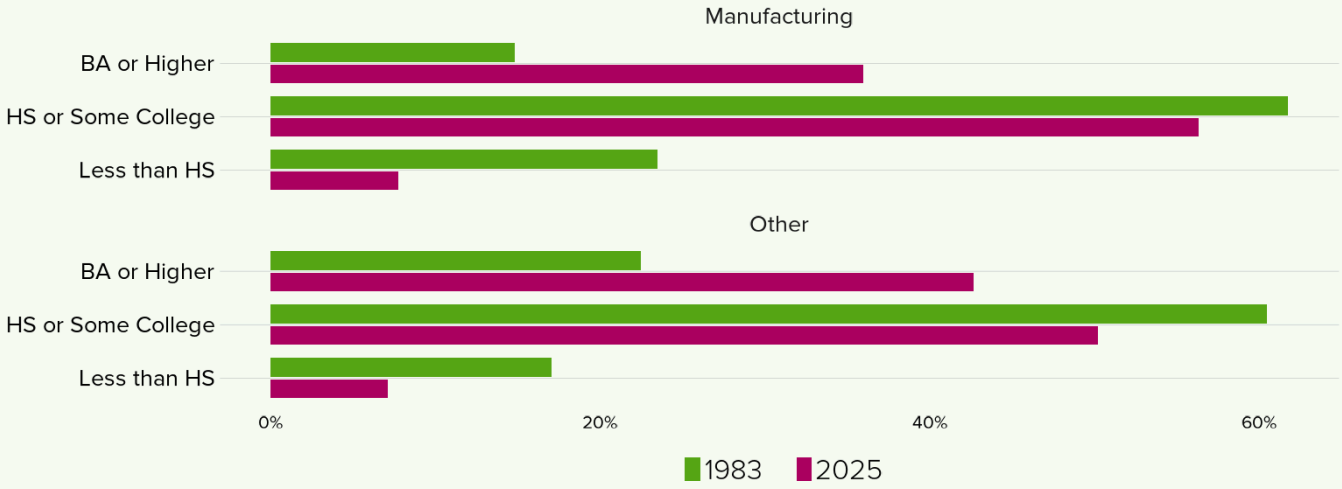


Source: Author's calculations based on Economic Policy Institute. 2026. Current Population Survey Extracts (Basic Monthly Data)

Roosevelt Institute

Figure 6b: Change in Worker Share, 1983–2025

By Education Group



Source: Author's calculations based on Economic Policy Institute. 2026. Current Population Survey Extracts (Basic Monthly Data)

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There are a number of theories about both why the manufacturing sector commands an earnings premium at all, and why the premium has declined. These explanations focus on the characteristics of the workers employed, the characteristics of the work process, the economic returns to the sector, and institutional factors such as unionization and its relative decline.

Economist Susan Helper and coauthors explain the wage differential between manufacturing and nonmanufacturing by arguing that "manufacturers need to pay higher wages to ensure that their workers are appropriately skilled and motivated" due to high costs of downtime and challenges of supervision in the industry.[46] This explanation is generally referred to as the concept of "efficiency wages"—that an employer will offer employees more to ensure their attendance and effort. An additional explanation is the notion of "compensating wage differentials," meaning that negative aspects of manufacturing work—physical demands, rigid schedules, boredom—lower the appeal of the jobs relative to other sectors, pushing firms to raise their wages. Another explanation considers the high capital intensity of manufacturing, which provides opportunities for returns to scale and barriers to entry, enabling economic rents and leading to higher profits than other sectors. In turn, these high profits offer the potential for high wages; whether they actually do so depends on workers' bargaining power to secure their fair share.[47]

For workers to be more likely to secure their share, they need unions or other forms of worker organization. Recent research has shown that unions provide a number of economic benefits and spillovers across the economy (not just in manufacturing). Being in a union is associated with a wage premium for all workers, with workers of all races (but Black workers especially) accumulating more wealth if they are in a union.[48] Other research has found that higher union density nationally drives down inequality.[49] At the state level, higher union density also leads to lower chances of being in poverty for both union and nonunion households.[50]

Unions have long been associated with the manufacturing sector, where the ever-expanding scale of operations in industries like textiles, steel, and autos involves minute divisions of labor and enables workers to take advantage of chokepoints in the assembly process to bargain for better working conditions.[51] Historically, manufacturing had a

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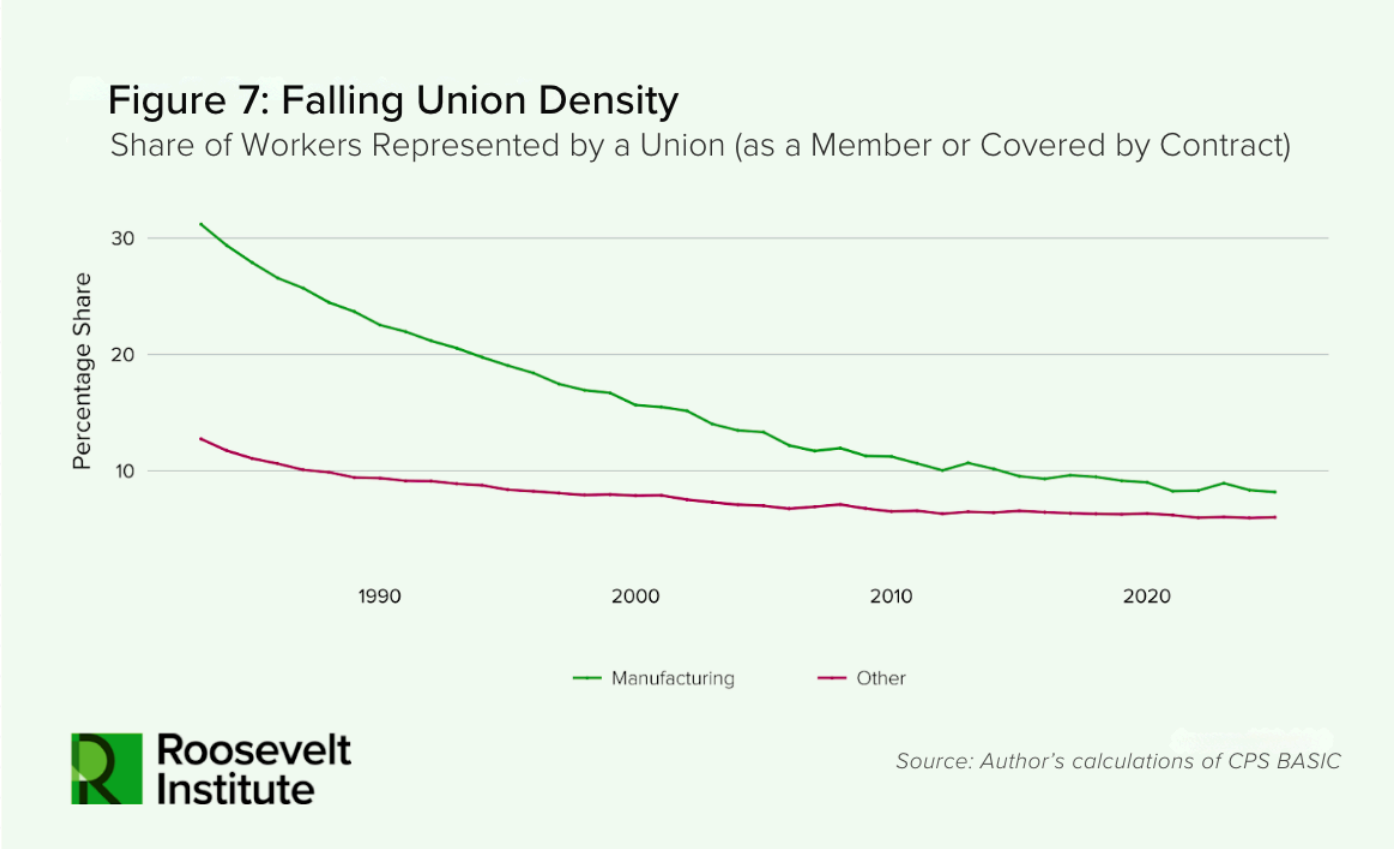
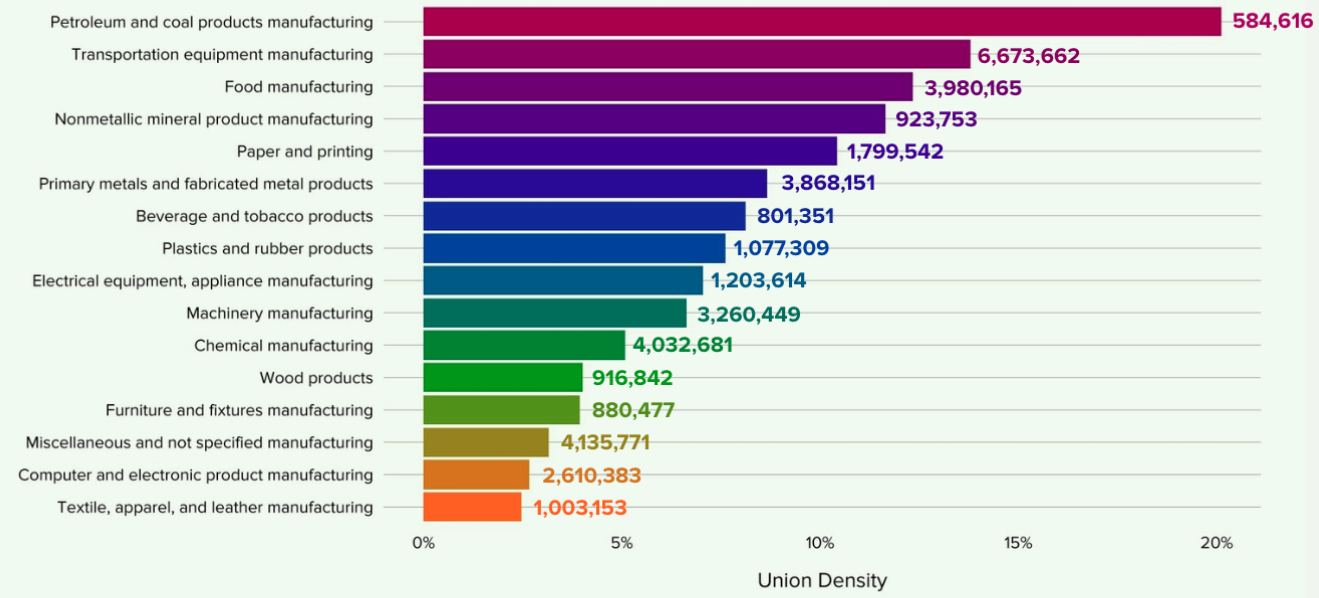
[46] Susan Helper et al., *Why Does Manufacturing Matter*?
[47] Elvery and Dunn, *Manufacturing Wage Premiums Have Diverged.*
[48] Christian E. Weller and David Madland, "Unions, Race, Ethnicity, and Wealth: Is There a Union Wealth Premium for People of Color?," *Journal of Economics, Race, and Policy* 5, no. 1 (2022): 25–40.
[49] Henry S. Farber et al., "Unions and Inequality over the Twentieth Century: New Evidence from Survey Data," *The Quarterly Journal of Economics* 136, no. 3 (2021): 1325–85, https://doi.org/10.1093/qje/qjab012.
[50] Tom VanHeuvelen and David Brady, "Labor Unions and American Poverty," *ILR Review* 74, no. 4 (2022): 891–917.
[51] Benjamin Y. Fong, "Organizing Logistics Chokepoints: Hitting Them Where It Hurts," *New Labor Forum* 34, no. 2 (2025): 21–30, https://doi.org/10.1177/10957960251331197.

higher union density than many service sectors and the private-sector average, as shown in Figure 7, which compares the share of workers represented by a union in the manufacturing sector to all other private-sector workers. Manufacturing union density has fallen dramatically, from over 30 percent in 1983 to just over 8 percent in 2025. While a higher share of workers in manufacturing remains represented compared to workers in the rest of the private sector, the gap has closed significantly over this period.



Within manufacturing, some industries are more unionized than others. Figure 8 breaks down some aggregates, from highest to lowest union density. Notably, petroleum and coal products manufacturing maintains the highest density, at over 20 percent. But these workers comprise only about 2 percent of the total manufacturing workforce displayed here. The subindustry with the largest share of employment, transportation equipment manufacturing, has a density of 13.8 percent.

