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Trade vs. Productivity: What Caused U.S. Manufacturing's Decline and How to Revive It

BY ADAMS NAGER | FEBRUARY 2017

The precipitous loss of U.S. manufacturing jobs in the last 17 years was not natural nor inevitable, nor was it primarily caused by automation. In fact, manufacturing labor productivity growth is at a historical low.

Manufacturing is all over the news these days, as President Trump has made revitalizing the sector and bringing back its jobs a centerpiece of his administration's agenda. But there is little agreement among experts about what happened to U.S. manufacturing in the last two decades, much less what is likely to happen in the near future. Many economists and pundits claim that the 5 million U.S. manufacturing jobs lost since 2000 vanished primarily because of automation, so there is nothing that can be done to bring them back. However, a growing minority of analysts, including the Information Technology and Innovation Foundation (ITIF), attribute a significant share of the losses to increased trade pressure and dwindling U.S. competitiveness, which suggest that the nation could reclaim manufacturing jobs with the right policies.

Just a few years ago, many predicted that the United States was on the verge of a manufacturing "renaissance," powered by technological advances and lower U.S. production costs relative to its trading partners. Now, the popular narrative counsels that the lost manufacturing jobs are gone for good. ITIF, on the other hand, argues that a U.S. manufacturing resurgence is indeed possible, though we cannot rely only on market forces to propel such a resurgence; rather, we need the right international and domestic policies.

It should come as little surprise that there are widely divergent views on the state of U.S. manufacturing, because ideological predispositions often color people's interpretations of events. But what should be surprising is how few analyses of the situation are based on an in-depth and comprehensive look at the sector. Indeed, much of what passes for analysis is simply opining and repeating what has become conventional wisdom.

Careful examination of the U.S. manufacturing sector reveals two main facts: The first is that the precipitous loss of U.S. manufacturing jobs in the last 17 years was not natural nor inevitable, nor was it primarily caused by automation. Indeed, at least half the jobs were lost because of lagging U.S. competitiveness in global trade. Second, rather than American manufacturing being in the midst of a technology-driven resurgence, the evidence suggests that the opposite is true: Manufacturing labor productivity growth is at a historical low.

If the United States is to reduce the trade deficit in goods, it will need to find a way to produce more here, in part by significantly increasing manufacturing productivity growth rates. If it can do that and eliminate the manufactured trade deficit, ITIF estimates the nation would gain an additional 1.3 million manufacturing jobs.

But to get America's manufacturing policy right, it is critical that we sort out the facts and determine the real state of U.S. manufacturing. This report attempts to do that.

WAS AUTOMATION TO BLAME FOR MANUFACTURING JOB LOSS?

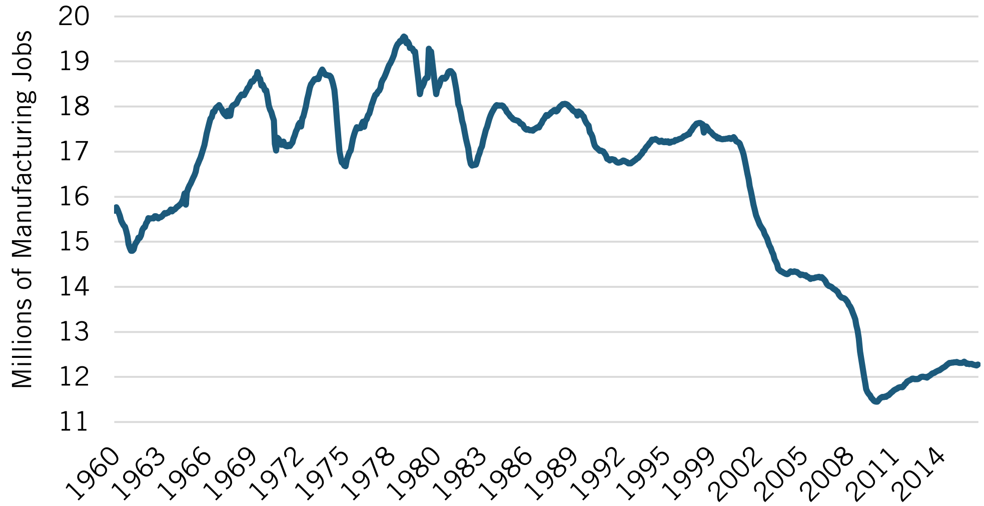
A core element of the debate over U.S. manufacturing concerns whether the massive and historic manufacturing job losses in the 2000s were because of trade or automation. In part to avoid blame being placed on trade, most defenders of free trade attempt to put the onus of job loss on automation.[1] Emblematic is economist Lawrence Katz's statement: "Over the long haul, clearly automation's been much more important—it's not even close."[2]

