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The Economic Impact of Arizona's Manufacturing Sector

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About the Authors



Glenn Farley is CSI Arizona's Director of Policy & Research. Before joining CSI in 2022, Glenn worked in the Office of the Arizona Governor, most recently as Gov. Doug Ducey's Chief Economist and a policy advisor. In that role he advised on issues of tax, fiscal, and regulatory policy, and was one of the Governor's lead architects of his two major tax reforms – including the 2021 income tax omnibus which phased in a 2.50% flat tax (the lowest in the country). Glenn also led the budget team that produced the Executive revenue forecasts and caseload spending numbers that have helped ensure the longest run of structurally balanced budgets in State history. Glenn has a Master's Degree in Economics from Arizona State University's WP Carey College of Business, as well as a B.S. from Arizona State University. He was born and raised in Arizona where he now lives with his wife and two daughters.



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ABOUT COMMON SENSE INSTITUTE

Common Sense Institute is a non-partisan research organization dedicated to the protection and promotion of Arizona's economy. CSI is at the forefront of important discussions concerning the future of free enterprise and aims to have an impact on the issues that matter most to Arizonans. CSI's mission is to examine the fiscal impacts of policies, initiatives, and proposed laws so that Arizonans are educated and informed on issues impacting their lives. CSI employs rigorous research techniques and dynamic modeling to evaluate the potential impact of these measures on the Arizona economy and individual opportunity.

Teams & Fellows Statement

CSI is committed to independent, in-depth research that examines the impacts of policies, initiatives, and proposed laws so that Arizonans are educated and informed on issues impacting their lives. CSI's commitment to institutional independence is rooted in the individual independence of our researchers, economists, and fellows. At the core of CSI's mission is a belief in the power of the free enterprise system. Our work explores ideas that protect and promote jobs and the economy, and the CSI team and fellows take part in this pursuit with academic freedom. Our team's work is informed by data-driven research and evidence. The views and opinions of fellows do not reflect the institutional views of CSI. CSI operates independently of any political party and does not take positions.

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Summary & Key Findings

The manufacturing sector has been one of the fastest growing parts of the Arizona economy over the past decade. In March, manufacturers **added** 2,000 jobs in Arizona (1st in the country), even as the overall labor market shrank. The manufacturing sector has for decades been a focus of public policy and public investment, but despite these efforts, the story of American manufacturing since the late 1970's has been one of slow decline – at least in terms of employment and at least relative to the rest of the world. However, since 2017, the state and to some extent the country have been undergoing something of a 'manufacturing renaissance'. This new story, by the numbers:

- **3.6%:** Average annual manufacturing job growth since 2017. For perspective, manufacturing job growth over the 6-years prior was just 1.5%, and overall Arizona annual job growth since 2017 was 2.3%.
- **\$77.6 billion:** Direct sales and output by Arizona's manufacturers in 2022 – up nearly 40% since 2017.
- **633,565:** Number of people directly and indirectly employed by Arizona's manufacturing sector, or 16% of the state's total workforce. This is particularly remarkable given the sector directly employs about 6% of the workforce.
- **19.4%:** Share of Arizona's economy directly and indirectly attributable to its manufacturing sector.
- **\$5.8 billion:** Combined state and local revenue collections in 2022 that CSI estimates were attributable to the state's manufacturing sector.

About the Manufacturing Sector

At approximately 9% of Arizona's Gross Domestic Product and 6% of total employment, the manufacturing sector today is relatively small and – it might at first seem – it receives a disproportionate amount of policy concern and attention. However, considered historically, the story becomes much more complicated. And this story begins with the United States.

In the U.S., manufacturing employment peaked at nearly 20 million workers in 1979. The sector then began a long, slow decline – falling about 30% to an all-time low (excluding the pandemic disruptions) of about 11.5 million workers by 2010. This trend was marked by two periods of marked deceleration, first in the early 2000's and then again during the Great Recession period.