Figure 8: Union Density of Manufacturing Subsectors, 2025
Compared to Total Number of Workers in Those Subsectors



Roosevelt Institute

Source: Author's calculation of CPS BASIC

That petroleum and autoworking are the two most unionized sectors is part of the reason that climate activists and the Biden administration have tried to find win-win decarbonization solutions for labor unions and the climate. If, instead, climate policy becomes zero-sum, these unions and the CEOs they work for have enough power and will to become blockers of climate action.[52] This labor-forward approach appears to be paying some dividends: New research has shown that unionization rates in clean energy are now greater than in fossil energy, and higher than in the private sector as a whole.[53]

While unions once helped to explain the high wage premium for manufacturing workers, their smaller footprint means that they have less ability to help with wage setting today. The traditional (unionized) US auto industry, for instance, has seen job losses and declining shares of production, replaced by transplant companies from Germany, Japan, and South Korea that have worked with state and local governments to

[52] Matto Mildenberger, *Carbon Captured: How Business and Labor Control Climate Politics* (MIT Press, 2020).
[53] Note these categories do not exactly match the CPS data in Table 3. See DOE, *U.S. Energy & Employment Jobs Report (USEER) 2024* (Department of Energy, 2024), https://energy.gov/policy/us-energy-employment-jobs-report-useer; Vanessa Grisko and Betony Jones, *Tracking Trends in U.S. Energy Employment: A Supplement to U.S. Energy and Employment Report (USEER)* (Inclusive Economics, 2025), https://energyemployment.us/wp-content/uploads/2025/11/Tracking-Trends_Energy_Employment_11.25.25-1.pdf.

keep unions out of their operations.[54] The declining workforce share and institutional power of unions is one clear explanation for the observed fall in the wage premium. A Federal Reserve Board study argues that the effect of declining unionization accounts for 70 percent of the decline in the manufacturing wage premium, while capital intensity explains the majority of the premium for nonunion manufacturing workers.[55] Moreover, as economist Lawrence Mishel has noted, the benefits premium (including insurance and retirement benefits) has not fallen in manufacturing, and even grew over 1986–2017. This suggests that workers and their representatives have been trading some wage gains for benefit gains.[56]

Trade may also be driving a lot of the decrease in job quality in the manufacturing sector. One study showed that union density would be 81–98 percent higher in advanced countries than it was in 1963 had firms not reorganized their value chains to push goods production to less-developed countries.[57] Other studies have looked at how trade with low-wage nations allowed businesses to hold down wages for the economy as a whole, amounting to $2,000 in earnings losses for the average worker without a college degree.[58] This is consistent with standard trade theory, which predicts that relatively capital-rich countries like the United States would see other factors of production (that is, labor) lose income as trade expands with relatively labor-rich countries.[59]

These earnings impacts and job dislocations brought on by trade policy changes have also led to other negative impacts: One study found that the loss of 1,000 jobs due to trade was associated with a 2.7 percent increase in opioid-related deaths. When fentanyl was present in the heroin supply, the same number of job losses was associated with an 11.3 percent increase in opioid-related deaths.[60] A more recent study found that areas with average "import exposure" to Mexican competitors' products after NAFTA was signed in

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[54] Susan Helper and Todd N. Tucker, *Challenges and Opportunities for the North American Auto Industry in the 2026 USMCA Renegotiation*, USMCA Forward 2026 (Brookings Institution, 2026), https://www.brookings.edu/articles/challenges-and-opportunities-for-the-north-american-auto-industry-in-the-2026-usmca-renegotiation.

[55] Bayard et al., *Are Manufacturing Jobs Still Good Jobs?*

[56] He also notes that manufacturing has increasingly outsourced its labor needs to temporary staffing firms. See Lawrence Mishel, *Yes, Manufacturing Still Provides a Pay Advantage, but Staffing Firm Outsourcing Is Eroding It* (Economic Policy Institute, 2018), https://www.epi.org/publication/manufacturing-still-provides-a-pay-advantage-but-outsourcing-is-eroding-it.

[57] Matthew C. Mahutga et al., "Global Value Chains and Union Decline in Rich Democracies," *American Sociological Review* 90, no. 2 (2025): 195–225, https://doi.org/10.1177/00031224251315496.

[58] See discussion of research by Josh Bivens et al. in Lawrence Mishel and L. Josh Bivens, *Identifying the Policy Levers Generating Wage Suppression and Wage Inequality* (Economic Policy Institute, 2021), https://epi.org/unequalpower/publications/wage-suppression-inequality.

[59] Wolfgang F. Stolper and Paul A. Samuelson, "Protection and Real Wages," *The Review of Economic Studies* 9, no. 1 (1941): 58–73, https://doi.org/10.2307/2967638.

[60] Adam Dean and Simeon Kimmel, "Free Trade and Opioid Overdose Death in the United States," *SSM–Population Health* 8 (August 2019): 100409, https://doi.org/10.1016/j.ssmph.2019.100409.

1993 saw an increase in mortality of 0.68 percent—larger than the estimated welfare benefits of access to cheaper products under the trade deal.[61]

While the idea of "deaths of despair" connected to trade is often associated with white workers, other research has found particularly negative effects of deindustrialization on Black workers. Before 1990, Black and white people were equally likely to be employed in manufacturing. Black people lost proportionally more manufacturing jobs than whites, leading the racial wealth gap between Black and white men to widen by 12 percent.[62] Moreover, a 1 percent increase in trade exposure is associated with a 3.8 percent decline in Black wages in the exposed sector, and a 3.2 percent decline in the share of overall Black working-age employment (not just in the exposed manufacturing sector).[63]

c) Affordability and Consumer Considerations

How might manufacturing help consumers? First, through lower prices. Thanks to the increased productivity of domestic manufacturing (so that the same goods can be made at lower costs) and to the rising share of low-cost imports in Americans' consumption basket, the share of income dedicated to goods purchases had declined steadily over the postwar period, from 39 to 24 percent, as shown in Figure 9. The effect is particularly notable when comparing specific (quality-adjusted) prices, as shown in Figure 10.[64] The price of hospital services and tuition went up around 200 percent from 2000 to 2020, while the costs of television and toys (mostly imported) have gone down around 100 percent. While a flat-screen TV used to cost 17 percent of annual income, today it costs around 1 percent.[65]

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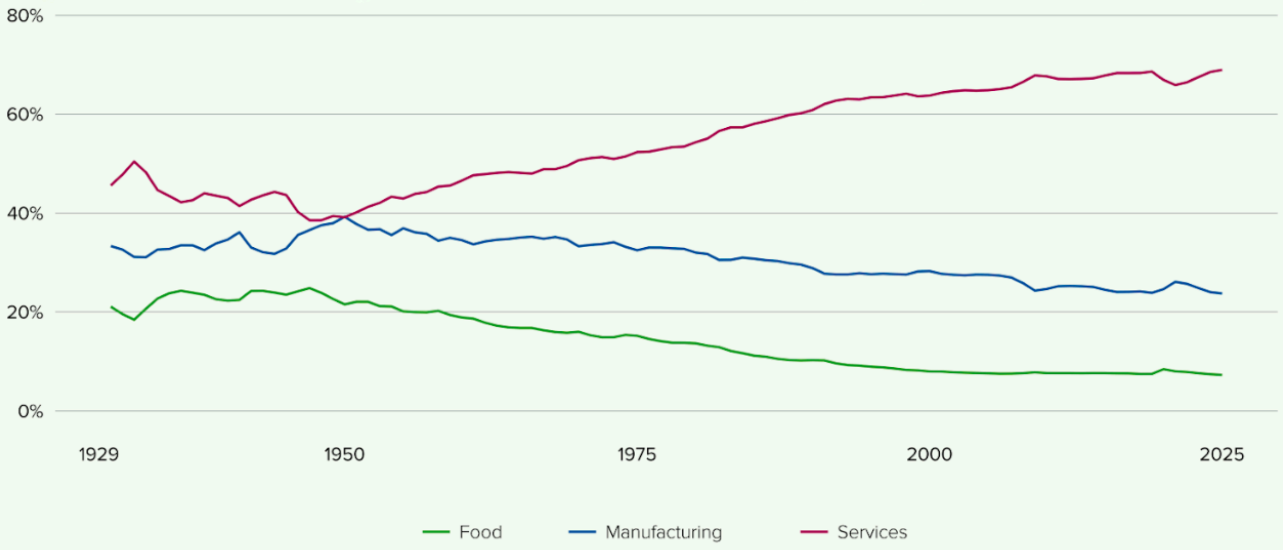
[61] Amy Finkelstein et al., "Trading Goods for Lives: NAFTA's Mortality Impacts and Implications," Working Paper No. 34855 (National Bureau of Economic Research, February 2026), https://doi.org/10.3386/w34855.
[62] Eric D. Gould, *The Impact of Manufacturing Employment Decline on Black and White Americans* (CEPR, 2018), https://cepr.org/voxeu/columns/impact-manufacturing-employment-decline-black-and-white-americans.
[63] For a summary of numerous studies, see Grace Western et al., *The Impact of Trade on Black Workers* (Groundwork Collaborative, 2021), https://groundworkcollaborative.org/news/new-research-from-groundwork-collaborative-shows-impact-of-trade-on-black-workers-economy.
[64] US Bureau of Labor Statistics, "Consumer Price Index: Quality Adjustment in the CPI," last modified August 11, 2025, https://www.bls.gov/cpi/quality-adjustment.
[65] Nick Routley, "Charted: Here's How US Goods and Services Have Changed in Price Since 2000," World Economic Forum, February 28, 2023, https://weforum.org/stories/2023/02/charted-heres-how-us-goods-and-services-have-changed-in-price-since-2000.

Figure 9: Manufacturing's Share of Personal Consumption Expenditures



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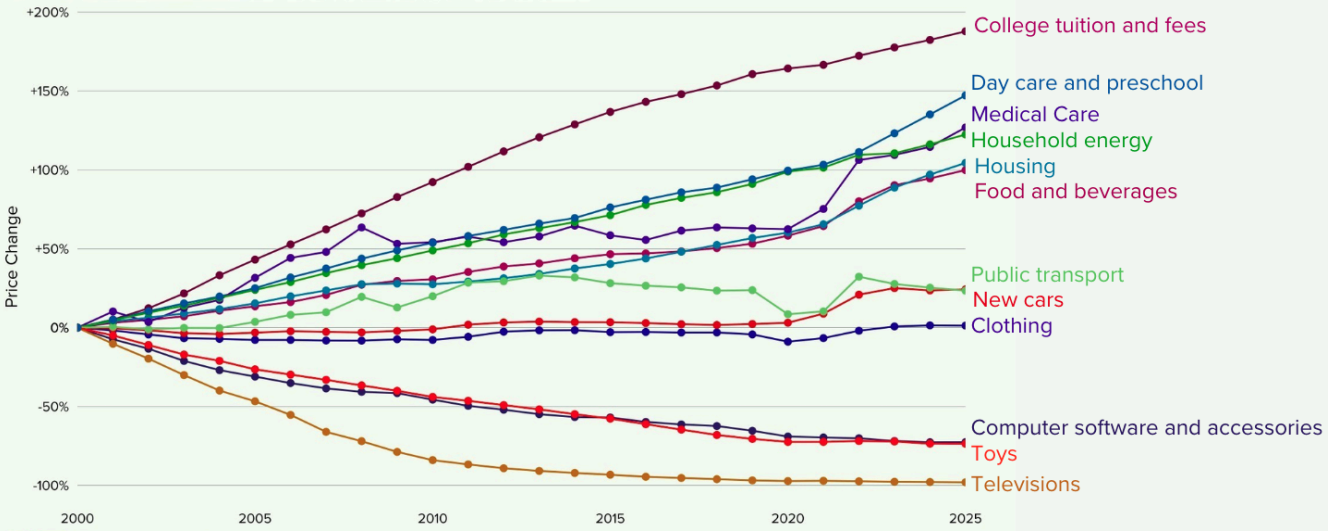
Source: BEA, NIPA, Personal Income and Outlays, Table 2.3.5.

Figure 10: Price Changes of Consumer Goods and Services Since January 2000

Broadly speaking, price levels have increased by 74% since 2000



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Source: Bureau of Labor Statistics

There is a lively debate about the degree to which globalization accounted for these declines in prices, versus other factors. Former Federal Reserve chair Alan Greenspan argued in 2005 that the entry of China and the former Soviet-bloc economies "into the world's free-market trading system has restrained the rise of unit labor costs in much of the world and, hence, has helped to contain inflation."[66] However, other Federal Reserve officials have argued that while import prices were 1.5 percentage points lower than core inflation during the 1990s and early 2000s, much of this was due to the strong dollar and technological change.[67]

But the effect of globalization on prices for US consumers can also go the other way, as when the reopening of economies after the COVID-19 pandemic battered supply chains, sending the prices of imports up 11 percent globally and nearly that domestically.[68] The US stood out in that its durable goods consumption accounted for a higher share of the observed inflation (about a third) than other countries, where services, energy, and food played larger roles.[69] Notably, it is estimated that the Trump administration's tariff wars were responsible for only 17 percent of inflation during his second term.[70] Thus, while lower goods prices can help Americans' bottom lines, too much dependence on foreign or single-source supplies can heighten exposure to price shocks of their own.

Finally, there are other costs to consumers from reducing domestic production. As manufacturing has shifted overseas, it is harder for government regulators to ensure the safety and quality of imported goods, as they have less capacity or jurisdiction to monitor conditions overseas than domestically.[71] Inspections of foreign-produced goods have declined dramatically as imports have surged, and those inspections that are conducted show a higher fail rate for goods produced in China and India than those produced in the US.[72] And American consumers' ability to engage in "self-help" and hold

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[66] Quoted in Chris Anstey, "The AI Boom Is Missing the Secret Sauce of the 1990s," Bloomberg.com, March 27, 2026, https://bloomberg.com/news/articles/2026-03-27/why-today-s-ai-boom-won-t-repeat-the-1990s-economy.