Headlining the debate for the "automation" explanation for job loss is the assumption that manufacturing employment is supposed to gradually decline as an economy develops. The view is that in a healthy, developing economy, agriculture should gradually give way to manufacturing as technology (and thus productivity) progresses, and manufacturing should in turn gradually give way to services.

Similar Productivity Growth Rates

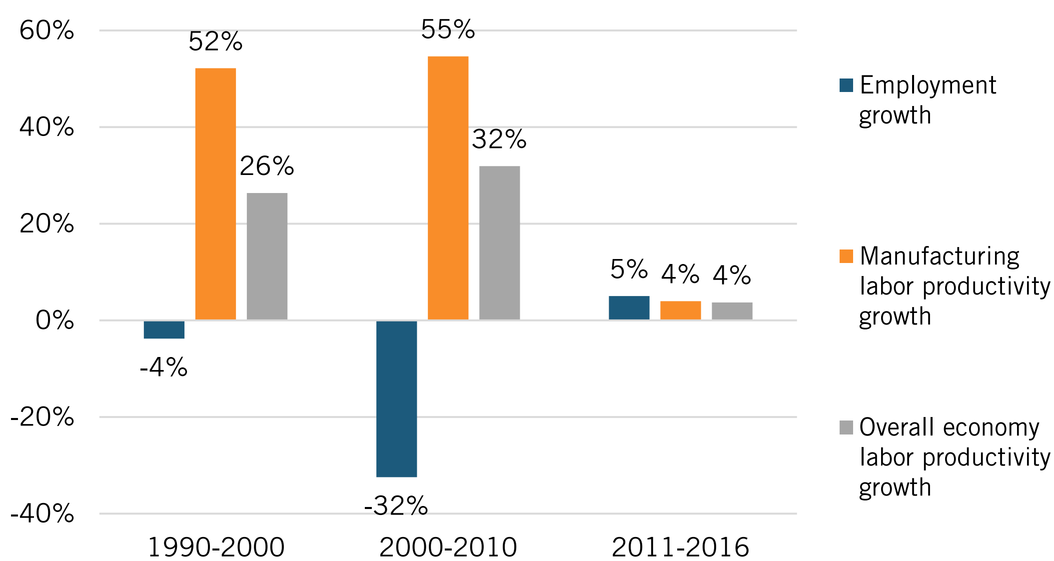
The "manufacturing job loss is natural" line of argument does not fit the data. For most of the postwar period, manufacturing employment has been more or less stable, hovering between 19.5 and 16.5 million for 35 years, from 1965 to 2000.[3] However, from 2000 to 2010, the number of U.S. manufacturing jobs plummeted by over 5 million, a rate faster than in the Great Depression, and the subsequent recovery has been shallow.[4] It is clear that this was not a natural rate of loss.

Figure 1: Manufacturing Employment, 1960–2016[5]



This employment pattern only makes sense if U.S. manufacturing consumption declined or if productivity growth accelerated relative to the rest of the economy. Neither happened. The reason manufacturing jobs are supposed to decline is not because of productivity, but relative productivity growth. If manufacturing productivity grows 5 percent a year and overall economy productivity growth is also 5 percent a year, we should expect no change in the share of jobs in manufacturing. That is why the data do not support the argument that productivity caused the job loss. From 1990 to 2000, manufacturing productivity growth was 25.8 percent faster than that of the overall economy. From 2000 to 2012, it was only 22.7 percent.[6] But job losses in the 2000s were higher than in 1990s. In fact, they were over 10 times greater. (See figure 2.)