Much debate and academic study has been devoted to the question of why American manufacturing – after achieving global dominance by the late 1950's – began to decline after the 1970's and why this decline seemed insurmountable. However, a consensus has emerged laying the blame a combination of public policy failures and oligopolistic behaviors that limited competition and innovation. For example, a 2014 economic policy paper for the Minneapolis Fed cited “the Rust Belt's ability to block competition and create monopolies” by “lobby[ing] Congress for protection” and that “powerful labor unions such as the United Auto Workers and United Steel Workers ensured that there was also very limited labor competition”ⁱ. A lack of direct competition enabled the nation's major manufacturers to avoid innovating and to pursue expedience over efficiency in its negotiations with labor, investors, and regulators. This complacency in turn spread to local and national policymakers, who took for granted the nations massive incumbent manufacturing base and ceased pursuing the policies that encouraged its growth and development, while at the same time opening domestic manufacturers up to competition from foreign sources. Innovative international upstarts – first from Japan and later from China – began to capture increasingly large shares of the U.S. market for manufactured goods, while American economic growth shifted to high-tech goods and service producers in the South and West coasts, and away from what we today call the Rust Belt.

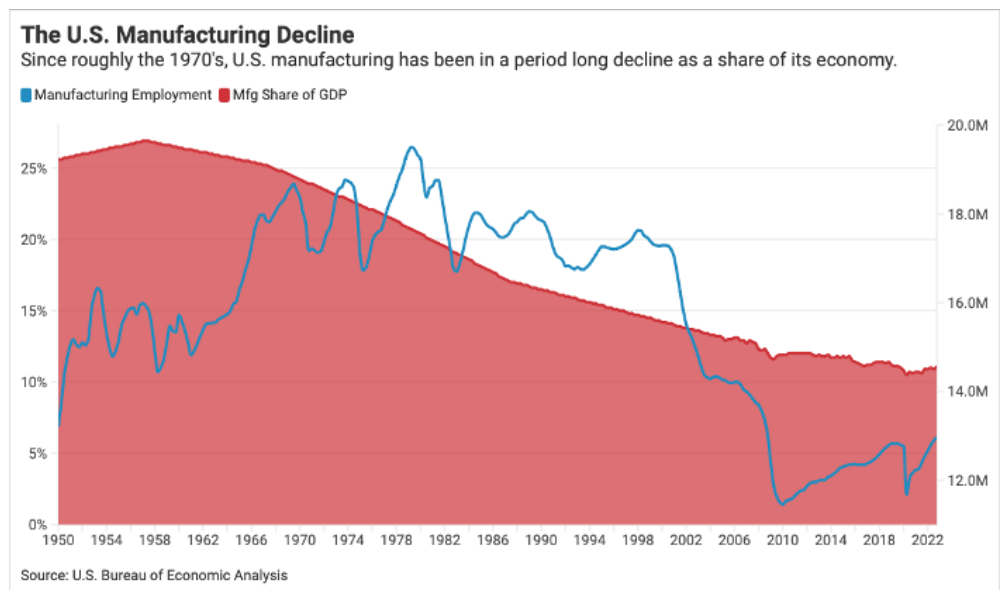


Figure 1

At the same time, though, U.S. manufacturing has by other measures proven remarkably resilient in the face of international pressures. In 1950, the average manufacturing worker produced \$12,600 worth of goods every year; by 2011 they were producing \$153,000 a yearⁱⁱ. These tremendous productivity increases came at a time of geographic disruption, with manufacturing leaving the Midwest and moving increasingly to the American South and Mountain states – where more permissive business environments awaited them.

The Manufacturing Renaissance

After the Great Recession and following decades of slow but steady decline, policymakers and major industry prognosticators began speculated about a burgeoning 'manufacturing renaissance'. According to a 2016 analysis by FTI consulting, U.S. manufacturing investment accelerated to an average of \$1.1 trillion/year for the period 2012-2015

(from just \$200 billion/year for the period 2008-2011)ⁱⁱⁱ. After averaging annual job losses of -1.6%/year between 2000 and 2017, U.S. manufacturing employment began growing again at an average annual rate of 1.5%/year^{iv} following passage of the Tax Cuts & Jobs Act in 2017 and a pro-manufacturing shift in federal regulatory policy from and after 2016 (though progress stalled somewhat following 2020, the pandemic, and subsequent state and federal policy choices).