[67] Donald L. Kohn, *The Effects of Globalization on Inflation and the Implications for Monetary Policy* (Federal Reserve Bank of Boston, 2006), 341–49, https://bostonfed.org/-/media/Documents/conference/51/conf51i.pdf.

[68] Mary Amiti et al., "What Drives U.S. Import Price Inflation?," Working Paper 32133 (National Bureau of Economic Research, 2024), https://doi.org/10.3386/w32133.

[69] Bart Hobijn et al., *What Is Driving U.S. Inflation amid a Global Inflation Surge?*, Chicago Fed Letter No. 470 (Federal Reserve Bank of Chicago, 2022), https://chicagofed.org/publications/chicago-fed-letter/2022/470.

[70] Maximiliano A. Dvorkin et al., *How Tariffs Are Affecting Prices in 2025* (Federal Reserve Bank of St. Louis, 2025), https://stlouisfed.org/on-the-economy/2025/oct/how-tariffs-are-affecting-prices-2025; Michael S. Derby, "NY Fed Report Says Americans Pay for Almost All of Trump's Tariffs," United States, *Reuters*, February 12, 2026, https://reuters.com/world/us/ny-fed-report-says-americans-pay-almost-all-trumps-tariffs-2026-02-12.

[71] Cary Coglianese et al., *Import Safety: Regulatory Governance in the Global Economy* (University of Pennsylvania Press, 2011).

[72] George Kwiecinski and Kevin Yuan, "The Foreign Inspection Gap: FDA GMP Oversight of U.S. Drug Imports, 2014–2024," *Journal of Pharmaceutical Innovation* 21, no. 3 (2026): 240, https://doi.org/10.1007/s12247-026-10406-3.

foreign-based manufacturers responsible for unsafe or defective products through the tort system remains highly limited.[73]

d) GDP and Productivity

What drives growth in GDP? To classical economists like Adam Smith and David Ricardo, the economy consisted of labor, capital, and land, and economic growth was driven by the extension of the division of labor within and between countries.[74] To modern economists, the growth of national income is measured by the growth of its constituent parts: consumption, investment, government spending, and net exports. They singled out the rate of investment growth (as in the Harrod–Domar model) or the rate of technological progress (as in the Solow–Swan model) as being the most important factors in determining economic growth.[75] Note that these theories are essentially sector-agnostic: It does not matter whether the investment or technological changes are coming to agriculture, manufacturing, or services.

This sector neutrality troubled development economists, who observed that many countries that relied on agriculture stayed poor, while most countries that got richer appeared to rely more on manufacturing. In the mid-1960s, economist Nicholas Kaldor observed a series of tendencies related to manufacturing in advanced economies. These observations came to be known as Kaldor's laws:[76]

- First law: The faster the manufacturing output growth rate (or its excess over the nonmanufacturing output growth rate), the faster the overall economic output growth rate.
- Second law: Faster manufacturing output growth causes faster manufacturing productivity growth.
- Third law: The growth of manufacturing output is correlated with overall economic productivity growth.

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[73] Stephanie Glynn, "Toxic Toys and Dangerous Drywall: Holding Foreign Manufacturers Liable for Defective Products—The Fund Concept," *Emory International Law Review* 26 (2012): 317.
[74] Donald J. Harris, "Classical Growth Model," in *The New Palgrave Dictionary of Economics*, ed. Steven N. Durlauf and Lawrence E. Blume (Palgrave Macmillan, London, 2008), https://doi.org/10.1057/978-1-349-95121-5_3037-2.
[75] Harald Hagemann, "Solow's 1956 Contribution in the Context of the Harrod-Domar Model," *History of Political Economy* 41, Suppl. 1 (2009): 67–87.
[76] Nicholas Kaldor, *Causes of the Slow Rate of Economic Growth of the United Kingdom; an Inaugural Lecture*, in *Causes of the Slow Rate of Economic Growth of the United Kingdom* (Cambridge University Press, 1966); Nicholas Kaldor, *Strategic Factors in Economic Development* (New York State School of Industrial and Labor Relations, Cornell University, 1967); A. P. Thirlwall, "A Plain Man's Guide to Kaldor's Growth Laws," *Journal of Post Keynesian Economics* 5, no. 3 (1983): 345–58.

These laws came at a time when the UK's economic growth was slowing, and commentators and policymakers routinely blamed labor union militancy, the tendency of young people to study humanities, or government interference with prices. Kaldor was dissatisfied with such explanations: He believed that the UK had suffered "premature maturity," or what contemporary scholars call "premature deindustrialization"—essentially, that the UK had not wrung all the benefits it could have with a longer-lasting manufacturing sector.[77]

The theory behind the laws is the following. While neoclassical growth theory generally assumed that all economic activities have diminishing returns to scale in the short run and constant returns to scale in the long run, Kaldor observed that manufacturing had increased returns to scale and higher labor productivity, while agriculture and services had diminishing returns to scale and lower labor productivity. In agriculture, if you double the amount of labor or capital spent to cultivate a given square foot of land, you will not get twice the output: There are limits to how many potatoes that space can grow. Similarly, in services, there are physical limits to how much quicker massage therapists or barbers could deliver a massage or a haircut—nor would many customers want them to try. As the economist Ha-Joon Chang has quipped, if a string quartet trots through a 27-minute piece in 9 minutes, we will not say that its productivity has tripled.[78]

In contrast, in manufacturing, there are increasing returns to scale, meaning that doubling the amount of labor or capital inputs can *more* than double the output. Processes are straightforward to automate, and as a factory gets bigger, the possibilities for ever-increased specialization of tasks are almost limitless. As a result, manufacturing is seen as the "engine of growth" for the economy as a whole (first law), and the bigger manufacturing gets, the better it gets (second law). Finally, a bigger and better manufacturing sector makes for a better agriculture and services sector, as it transforms the structure of the economy, makes nations richer, encourages learning-by-doing and denser linkages with the rest of the economy, and absorbs surplus labor from agriculture, thus making the latter sector more efficient (third law). (For more on these multiplier effects, skip to Section 3g.)

While Kaldor formulated his laws using a limited sample of countries and years, more recent and sophisticated research has continued to support his observations. According to the UN Industrial Development Organization, two-thirds of growth episodes in the last 50 years were driven by manufacturing. Manufacturing-led episodes last longer than those driven by other sectors, and are more likely to lead to permanent increases in income and lower growth volatility.[79]

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[77] Nelson Marconi et al., "Manufacturing and Economic Development: The Actuality of Kaldor's First and Second Laws," *Structural Change and Economic Dynamics* 37 (June 2016): 75–89, https://doi.org/10.1016/j.strueco.2015.12.002.
[78] Ha-Joon Chang, *Economics: The User's Guide* (Bloomsbury Press, 2014), 257.
[79] Alejandro Lavopa and Federico Riccio, *Manufacturing-Led Growth: Driving and Sustaining Economies*, Policy Brief Series, Insights on Industrial Development (United Nations Industrial Development

Recent literature also supports Kaldor's argument that labor productivity is endogenous to the growth process, showing that demand shocks from increased government spending or trade generate positive effects on labor productivity.[80] Recently, researchers using novel empirical techniques have been able to examine the workings of this process across all Organisation for Economic Co-operation and Development (OECD) countries, finding that that the relationship continues to hold—most prominently for countries with large manufacturing sectors and manufacturing sectors that contribute to a high export share of GDP.[81]

Manufacturing continues to play an important role in advanced economies. While there may be a downward U shape when it comes to the manufacturing employment share as today's rich countries developed (as shown in Figure 4 in Section 3a), Figure 11a shows that there is a slight upward (i.e., normal) U shape when it comes to the share of manufacturing value added in GDP. This is driven in part by countries like Japan and Germany, where manufacturing is almost twice as important as in the US and UK as a share of the economy, as shown in Figure 11b.[82] This does not mean that manufacturing is unimportant to the US in aggregate terms. In fact, as Figure 11c shows, the overall US manufacturing footprint—at $2.5 trillion—is nearly three times larger than Japan and Germany's.

Organization, 2024), https://unido.org/sites/default/files/unido-publications/2024-11/IID%20Policy%20Brief%2015%20-%20Manufacturing-led%20growth.pdf.

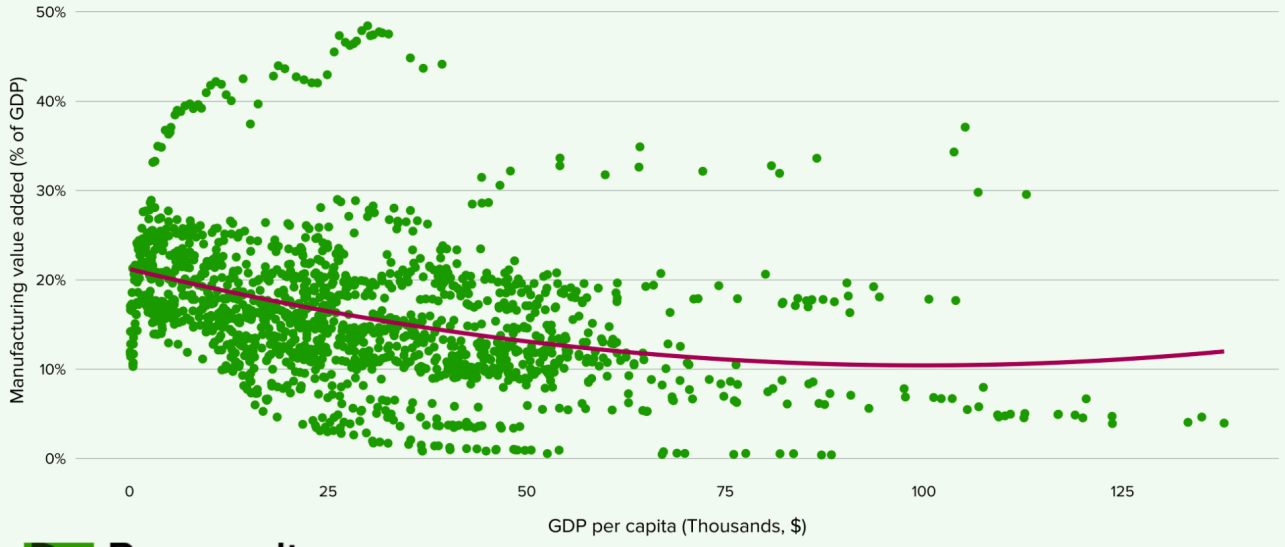
[80] Matteo Deleidi et al., "Autonomous Demand and Technical Change: Exploring the Kaldor–Verdoorn Law on a Global Level," *Economia Politica* 40, no. 1 (2023): 57–80, https://doi.org/10.1007/s40888-023-00294-y.

[81] Walter Paternesi Meloni, "Okun vs. Verdoorn: Distinguishing between Cyclical and Structural Effects of Output on Productivity," *Economia Politica* 41, no. 2 (2024): 295–325, https://doi.org/10.1007/s40888-024-00334-1.

[82] Ireland also has a large manufacturing sector, though some of this is due to firms' tax avoidance strategies. See Brad Setser, *The Luck of the Irish* (Council on Foreign Relations, 2026), https://www.cfr.org/articles/the-luck-of-the-irish.

Figure 11a: Income Level versus Manufacturing Value Added Share of GDP

Advanced Economies, 1960—2024



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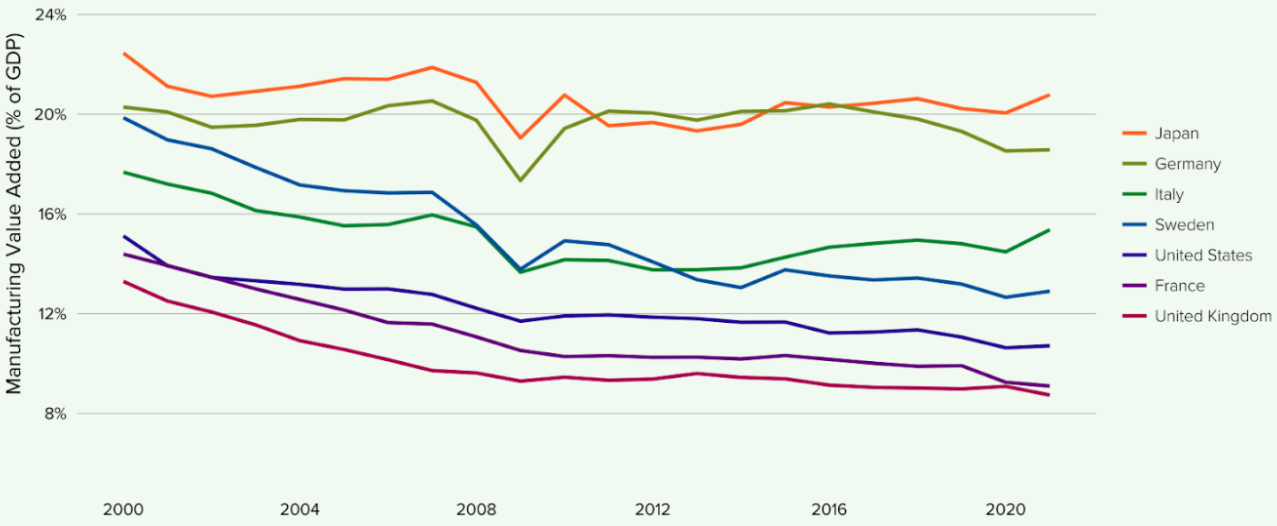
Source: Author's calculations based on World Bank Group Series NY.GDP.PCAP.CD and NV.IND.MANF.ZS

Figure 11b: Manufacturing Share of GDP, 2000–2021

Select OECD Countries



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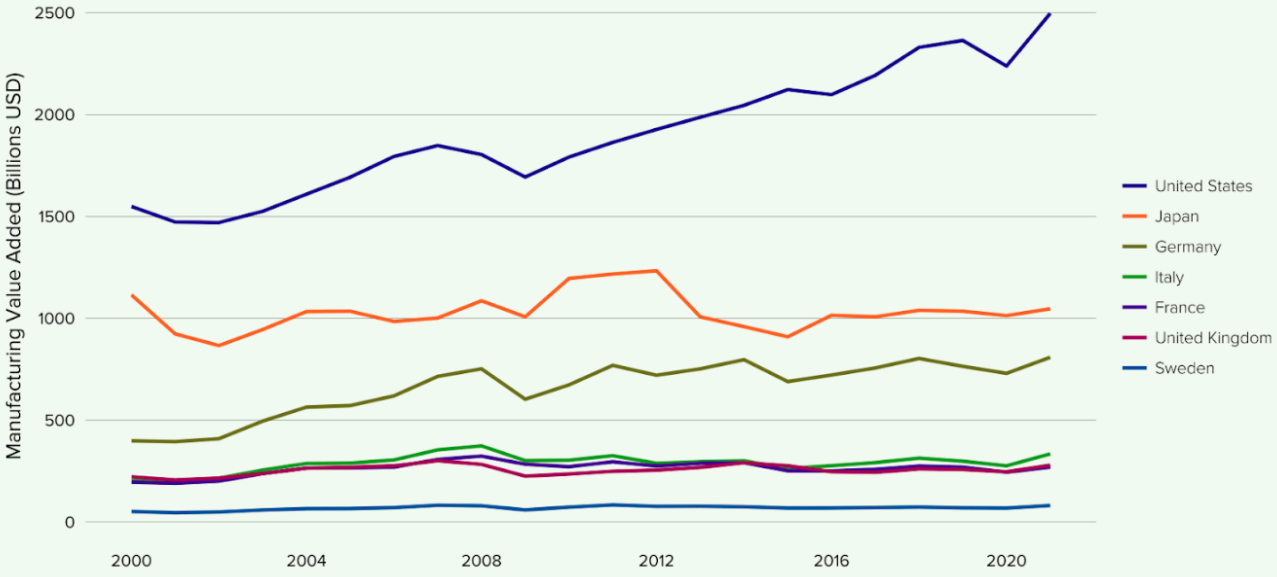
Source: Author's calculations based on World Bank Group Series NV.IND.MANF.ZS

Figure 11c: Manufacturing Value Added in Dollar Amounts, Select OECD Countries, 2000–2021
Select OECD Countries



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Source: Author's calculations based on World Bank Group Series NV.IND.MANF.ZS

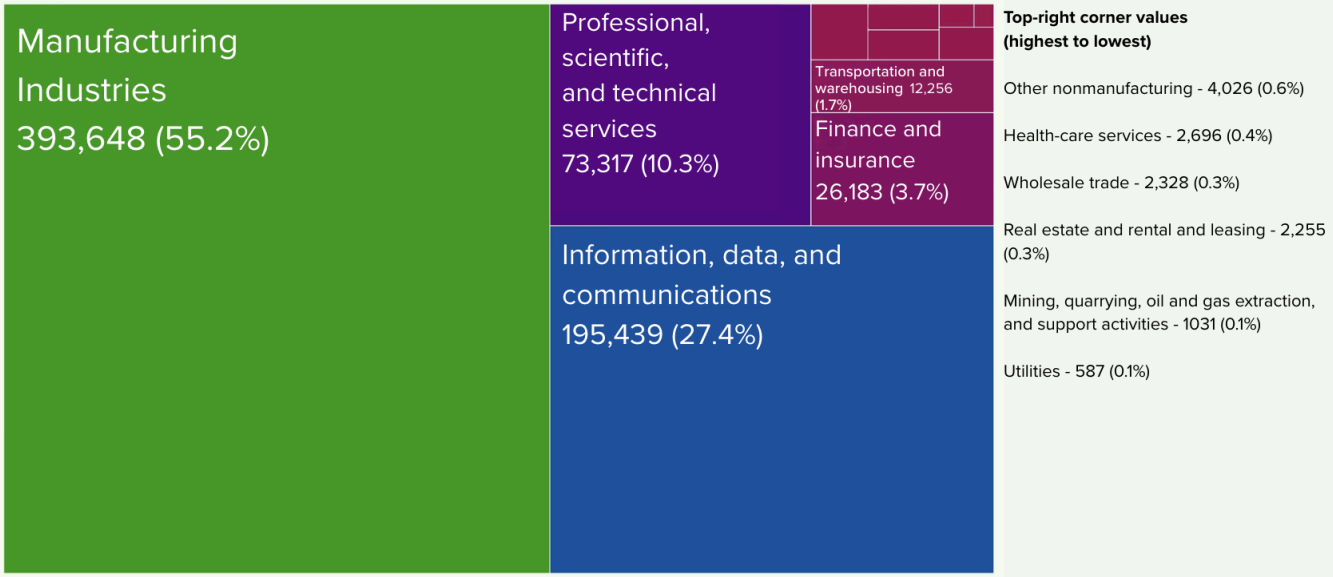
e) Innovation

Manufacturing also punches above its weight when it comes to measures of innovation. At the peak of manufacturing employment in the late 1970s, manufacturing accounted for 91 percent of patents and 99 percent of R&D. This preeminence has since declined due to import penetration's negative effects on firm revenues. But the manufacturing sector still accounts for two-thirds of R&D expenditure and corporate patent filings. Manufacturing firms also account for more than half of total domestic R&D spending and are the largest single sector for R&D spending (as shown in Figure 12).[83]

[83] David Autor et al., "Foreign Competition and Domestic Innovation: Evidence from US Patents," *American Economic Review: Insights* 2, no. 3 (2020): 357–74, https://doi.org/10.1257/aeri.20180481.

Figure 12: Domestic R&D Paid for by the Company and Others and Performed by the Company, 2023

Millions of $



Roosevelt Institute

Source: National Science Foundation, National Center for Science and Engineering Statistics, Business Enterprise Research and Development (BERD) Survey 2023, Table 12

Furthermore, firms that once engaged in manufacturing continue to innovate at higher rates than those that never did, and firms that still colocate their manufacturing and innovation functions domestically innovate more than those that do not. Indeed, firms that colocate these functions five or fewer miles apart innovate more than those where functions are further apart.[84]

An additional metric of innovation comes from firm-based surveys, based on the set of international guidelines provided by the OECD Oslo Manual. These surveys document whether firms have introduced new product or process innovations. As can be seen in Table 3, manufacturing firms rank in the top three industries, measured as the share of firms within each industry reporting new innovations. These surveys can provide a more direct measure of change to products or production processes than either patents or R&D spending.[85] However, they have weaknesses as well, given their basis in self-reporting. Furthermore, this survey information alone does not specify the significance or scale of any reported innovation.

[84] Teresa C. Fort et al., "Colocation of Production and Innovation: Evidence from the United States," Working Paper, 2020, https://sompks4.github.io/public/cl_82.pdf.
[85] Nizar Becheikh, Réjean Landry, Nabil Amara, "Lessons from Innovation Empirical Studies in the Manufacturing Sector: A Systematic Review of the Literature from 1993–2003," *Technovation* 26, Issues 5–6 (2006): 644-664, https://doi.org/10.1016/j.technovation.2005.06.016.

Table 3. Product and Process Innovations by Industry

Industry	Number of Companies Introducing Product or Process Innovation	Percent of Industry Total
Educational services	21,227.04	36
Information	20,808.83	31.7
Manufacturing industries	57,519.87	27.8
Professional, scientific, and technical services	188,362.02	26.2
Accommodation and food services	121,410.91	25.7
Retail trade	137,123.22	25.3
Health care and social assistance	132,480.36	24.8
Transportation and warehousing	44,053.94	24.5
Wholesale trade	56,000.02	23.7
Arts, entertainment, and recreation	20,854.89	22.1
Finance and insurance	44,228.80	22
Utilities	680.87	21.9
Administrative and support and waste management and remediation services	61,911.84	20.7
Other services	69,816.21	19.7
Management of companies and enterprises	406.98	16.7
Real estate and rental and leasing	46,950.74	16.4
Other real estate and rental and leasing	46,681.78	16.4
Construction	102,626.37	15.8
Mining, extraction, and support activities	1,634.88	12
Agriculture, forestry, fishing, and hunting	2,134.90	11.7

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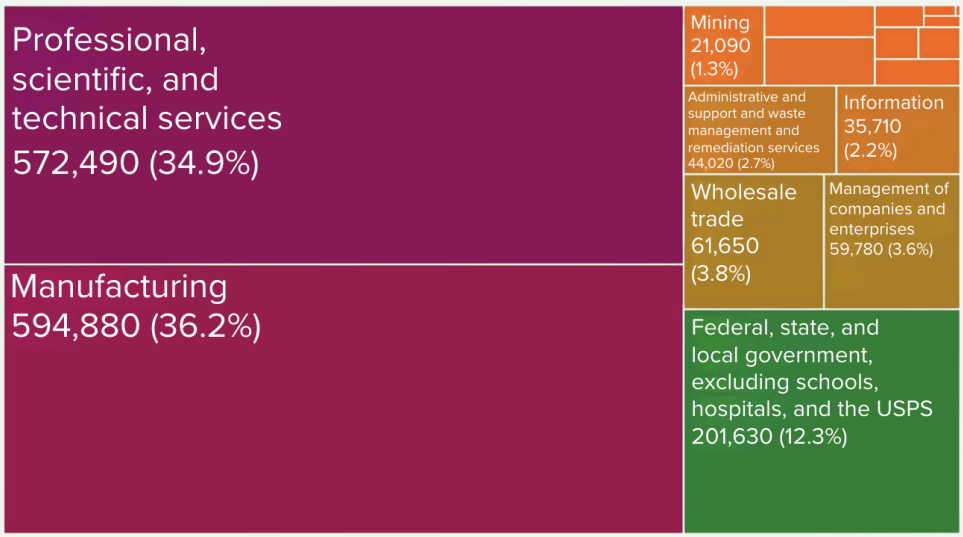
Source: NSF, NCSES, Annual Business Survey, Table 30, 2023.

Finally, the manufacturing industry employs a larger number of engineers than any other industry, as can be seen in Figure 13. Engineers are associated with innovation because they are often the employees responsible for designing new products, turning ideas into designs, creating new processes, and identifying areas for cost savings.[86] Together, these contributions result in observable improvements in productivity.[87]

Figure 13: Employment of Engineers by Industry, 2024



Top-right corner values (highest to lowest)

Transportation and warehousing - 17,360 (1.1%)

Educational services - 11,390 (0.7%)

Other services (except federal, state, and local) - 7,340 (0.5%)

Health care and social assistance - 4,520 (0.3%)

Real estate and rental and leasing - 4,330 (0.3%)

Finance and insurance - 3,460 (0.2%)

Retail trade - 1,350 (0.1%)

Arts, entertainment, and recreation - 1,080 (0.1%)

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Source: US BLS, Occupational Employment and Wage Statistics, May 2024

[86] Susan Helper and Jennifer Kuan, "What Goes On Under the Hood? How Engineers Innovate in the Automotive Supply Chain," Working Paper No. 22552 (National Bureau of Economic Research, 2016), https://doi.org/10.3386/w22552.

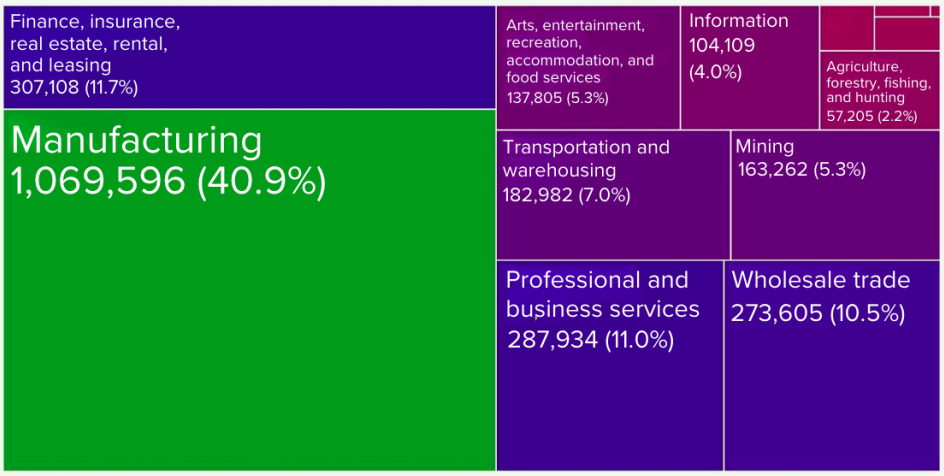
[87] Erling Barth, James C. Davis, Richard B. Freeman, and Andrew J. Wang, "The Effects of Scientists and Engineers on Productivity and Earnings at the Establishment Where They Work," Working Paper 23484 (National Bureau of Economic Research, 2017), https://doi.org/10.3386/w23484.

f) Exports

Despite China's impressive rise, the US is still the number-two manufacturing nation and exporter—far ahead of the number-three nation, Japan. As Figure 14 shows, manufacturing remains the US's predominant source of exports in value-added terms—worth over a trillion dollars. While historically manufacturing's outsized share of exports could be attributed at least in part to the fact that services remained by nature less tradable, technological changes are making services easier to trade.[88] Given that trend, it is striking that exports are still mostly focused on goods.