Notably, policy mattered. Just as it took a change in federal policies to precipitate the U.S. manufacturing renaissance, its benefits were not distributed evenly across states – again depending on their local policy choices. California had long been a center of American digital manufacturing – semiconductors, data centers, software and other 21st century manufacturing had long been concentrated on the West Coast. At the end of the 20th century, about 14% of California's workforce was in manufacturing. By the end 2017, that share had declined to 7.8% of jobs (mirroring broader US trends), but those fortunes changed little during the pre-pandemic period and by the end of 2019 the manufacturing share had fallen to 7.6%. Arizona's share climbed over the same two years, though, as average manufacturing job growth increased to 3.6% after 2017 (from 1.5% over the post-Great Recession period 2011-2017). Even the pandemic barely slowed this progress; today Arizona has 8% more jobs in manufacturing than it did in Feb. 2020. California is up just 1%.



Figure 2

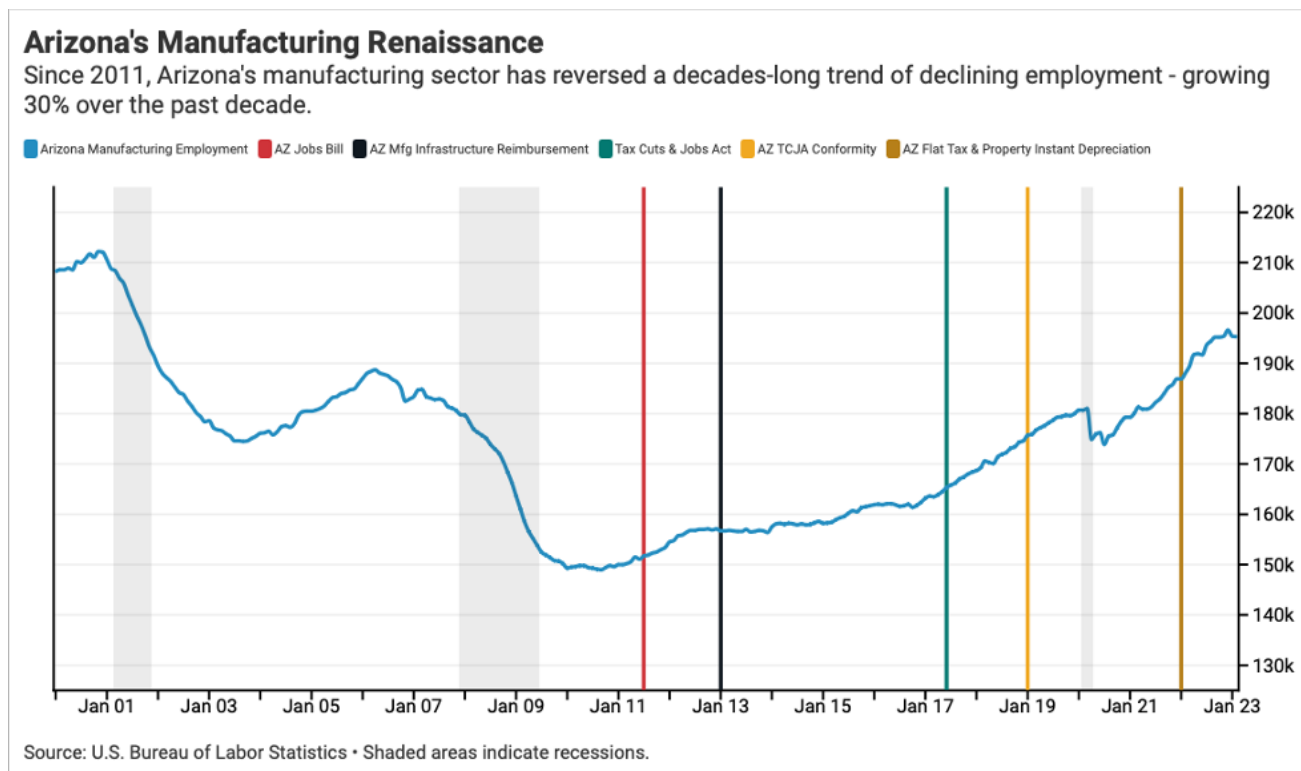


Figure 3

Since 2011, Arizona has embarked on a series of foundational reforms intended to improve its competitive position for manufacturing investment and jobs, beginning with passage of HB 2001 during the 2011 special session – the “jobs bill” which created the Arizona Commerce Authority, lowered corporate income and business property taxes, and (critically) established an optional single-weight formula for calculating state income tax liability considering only your sales in the state, and not considering at all the value of your production in the state.^v This provided clear financial investment for large manufacturers to invest and locate here. Since then, the state has further benefited from:

- A 2013 law allowing the state to reimburse up to 80% of the costs for public infrastructure needed to support large manufacturing facilities (projects investing at least \$500 million in Arizona, or \$50 million if in a rural area). Traditionally, these costs would be passed on by local governments to the investing manufacturer.
- The 2017 federal *Tax Cuts & Jobs Act*, which lowered corporate income tax rates and provided various incentives to encourage new investment and the repatriation of manufacturing activity to the United States.
- The state's 2019 conformity with the new federal law, which both allowed state taxpayers to capture the benefits of federal investment-friendly reforms and provided conforming state income tax cuts.