Figure 14: Trade in Value Added by Industry, 2023

Millions of $



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US BEA Trade in Value Added (TIVA) by Industry. For methodology of TIVA see Chute et al. "Trade in Value Added: Uses and Applications," BEA Survey of Current Business, 2023.

g) Multiplier Effects on Other Sectors

These patterns are observed globally. According to the UN Industrial Development Organization, while 12 percent of workers in advanced economies work in manufacturing, 21.7 percent of all workers indirectly depend on manufacturing because they work in industries that supply output to manufacturing's final demand. In advanced economies, as shown in Figure 15, every 1 job in manufacturing supports an additional 0.8 jobs domestically, and a further 1.5 jobs internationally—for a total of 2.3. That is four times the comparable number for the service sector, which is lower than even agriculture.[89]

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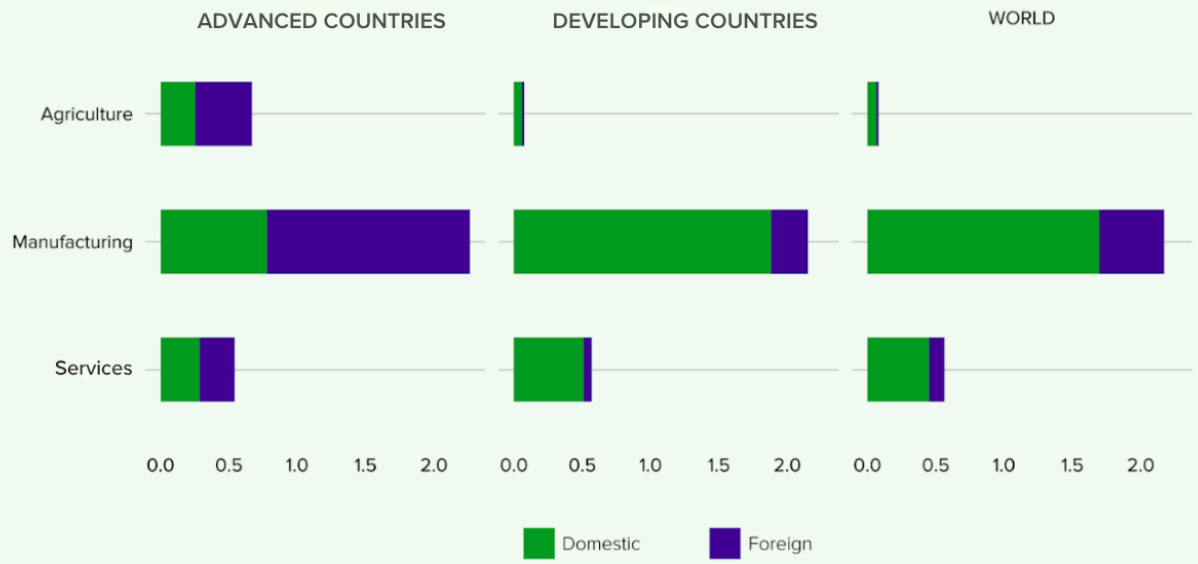
[88] Richard Baldwin, "Globotics and Macroeconomics: Globalisation and Automation of the Service Sector," Working Paper 30317 (National Bureau of Economic Research, 2022), https://doi.org/10.3386/w30317.
[89]Alejandro Lavopa and Federico Riccio, "The Multiplier Effect of Industrial Jobs," Policy Brief Series, Insights on Industrial Development (UN Industrial Development Organization, 2025),

Figure 15: Mapping Employment Multipliers by Industry
Additional indirect jobs created for every new direct job



Roosevelt Institute

Source: Author's Calculations based on raw data from Lavopa and Riccio,The multiplier effect of industrial jobs (2025).

Interlinkages in supply chains are a major reason to care about particular manufacturing industries. Some industries—say steel since the first Industrial Revolution, or semiconductors since the third—are *upstream* suppliers to nearly every other industry. Steel (NAICS 3311–3312) is used in thousands of products,[90] and the value of steel incorporated into other goods is traded almost as much as raw steel itself.[91] Chips (NAICS 334413) are the steel of the 21st century, used in everything from phones to cars to refrigerators, with 40 percent of manufacturing using chips as an input.[92] Upstream-ness attracts the attention of policymakers, because their constituents who work in other parts of the economy can be furloughed if they do not have access to necessary inputs. For example, during the Harry S. Truman administration, labor-management disputes in steel meant that the defense industry was at risk (as were

https://unido.org/sites/default/files/unido-publications/2025-03/IID%20Policy%20Brief%2018%20-%20Multiplier%20effect%20of%20industrial%20jobs.pdf.

[90] National Minerals Information Center, "Iron and Steel Statistics and Information," US Geological Survey, https://www.usgs.gov/centers/national-minerals-information-center/iron-and-steel-statistics-and-information.

[91] Brian Taylor, "Worldsteel Finds Growth in 'Indirect' Steel Trade This Decade," *Recycling Today*, August 7, 2025, https://www.recyclingtoday.com/news/steel-appliances-automotive-global-trade-rising-worldsteel-study.

[92] Fernando Leibovici and Jason Dunn, "Supply Chain Bottlenecks and Inflation: The Role of Semiconductors," Economic Synopses no. 28 (Federal Reserve Bank of St. Louis, 2021), https://doi.org/10.20955/es.2021.28.

others), leading the Truman administration to temporarily nationalize the industry.[93] During the COVID-19 pandemic, there was a shortage in chips, knocking a percentage point off the GDP and fueling one-third of that period's inflation. In response, the Biden administration launched investigations and task forces to better coordinate suppliers and demanders in the private sector, ultimately passing the CHIPS Act to bring all five leading global chip companies back to the US (which had once been the center of chip production but had fallen to around 10 percent).[94] China appears to have beat the high-cost curse of nuclear energy by "indigenizing" the upstream supply chains that industry relies on.[95] Scholarship has confirmed that policymakers with imperfect information (i.e., all of them) can make efficient industrial policy interventions by simply subsidizing those upstream sectors that the rest of the economy relies on.[96]

Downstream industries are also important. The Department of Commerce, for example, has found that the offshoring of downstream producers of low- and high-end electronics contributed to the offshoring of upstream chips.[97]

Take the auto industry (NAICS code 3361–3363), which is a voracious consumer of inputs from other industries. Globally, the auto industry procures 12 percent of all steel (including 26 percent of US steel), 13 percent of all semiconductors, and 75 percent of all lithium-ion batteries.[98] The steel, chips, and batteries industries—and their workforces—are thus invested in the health of the auto industry.

These supply chain dynamics have informed advocates' attempts to decarbonize the US steel industry, which have focused on securing pledges from major auto manufacturers to buy only zero-carbon steel. The environmental campaign group Industrious Labs estimates that this could result in a 30 to 50 percent reduction in automakers'

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[93] Maeva Marcus, *Truman and the Steel Seizure: The Limits of Presidential Power* (Columbia University Press, 1979).
[94] Sameera Fazili, "Industrial Policy + Macroeconomic Policy," in *Industrial Policy Synergies: Reflections from Biden Administration Alumni*, ed. Todd N. Tucker (Roosevelt Institute, 2023), https://rooseveltinstitute.org/publications/industrial-policy-synergies-reflections-from-biden-administration-alumni; US Commerce Department, "Two Years Later: Funding from CHIPS and Science Act Creating Quality Jobs, Growing Local Economies, and Bringing Semiconductor Manufacturing Back to America," August 9, 2024, https://commerce.gov/news/blog/2024/08/two-years-later-funding-chips-and-science-act-creating-quality-jobs-growing-local.
[95] Shangwei Liu, "Can China Break Nuclear Power's Cost Curse—and What Can the US Learn?," Roosevelt Institute, September 17, 2025, https://rooseveltinstitute.org/blog/can-china-break-nuclear-powers-cost-curse.
[96] See discussion of work by Ernest Liu and others on the idea of "distortion centrality" in Réka Juhász et al., "The New Economics of Industrial Policy," *Annual Review of Economics* 16 (August 2024): 233, https://doi.org/10.1146/annurev-economics-081023-024638.
[97] Departments of Commerce and Homeland Security, *Assessment of the Critical Supply Chains Supporting the U.S. Information and Communications Technology Industry* (2022), https://commerce.gov/sites/default/files/2022-02/Assessment-Critical-Supply-Chains-Supporting-US-ICT-Industry.pdf.
[98] Susan Helper et al., *America's Retreat in EVs: Economic Security, Prosperity, and the Industrial Future* (Technology, Competitiveness, and Industrial Policy Center, 2025).

embodied emissions (a measure of supply chain carbon), while adding less than a percentage point to the final consumer's purchase price.[99] If successful, these efforts could have a major impact on markets: Automaking is the second-largest steel-purchasing industry in the United States, behind only construction. Another estimated 18 percent of US steel is purchased for construction for federal use or federal contracts, and many government entities have committed to "Buy Clean."[100] Thus if the small number of automakers in the US made the same commitment, half of the US steel market could be green steel.

[99] Ariana Criste, "Climate, Industry Organizations Launch 'Race to Green Steel' to Help Automakers Procure Low-Emission Steel," press release, Industrious Labs, February 14, 2024, https://industriouslabs.org/archive/press-release-climate-industry-organizations-launch-race-to-green-steel-to-help-automakers.

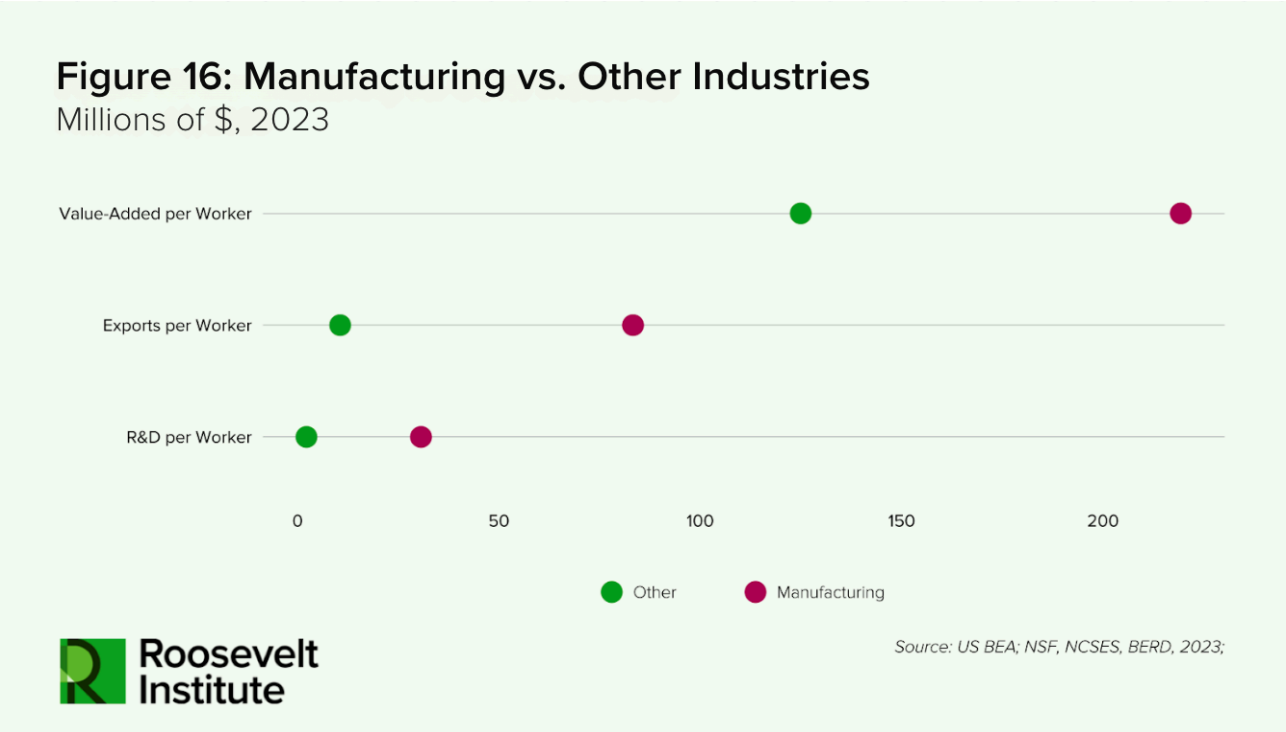
[100] Christopher D. Watson, *Domestic Steel Manufacturing: Overview and Prospects*, no. R47107 (Congressional Research Service, 2022), https://congress.gov/crs-product/R47107; Ali Hasanbeigi et al., *Federal Buy Clean for Cement and Steel* (Global Efficiency Analysis, 2021), https://globalefficiencyintel.com/federal-buy-clean-for-cement-and-steel.

4. Discussion: Five Reasons to Be Bullish on US Manufacturing

Despite the challenges the sector faces, there are reasons to believe manufacturing will continue to matter.

First, manufacturing continues to punch above its weight.

While 9 in 10 workers in the economy work in services, manufacturing contributes more on a per-job basis to value added (76 percent greater), exports (688 percent greater), and R&D spending (1,288 percent greater). These statistics are shown in Figure 16, which summarizes the findings of Section 3.



Second, past and current US national security and economic security strategy relies on and supports the domestic manufacturing base, and vice versa.

Key manufacturing industries like steel, shipbuilding, and semiconductors emerged as a result of demand by government for national defense purposes: Military planners have an initial demand for warfighting or technological capacities, which functions as a type of infant industry policy. New firms emerge to supply that demand, which can over time either stay close to the military as part of what President Dwight D. Eisenhower called

the military-industrial complex, or increasingly see their interests in supplying their goods to private markets. Often, military planners themselves are keen on having robust private markets for the goods they demand, so as to ensure that the firms they rely on for defense purposes remain profitable and that capabilities remain onshore. If domestic factories exist and are run by owners that are willing (or able to be coerced), these facilities can be repurposed into meeting national needs, whether that is car companies making tanks for the Roosevelt administration during World War II, or textile companies converting to making PPE during the COVID-19 crisis.[101]

This intertwining between public/defense and private/profit is reflected in national law. For instance, the Trade Expansion Act of 1962 allows trade restrictions to be instituted to protect domestic industries vital for national security—even when they're not currently being used for national defense. It instructs the president to:

> in the light of the requirements of national security and without excluding other relevant factors, give consideration to domestic production needed for projected national defense requirements, the capacity of domestic industries to meet such requirements, existing and anticipated availabilities of the human resources, products, raw materials, and other supplies and services essential to the national defense, the requirements of growth of such industries and such supplies and services including the investment, exploration, and development necessary to assure such growth, and the importation of goods in terms of their quantities, availabilities, character, and use as those affect such industries and the capacity of the United States to meet national security requirements. [He] *shall further recognize the close relation of the economic welfare of the Nation to our national security*, and shall take into consideration the impact of foreign competition on the economic welfare of individual domestic industries; and any substantial unemployment, decrease in revenues of government, loss of skills or investment, or other serious effects resulting from the displacement of any domestic products by excessive imports shall be considered, without excluding other factors, in determining whether such weakening of our internal economy may impair the national security.[102] (emphasis added)

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[101] The literature on these dynamics is extensive. For useful starting points, see Paul A. C. Koistinen, *Beating Plowshares Into Swords: The Political Economy of American Warfare, 1606-1865* (University Press of Kansas, 1996) (and its four follow-up volumes); Linda Weiss, *America Inc.?: Innovation and Enterprise in the National Security State* (Cornell University Press, 2014); Mark R. Wilson, *Destructive Creation: American Business and the Winning of World War II* (University of Pennsylvania Press, 2016); Thomas Heinrich, *Warship Builders: An Industrial History of U.S. Naval Shipbuilding, 1922-1945* (Naval Institute Press, 2020); Rana Foroohar, *Homecoming: The Path to Prosperity in a Post-Global World* (Crown, 2022).

[102] 19 U.S. Code § 1862(d). For an application of this authority to the green steel industry, see Todd N. Tucker and Timothy Meyer, *A Green Steel Deal: Toward Pro-Jobs, Pro-Climate Transatlantic Cooperation on Carbon Border Measures*, Working Paper (Roosevelt Institute, 2021), https://rooseveltinstitute.org/publications/a-green-steel-deal-towards-pro-jobs-pro-climate-trans-atlantic-cooperation-on-carbon-border-measure.

A similarly expansive definition of "national defense" is included in the Defense Production Act, which in addition to tending to immediate defense needs, also instructs the executive branch to maximize the domestic supply of convention and renewable energy—for both defense and civilian purposes.[103]

And yet, the defense industrial base has faced several notable changes during the neoliberal period. The US defense industrial base has lost 40 percent of its small-business suppliers in recent decades, following the so-called "Last Supper" during the Clinton administration, where the Secretary of Defense called on military contractors to contract and consolidate—mirroring concentration patterns in the private sector.[104] Employment levels have also declined among defense contractors, tracking trends in the rest of manufacturing. Unionization rates used to actually be higher in defense contractors than in manufacturing overall, but are now lower at some major contractors than manufacturing as a whole.[105] A Biden administration supply chain report by the Defense Department bemoaned that 86 percent of manufacturers surveyed by the military earn less than 10 percent of their profits from defense purposes, while private capital wants higher and quicker returns than US manufacturing provides today—leading to further offshoring risk.[106]

Adding are the challenges now posed by what historian Daniel Immerwahr has called Trump's regime change nihilism.[107] The US and Israel's unprovoked attack on Iran has led to an apparently unplanned-for escalation that has led to the latter's closure of the Strait of Hormuz. This has now strained a key global chokepoint for all sorts of manufactured, mined, and agricultural products, including aluminum, urea, and potash. The US has limited domestic capacity to produce these products, but they are increasingly the focus of industrial policy planning.[108] The rapid depletion of munition

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[103] See Joel Dodge and Todd N. Tucker, *Trump Wields Defense Production Act to Promote Fossil Fuels. It Could Instead Be Used to Promote All-of-the-Above Energy Abundance.* (Roosevelt Institute, 2026), https://rooseveltinstitute.org/publications/trump-wields-defense-production-act-to-promote-fossil-fuels.
[104] Farooq Mitha, "Small Businesses Are Key to National Defense," *The Hill*, February 7, 2023, https://thehill.com/opinion/congress-blog/3847967-small-businesses-are-key-to-national-defense; Jonathan Chang and Meghna Chakrabarti, "*The Last Supper*": *How a 1993 Pentagon Dinner Reshaped the Defense Industry*, (Boston), March 1, 2023, https://www.wbur.org/onpoint/2023/03/01/the-last-supper-how-a-1993-pentagon-dinner-reshaped-the-defense-industry.
[105] Taylor Barnes, *Labor of the US Military-Industrial Complex* (Transition Security Project, 2026), https://transitionsecurity.org/labor-of-the-us-military-industrial-complex.
[106] DOD, *Securing Defense-Critical Supply Chains* (Department of Defense, 2022), https://media.defense.gov/2022/feb/24/2002944158/-1/-1/1/dod-eo-14017-report-securing-defense-critical-supply-chains.pdf, at 62.
[107] Daniel Immerwahr, "What's Behind Trump's New World Disorder?," Annals of War, *The New Yorker*, March 16, 2026, https://www.newyorker.com/magazine/2026/03/23/whats-behind-trumps-new-world-disorder.
[108] Joana Colussi and Michael Langemeier, "Middle East Conflict Revives Concerns Over Fertilizer Dependence in the U.S. and Brazil," *Farmdoc Daily* 16, no. 68 (2026), https://farmdocdaily.illinois.edu/2026/04/middle-east-conflict-revives-concerns-over-fertilizer-dependence-in-the-u-s-and-brazil.html; Kailyn Rhone, "It's Not Just Oil. The Iran War Is Disrupting Many Essential Goods.," Business, the *New*

stocks—mirroring a similar depletion during Russia's war on Ukraine—is leading some military analysts to raise concern that US military capacity would be strained moving forward, particularly in the event of a US-China war for dominance in the Asia-Pacific region.[109] If such a war were to take place, it is estimated that it would cost over $10 trillion in damages to the global economy, eclipsing the cost of the 2009 financial crisis and COVID-19 and leading to interruptions to half of the global container fleet for goods trade.[110] This in turn comes on top of growing concern over disparities in production levels of all manner of military and nonmilitary production between the US and China, including a 230-1 disparity in shipbuilding capacity.[111]

While it is beyond the scope of this report to resolve these thorny geopolitical questions, it's clear that against this backdrop, policymakers are pouring money into the defense industrial base: Currently, this administration is pushing for a 40 percent increase in the defense budget for FY 2027,[112] a dramatic acceleration of an already upward trend in federal military spending.[113] The enacted defense budget for FY 2026 was more than $1 trillion.[114] Between 2020 and 2024, private-sector defense spending surged by an estimated $440 billion,[115] and the 2026 National Defense Authorization Act aims to plow tens of billions into domestic shipbuilding, munitions manufacturing, and other defense industrial base projects.[116] In April 2026, a large bipartisan, bicameral,

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York Times, March 10, 2026, https://www.nytimes.com/2026/03/10/business/iran-war-impact-helium-urea-sulfur.html; Ryan Dezember, "How Oklahoma Landed America's First Aluminum Smelter in Half a Century," Business, *Wall Street Journal*, April 12, 2026, https://www.wsj.com/business/how-oklahoma-landed-americas-first-aluminum-smelter-in-half-a-century-e00c83d3.

[109] Seth G. Jones, *Empty Bins in a Wartime Environment: The Challenge to the U.S. Defense Industrial Base* (Center for Strategic and International Studies, 2023), https://csis.org/analysis/empty-bins-wartime-environment-challenge -us-defense-industrial-base; Eric Schmitt and Jonathan Swan," Iran War Has Drained U.S. Supplies of Critical, Costly Weapons," *The New York Times*, April 23, 2026. https://www.nytimes.com/2026/04/23/us/politics/iran-war-cost-military.html; Grant Newsham, "Does Iran War Make a China Attack on Taiwan More Likely?," *Asia Times*, March 5, 2026, https://asiatimes.com/2026/03/iran-war-make-a-china-attack-on-taiwan-more-likely.

[110] Jennifer Welch and Maeva Cousin, "The $10 Trillion Fight: Modeling a US-China War Over Taiwan," *Bloomberg*, February 10, 2026, https://www.bloomberg.com/news/articles/2026-02-10/the-10-trillion-fight-modeling-a-us-china-war-over-taiwan.

[111] Seth G. Jones and Alexander Palmer, China Outpacing U.S. Defense Industrial Base (Center for Strategic and International Studies, 2024), https://csis.org/analysis/china-outpacing-us-defense-industrial-bas;

[112] Tony Romm, "White House Seeks $1.5 Trillion for Defense in New Budget Request," *New York Times*, April 3, 2026, https://www.nytimes.com/2026/04/03/us/politics/white-house-defense-budget.html.

[113] US Bureau of Economic Analysis, Federal Government: National Defense Consumption Expenditures and Gross Investment [FDEFX], retrieved from FRED, Federal Reserve Bank of St. Louis; https://fred.stlouisfed.org/series/FDEFX, April 27, 2026.

[114] US Department of War, FY 2027 Budget Request Overview Book, p. 8, https://comptroller.war.gov/Portals/45/Documents/defbudget/FY2027/FY2027_Budget_Request_Overview_Book.pdf#page=8

[115] Sam Moyer, *Mobilizing Private Capital for Defense* (NDIA Emerging Technologies Institute, 2026), https://emergingtechnologiesinstitute.org/-/media/ndia-eti/reports/mobilizing-capital-for-defense/mobilizingcapitalreport_2026_final.pdf?download=1.

[116] Nathan Owens, "What Trump's $901B Defense Law Means for Manufacturing," *Manufacturing Dive*, December 19, 2025,

labor-management coalition was announced to launch a full-scale industrial policy to rebuild US shipbuilding.[117] While debates rage about whether such spending levels reflect the correct national priorities,[118] it is clear that US policymakers are increasingly putting skin in the game of preserving US manufacturing for defense purposes.

Third, addressing the climate crisis means moving toward primarily manufactured (rather than primarily mined) energy.

The United Nations estimates that countries globally need to be spending $4–6 trillion a year to mitigate and adapt to climate change.[119] By some estimates, China is producing the majority of current world demand for clean energy.[120] However, ceding production in this market to China would carry several risks. First, that degree of reliance on a single source would entail a level of monopolization far in excess of OPEC's over the petroleum market—close to 100 percent in a single country for some subsectors for the former, compared to around 40 percent spread across a dozen countries in the latter.[121] To be sure, the mechanics of clean energy versus fossil fuels are different: An existing stock of solar panels can continue to function even if US–China trade is cut off for a period of time, while an oil embargo can bring the economy to a halt. Nonetheless, China is already showing that it can weaponize its stock and pricing power over clean-energy minerals to create major shockwaves in the global economy.[122] These actions confirm the desirability of a de-monopolization strategy with distributed energy production around the world.

Moreover, the economics of clean energy will eventually become irresistibly preferable over fossil fuel production. By some measures, renewables are already the cheapest form of energy—with solar and onshore wind undercutting fossil fuels by 41 and 53

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https://manufacturingdive.com/news/trumps-901b-defense-law-manufacturing-shipbuilding-CRMN-DIB/808443.