- And most recently, the state's adoption of a new [single-rate income tax](#) and [instant depreciation](#) of new business investments in machinery and equipment for property tax purposes in 2022.

As a result of this posture, the state has become a destination for new manufacturing and industrial investment in the United States – particularly semiconductors^{vi}, data centers^{vii}, batteries^{viii}, and other advanced electronics^{ix}. As a result, Arizona's annual manufacturing production has nearly doubled since 2011 – from \$23 billion to over \$40 billion in 2022, as measured by GDP. According to the Annual Survey of Manufacturers, Arizona manufacturers made over \$41 billion in capital investments in the state between 2013 and 2021 – with annual investment nearly doubling in the four year period after U.S. passage of the *Tax Cuts & Jobs Act*.

Still, policy remains critical to protecting the state's nascent manufacturing economy, particularly after the disruptions of the pandemic and current economic uncertainty. New federal rules limiting eligibility for CHIPS Act^x and Inflation Reduction Act^{xi} subsidies, for example, could derail continued anticipated growth. Policymakers at all levels should continue to pursue the pro-growth policies that have proven effective over the past decade in reversing the "inescapable" trend of a declining manufacturing sector. To that end, this paper explores the value of the sector in Arizona today, and the implications of its continued growth tomorrow.

The Economic Impact Model

CSI estimated the economic impact of the manufacturing sector by using Regional Economic Models, Inc. (REMI). This is a dynamic program that estimates the impact of changes in regional economies using a representative national and state-level macroeconomic model. The North American Industry Classification System defines "manufacturing" as a sector "comprising establishments engaged in the mechanical, physical, or chemical transformation of materials, substances or components into new products"^{xii}. The sector has its own category pre-defined within the REMI software and is composed of dozens of industries, ranging from "animal food manufacturing" to "ship and boat building".

To model the economic impact of the state's manufacturing sector, we exclude this category from total output, and use the resulting change in GDP, employment, income, and other measures of economic activity. Our model further allows us to separately consider the direct, indirect, induced, and dynamic effects of the manufacturing sector.