[117] Mike Schuler, "'We Need to Get This Done': Lawmakers, Labor and Industry Renew Push for SHIPS for America Act," *gCaptain*, April 23, 2026, https://gcaptain.com/we-need-to-get-this-done-lawmakers-labor-and-industry-renew-push-for-ships-for-america-act.

[118] See e.g. Oliver Milman, "Cost of the War in Iran Is Outweighing the Budget of Several Government Agencies in the US," *The Guardian*, March 18, 2026, https://www.theguardian.com/us-news/2026/mar/18/us-spending-iran-war-priorities .

[119] UNFCCC, *Sharm El-Sheikh Implementation Plan* (United Nations Climate Change, 2022), https://unfccc.int/documents/624444.

[120] Brad Setser, *Will China Take Over the Global Auto Industry?* (Council on Foreign Relations, 2024), https://cfr.org/articles/will-china-take-over-global-auto-industry; Brad Setser, *China's Massive Surplus Is Everywhere (Yet The IMF Still Has Trouble Seeing It Clearly)* (Council on Foreign Relations, 2025), https://cfr.org/articles/chinas-massive-surplus-everywhere-yet-imf-still-has-trouble-seeing-it-clearly.

[121] US Energy Information and Analysis, "What Drives Crude Oil Prices: Supply OPEC," https://www.eia.gov/finance/markets/crudeoil/supply-opec.php.

[122] Trevor Sutton and Evelyne Williams, *How China's New Trade Assertiveness Is Linked to Its Clean Energy Dominance* (Center on Global Energy Policy at Columbia University, 2025), https://energypolicy.columbia.edu/how-chinas-new-trade-assertiveness-is-linked-to-its-clean-energy-dominance.

percent, respectively.[123] Countries and companies are racing to make other forms of clean energy cost-competitive. The US's unprovoked war in Iran has led to oil prices spiking, but countries that use more clean energy have been relatively spared. This will push more countries to expand clean energy consumption.[124] Thus, even as the US backtracks on climate action under the Trump administration, the world will not. According to some estimates, by the 2030s, relatively high-cost fossil fuel producers like the US and Canada will be priced out of global energy markets, while relatively low-cost fossil fuel producers like OPEC will expand their share of the remaining demand for fossil fuels. Even if the US were to maintain or expand fossil fuel consumption at home (as Trump appears to want to do), it would not make up for the decline in export revenues. US fossil fuel revenues could drop by 40 percent, and exports by 65 percent.[125] This could lead to an unplanned and unmanaged transition out of fossil fuels, putting key US jobs and regions at risk.

It would be far preferable to get out ahead of that juncture and plan for clean energy manufacturing and service-sector jobs better than policymakers handled the opening to global markets over the neoliberal period. Indeed, for manufacturers, this transition holds a lot of promise. According to the UN Industrial Development Organization, manufacturing generates the majority of "green patents" globally.[126] What would planning a transition require? As research for the French government has shown, reaching net zero by 2050 will require that 80 percent of total energy supply be provided by nuclear, hydropower, solar, wind, and other renewables—which for many countries will involve investments of over 2 percent of GDP per year. Clean energy requires a lot of machines and a lot of factories, with high up-front capital costs but eventually lower operating costs than fossil fuels. This study also estimated the number of electric vehicles, heat pumps, and other products that will need to be brought online to meet intermediate climate targets.[127]

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[123] *91% of New Renewable Projects Now Cheaper Than Fossil Fuels Alternatives* (International Renewable Energy Agency, 2025), https://www.irena.org/News/pressreleases/2025/Jul/91-Percent-of-New-Renewable-Projects-Now-Cheaper-Than-Fossil-Fuels-Alternatives. But, see Brett Christophers, *The Price Is Wrong* (Verso, 2024).

[124] Dharna Noor, "What Does the Iran War Mean for Clean Energy Transition?," Environment, *The Guardian*, March 26, 2026, https://theguardian.com/environment/2026/mar/26/iran-war-clean-energy-transition.

[125] Jean-Francois Mercure et al., "Reframing Incentives for Climate Policy Action," *Nature Energy* 6, no. 12 (2021): 1133–43, https://doi.org/10.1038/s41560-021-00934-2.

[126] Alejandro Lavopa and Maria de las Mercedes Menendez, *Who Is At the Forefront of the Green Technology Frontier? Again, It's the Manufacturing Sector*, Policy Brief Series, Insights on Industrial Development (UN Industrial Development Organization, 2023), https://unido.org/sites/default/files/unido-publications/2023-10/IID%20Policy%20Brief%206.pdf.

[127] Jean Pisani-Ferry and Selma Mahfouz, *The Economic Implications of Climate Action: A Report to the French Prime Minister* (France Stratégie, 2023), https://piie.com/sites/default/files/2023-11/2023-11-08-pisani.pdf; Jean Pisani-Ferry, *The Transition to Carbon Neutrality: An Unusual Type of Structural Reform* (Peterson Institute for International Economics, 2024), https://piie.com/commentary/speeches-papers/2024/transition-carbon-neutrality-unusual-type-structural-reform.

This complements the work of the "Draghi report"—named for its author, Mario Draghi, the former European Central Bank chief and Italian prime minister—which categorizes industries into four cases: where Europe cannot catch up, where Europe could catch up, where Europe should try to maintain a technology and production edge, and where Europe should maintain a production (but not technology) edge.[128] Having quantitative targets in mind for each industrial sector allows national, subnational, and private leaders to make plans for what production will happen where. After 2029, US policymakers will need to learn from these planning experiences,[129] and ensure that their investments are visible, durable, and executed as speedily as possible.[130]

Fourth, changes in technology may make manufacturing work relatively more attractive.

Innovations like advanced or "additive manufacturing," also called 3D printing, are intended not necessarily to replace workers but to tailor production to meet customer-specific needs. 3D printers can be used, for instance, to create a customized prosthetic limb for an amputee within hours of diagnosis.[131] In a first step, workers create a digital model of the desired product, and then supervise as the "printer" creates a series of very thin layers of plastic, textiles, steel, or other materials until the product is fully formed—typically without the need for molds or final assembly. They can be entered directly into markets without the need to retain excess inventories. An increase of 1 percent in the additive manufacturing patent stock (a proxy for the spread of the process) actually increases the demand for labor by 0.065 percent—rather than displacing labor as historical technology changes did. By saving on capital costs, 3D printing reduces the scale of operations needed and the importance of international wage disparities, leading to possibilities to reshore work and distribute it around the country.[132]

Another study found that while traditional manufacturing divides labor tasks into "high-skilled" work that requires high levels of training and discretion, and "low-skilled" work that is routine (and thus automatable and low pay), additive manufacturing converts the would-be assembly line workers into designers and experimenters,

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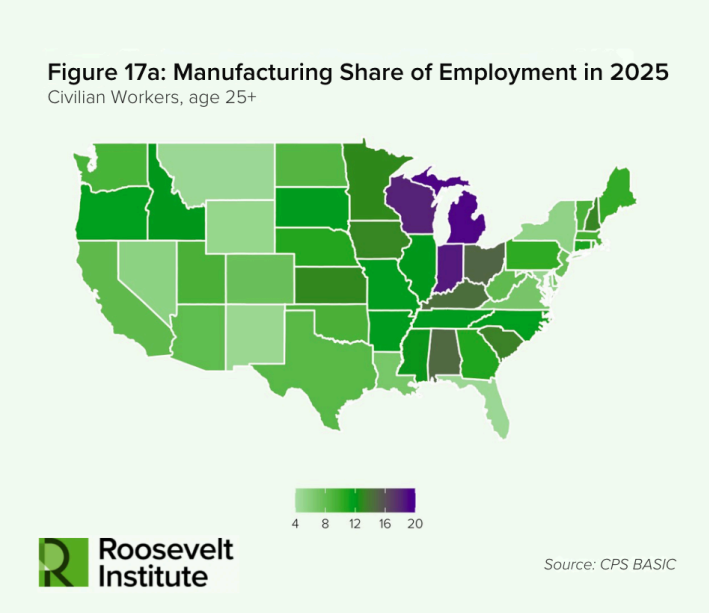
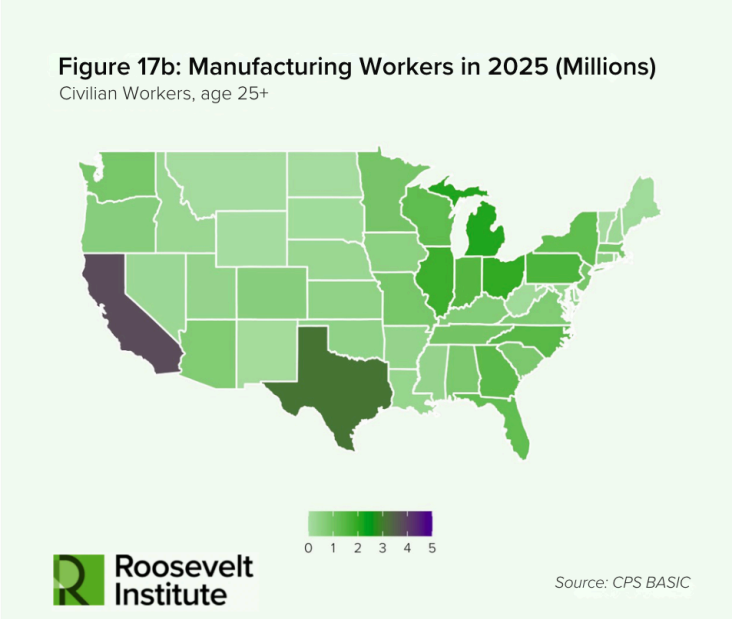
[128] Mario Draghi, *The Future of European Competitiveness: A Competitiveness Strategy for Europe* ("*The Draghi Report*") (European Commission, 2024), https://commission.europa.eu/topics/strengthening-european-competitiveness/eu-competitiveness-looking-ahead_en.
[129] Todd N. Tucker, *Building Up in 2029: How To Make Green Statecraft Durable* (Roosevelt Institute, forthcoming).
[130] For the importance of the traceability of these efforts, see Alexander F. Gazmararian et al., "Why Biden-Era Clean Energy Investment Policies Had Limited Political Returns," *Proceedings of the National Academy of Sciences* 123, no. 9 (2026): e2526802123, https://doi.org/10.1073/pnas.2526802123.
[131] Jacob Williamson-Rea, "Reducing Prosthesis Fitting Time through Additive Manufacturing," Manufacturing PA Innovation Program, August 16, 2022, https://manufacturingpa.org/news/2022/08/rmu-union-orthotics.html.
[132] Giulia Felice et al., "The Employment Implications of Additive Manufacturing," *Industry and Innovation* 29, no. 3 (2022): 333–66, https://doi.org/10.1080/13662716.2021.1967730.

executing more nonroutine, bespoke tasks. While "high-skilled" engineers also gain skills relative to traditional manufacturing, the relative upskilling effect is highest for the previously "low-skilled" operators.[133]

Finally, even as manufacturing employment declines overall, there are some areas where the sector remains important in employment terms.

As Figure 17a shows, several states, including Michigan, Wisconsin, and Ohio, have more than 10 percent of their workers in manufacturing. While these states have long been associated with their manufacturing sectors, Figure 17b shows that in numeric terms, California and Texas are actually the nation's leading industrial centers. If manufacturing continues to matter to places (especially such politically relevant ones), it will continue to matter for policy.





[133] Avner Ben-Ner et al., "Effects of New Technologies on Work: The Case of Additive Manufacturing," *ILR Review* 76, no. 2 (2023): 255–89, https://doi.org/10.1177/00197939221134271. For more on the labor impact of advanced manufacturing more broadly, see Susan Helper et al., "Who Profits from Industry 4.0? Theory and Evidence from the Automotive Industry," SSRN Scholarly Paper no. 3377771 (Social Science Research Network, January 31, 2019), https://doi.org/10.2139/ssrn.3377771; Susan Helper et al., *Factories of the Future: Technology, Skills, and Digital Innovation at Large Manufacturing Firms*, Research Brief no. 19 (MIT, 2021); John Liu and William B. Bonvillian, "The Technologist," *Issues in Science and Technology*, February 5, 2024, https://issues.org/technologist-advanced-manufacturing-workforce-liu-bonvillian.

5. Conclusion

Policymakers cannot afford to be "sector agnostic," or what we've called manufacturing doomers. While services will continue to provide the lion's share of employment in the United States and other economies, manufacturing will provide the backbone of innovation, energy, and national economic security. Losing the productive backbone of a country's economy can put it on a lower innovation pathway.[134] While computing innovations unmoored production, allowing work to be offshored to low-wage destinations far away from the financial cores of the global economy,[135] geopolitical tensions will require technology stacks to be not only designed but also produced closer to home and in trusted countries. Moreover, goods production exhibits economies of scale and has other features that allow it to remain affordable, unlike services, which are often difficult to milk significant savings out of.[136] And while financialized capital has tended to require double-digit returns on investment over a short time period, making many manufacturing projects unbankable relative to services,[137] innovative industrial policy tools like publicly owned or operated sovereign wealth funds and development banks can make the world safe for projects with a mere 5 percent return and decades-long timelines (or even, in some cases, lower or no return).[138] However, as economist Susan Helper recently noted in testimony to Congress, there are reasons to think that the robotics revolution could help boost returns to capital and opportunities for labor in manufacturing. Smart policymaking can help manufacturers become more productive and familiar with potential customers, make products that society needs and values, and overcome decades of domestic decline.[139] The returns to the rest of society from a strong manufacturing sector are worth continued policymaker attention and creativity.

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[134] David H. Autor et al., "Foreign Competition and Domestic Innovation: Evidence from US Patents," *American Economic Review: Insights* 2, no. 3 (2020): 357–74, https://doi.org/10.1257/aeri.20180481.

[135] Ilias Alami and Adam D. Dixon, *The Spectre of State Capitalism*, Critical Frontiers of Theory, Research, and Policy in International Development Studies (Oxford University Press, 2024), https://doi.org/10.1093/9780198925224.001.0001.

[136] Zachary D. Carter, "What If We're Thinking About Inflation All Wrong?," *New Yorker*, June 6, 2023, https://newyorker.com/news/persons-of-interest/what-if-were-thinking-about-inflation-all-wrong; Steven Teles et al., *Cost Disease Socialism: How Subsidizing Costs While Restricting Supply Drives America's Fiscal Imbalance* (Niskanen Center, 2021), https://niskanencenter.org/wp-content/uploads/2021/09/Cost-Disease-Socialism.pdf.

[137] David Adler, "Financing Advanced Manufacturing: Why VCs Aren't the Answer," *American Affairs Journal*, May 20, 2019, https://americanaffairsjournal.org/2019/05/financing-advanced-manufacturing-why-vcs-arent-the-answer; Rana Foroohar, *Makers and Takers: The Rise of Finance and the Fall of American Business* (Crown Business, 2016).

[138] Saule T. Omarova, "Finance as a Tool of Industrial Policy: A Taxonomy of Institutional Options," in *Industrial Policy 2025: Bringing the State Back In (Again)*, ed. Todd N. Tucker (Roosevelt Institute, 2024), https://rooseveltinstitute.org/publications/industrial-policy-2025.

[139] Susan Helper, *Robots Made in America: Advancing U.S. Leadership in Manufacturing and Automation*, Testimony (U.S. House of Representatives Committee on Science, Space, and Technology, 2026), 129–38, https://doi.org/10.2308/0148-4184.42.1.129.

Appendix

Table A-1 is an alternative take on Table 1, but instead of gross output, it looks at value added. Value added represents the portion of output that reflects new production, calculated by subtracting intermediate inputs from gross output. In this case, intermediate inputs refers to the goods and services used within an industry's production process, rather than for final consumption. Subtracting the cost of these inputs avoids "double counting," since their value is already included in the output of the industries that produced them.[140] By still another measure, real value-added share of real GDP, manufacturing has remained at around 12 percent from 1947 to 2015, and was at 10 percent as of 2024.[141]

Table A-1. Employment and Value Added by Sector, 2023

Industry by Employment	Employment (thousands)	Industry by Value Added	Value Added (Billions)
Educational services, health care, and social assistance	25,494	Finance, insurance, real estate, rental, and leasing	$5,883.50
Government	25,064	Professional and business services	$3,609.90
Professional and business services	22,757	Government	$3,098.70
Arts, entertainment, recreation, accommodation, and food services	16,587	Manufacturing	$2,816.50
Retail trade	15,830	Educational services, health care, and social assistance	$2,360.10
Manufacturing	12,842	Retail trade	$1,779.60
Finance, insurance, real estate, rental, and leasing	9,199	Wholesale trade	$1,652.80
Construction	8,133	Information	$1,491.30
Other services, except government	7,108	Construction	$1,224.60
Transportation and warehousing	6,670	Arts, entertainment, recreation, accommodation, and food services	$1,219.50
Wholesale trade	6,136	Transportation and warehousing	$946.10
Information	2,986	Other services, except government	$589.20
Agriculture, forestry, fishing, and hunting	1,406	Utilities	$457.80
Mining	584	Mining	$411.80
Utilities	576	Agriculture, forestry, fishing, and hunting	$270.40

Roosevelt Institute

Source: US BEA National Accounts, GDP and Personal Income, "Value-Added by Industry" and "Gross Output by Industry"

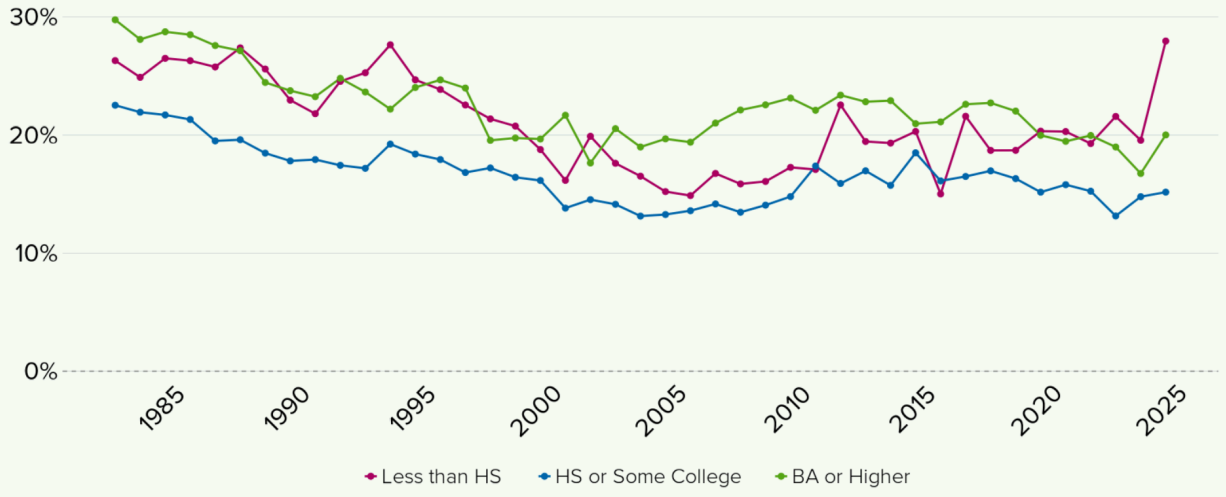
[140] See US Bureau of Economic Accounts (BEA), "Historical Industry Accounts Data: GDPbyInd_VA_SIC," last modified June 13, 2025, https://bea.gov/industry/historical-industry-accounts-data; US BEA, "Industries," last modified February 24, 2021, https://bea.gov/resources/learning-center/what-to-know-industries.

[141] Author's calculations; US Bureau of Economic Analysis, "Real Value Added by Industry as a Percentage of Gross Domestic Product," accessed Monday, March 16, 2026; YiLi Chien and Paul Morris, *Is US Manufacturing Really Declining?* (Federal Reserve Bank of St. Louis, 2017), https://stlouisfed.org/on-the-economy/2017/april/us-manufacturing-really-declining.

Figures A1 and A2 report the manufacturing earnings premium using weekly pay rather than hourly wages, as done in Figures 5a and 5b in Section 3b. The weekly pay manufacturing premium is notably higher. This is largely due to differences in hours worked between manufacturing and nonmanufacturing work. Given this variation, hourly wages are the more comparable figure. However, weekly pay is more reflective of the actual earnings workers receive, while also reflecting the greater rigidity and scheduling demands of manufacturing work.

Figure A1: Manufacturing Weekly Pay Premium by Education Group

Controlling for sex, race, age, union coverage, and state fixed effects

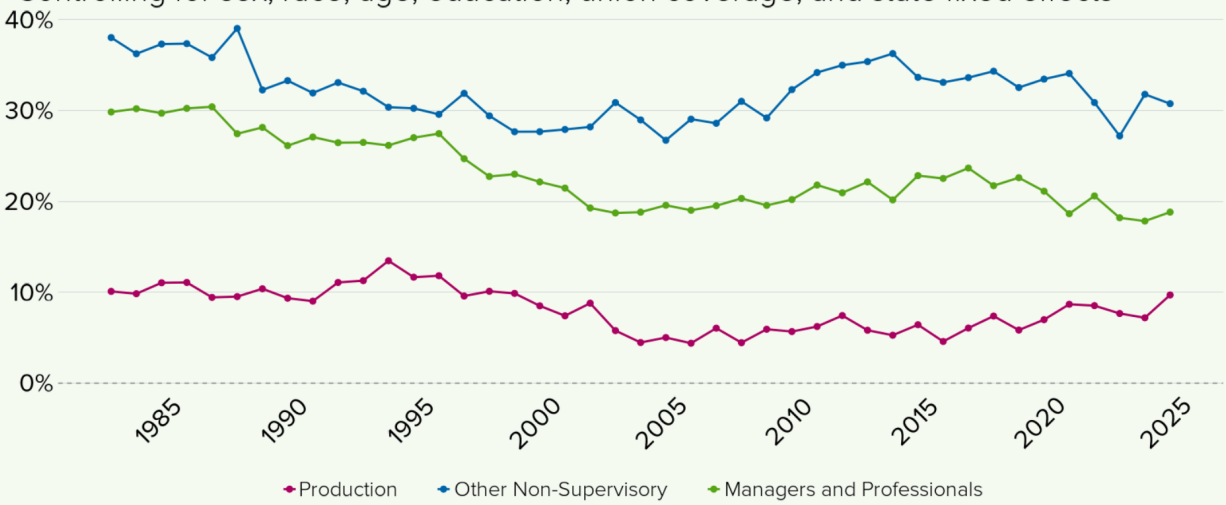


Roosevelt Institute

Source: Author's calculations based on Economic Policy Institute. 2026. Current Population Survey Extracts (Outgoing Rotation Group)

Figure A2: Manufacturing Weekly Pay Premium by Occupation Group

Controlling for sex, race, age, education, union coverage, and state fixed effects



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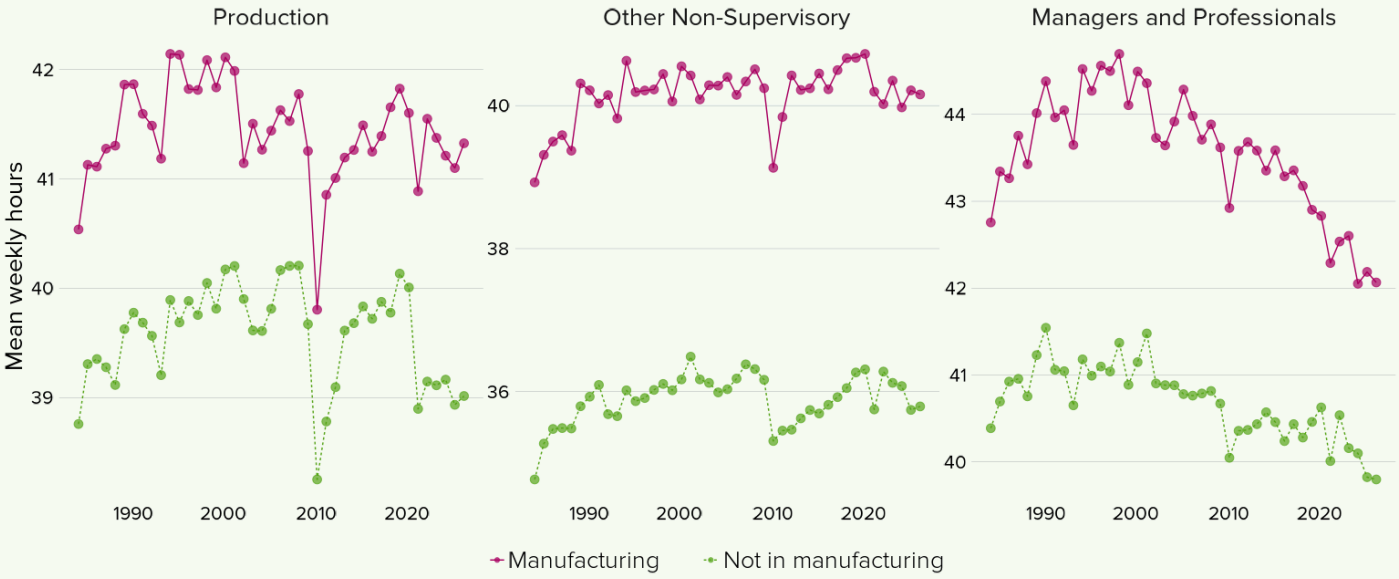
Source: Author's calculations based on Economic Policy Institute, 2026, Current Population Survey Extracts (Outgoing Rotation Group)

Figure A3 shows differences in hours worked between manufacturing and nonmanufacturing work across the different occupation groups used in Figure 5b and A2. As can be seen, workers in manufacturing consistently report higher hours worked, with production workers consistently reporting over 40 hours a week. Notably, following the COVID-19 pandemic, reported hours worked for nonmanufacturing workers dropped and have since failed to recover.

Figure A3. Mean weekly hours worked

By Occupation and Sector



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Source: Author's calculations based on Economic Policy Institute, 2026, Current Population Survey Extracts (Outgoing Rotation Group)

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