Direct impacts are initial changes that occur specifically because of the definition of sports and tourism activities used – for example, the employment, wages, and salaries associated with all Arizona semiconductor manufacturers within the "semiconductor and other electronic component manufacturing" NAICS category. Indirect impacts reflect changes that occur in the supply chain for the directly impacted industries – for example, the copper and other metal suppliers that sell raw materials to the directly impacted fabricators. Induced impacts reflect changes that occur throughout the economy due to the loss (or gain) of wages and salaries in the directly and indirectly impacted industries – for example, retail spending by Arizona factory workers. And finally, dynamic effects are the geographic and compositional changes in the economy in response to the policy shock – like the movement of workers elsewhere when a large local employer closes. As a baseline, the REMI model assumes the Arizona economy employs 4.2 million people and has an annual (real, inflation-adjusted) Gross Domestic Product of \$379.1 billion (in 2022).

The Economic Impacts of Arizona's Manufacturing Sector

CSI estimates that the manufacturing sector of the economy directly employs 214,200 Arizonans and contributes \$77.6 billion in final industry sales. For context, state and local government employed 376,487 and had \$48.1 billion in annual output last year.

However, because the manufacturing sector add jobs and income for Arizonans generally, other industries benefit from this activity indirectly. As a result of the products and services

demanded by companies in the manufacturing sector, another \$20.1 billion in output and 59,000 jobs are supported by this sector from the sale of raw materials, electricity and other utility services, data processing and hosting services, and other intermediate goods and services. As employees of the sports and tourism sector receive wages and spend money on goods and services outside of their own companies, sports and tourism further induces \$23.8 billion in output and 186,100 jobs in other industries. For example, CSI estimates the state would lose a over quarter of its mining, construction, and logging jobs but for demand created by its manufacturing sector.

Including all direct, indirect, and other dynamic effects, the manufacturing sector contributes \$71.5 billion in Gross Domestic Product (GDP) to the Arizona economy (19% of all economic activity). Additionally, 633,600 jobs and \$47.8 billion in personal income are supported by this sector. A full accounting of modeled job and output losses by industry is included in an interactive table on the CSI website.^{xiii}

State and local governments would lose about \$5.8 billion in tax revenue but for the state's manufacturing sector. Cumulative revenue losses over ten years would grow to \$77.8 billion. For perspective, CSI identified approximately \$315 million in annual tax expenditures in support of the manufacturing sector – including Transaction Privilege Tax (TPT) exemptions^{xiv}, income tax credits, instant property tax depreciation for capital investments^{xv}, and the reimbursement of local infrastructure costs with state TPT^{xvi}.

Category	Output (Billions of \$)	Employment
Direct	\$77.60	214,214
Indirect	\$19.90	58,961
Induced	\$24.69	186,073
Dynamic	\$14.46	174,317
Total	\$136.65	633,565

Source: REMI Tax-PI

Figure 4

The Economic Impacts of Manufacturing Sector Growth

As mentioned, the American - and by proxy Arizona - manufacturing sectors stand on a precipice. The disruptions of the pandemic era have at least partly ended the brief period of rapid growth the sector enjoyed between the Great and Covid Recessions. Promised returns from the federal *CHIPS* and *Inflation Reduction Acts* appears increasingly uncertain as the realities of cumbersome federal rules and regulatory processes manifest, and many provisions of the highly effective *Tax Cuts & Jobs Act* begin to sunset in 2026.

To support continued growth in Arizona given this environment, state policymakers may be asked to consider policies that create new or expand existing manufacturing incentives. To assist policymakers in assessing the value of these propositions relative to their costs in terms of tax expenditures, CSI provides the following estimated “returns on investment” for hypothetical manufacturing capital investments over a decade.

Impact of New Arizona Manufacturer Capital Investments					
Cumulative New Investment (10-years)	Annual New GDP	Permanent Employment	Temporary Employment	Cumulative Personal Income	Cumulative Tax Revenue
\$1.5B	\$61M	462	209	\$685M	\$70M
\$10.0B	\$407M	3,076	1,398	\$4.6B	\$474M
\$50.0B	\$2.0B	15,395	6,975	\$22.9B	\$2.4B
\$100B	\$4.1B	30,766	13,976	\$45.9B	\$4.7B

Source: REMI Tax-PI • By assumption, the investment is evenly distributed over ten years. Investments are modeled as shocks to investment demand within the industries that compose the manufacturing sector.

Figure 5

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