Figure 2: Employment and Labor Productivity Growth in Manufacturing, 1990–2016[7]

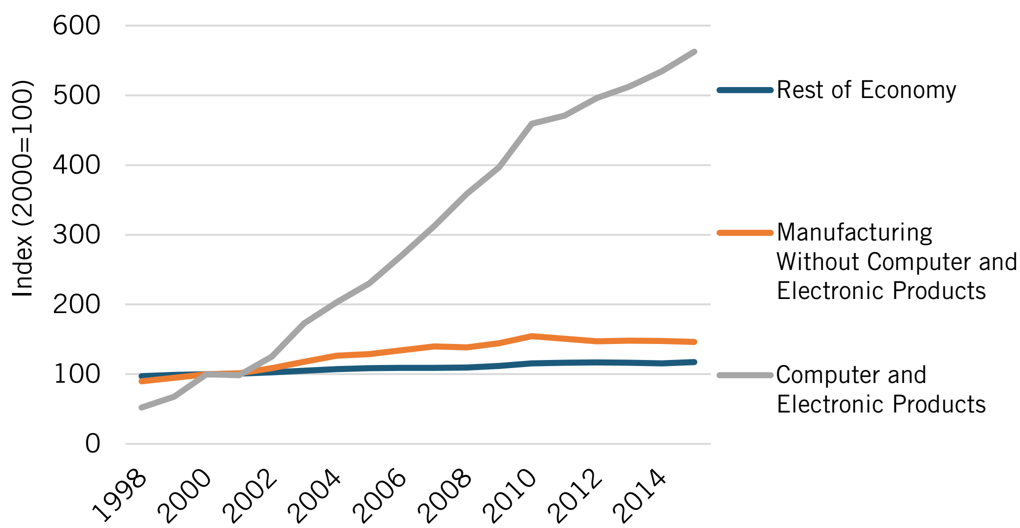


The Misleading Impact of Computer Data

Productivity statistics are a function of output growth divided by labor input. The core reason why so many analysts conclude that trade didn't cause manufacturing job loss is that inflation-adjusted manufacturing output grew at roughly the same rate as GDP. Since jobs were down, the cause logically had to be increased productivity.

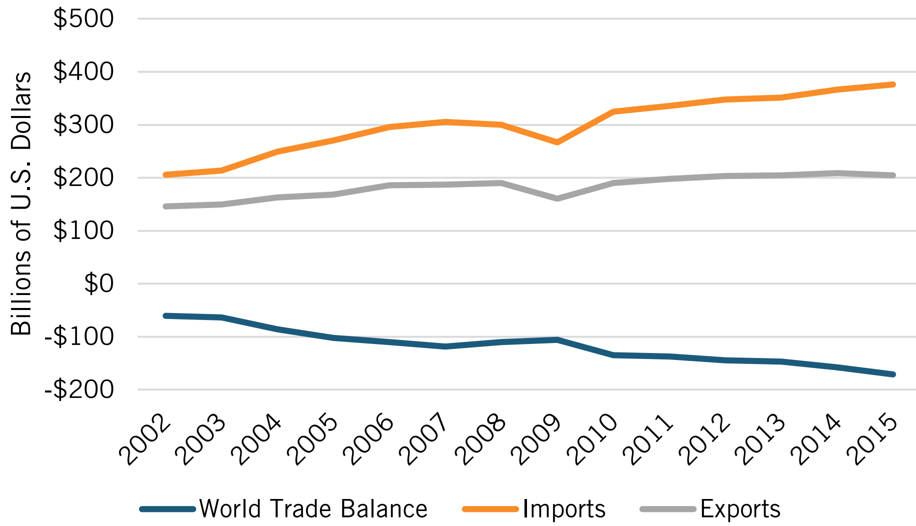
There is a key flaw to this comforting narrative: The official government statistics on manufacturing are significantly skewed by an outlier. Computer and electronics products (classified by the NAICS code 334), one of 19 subindustries defined by the Bureau of Economic Analysis, which together comprise manufacturing, purportedly enjoyed a 350 percent growth in labor productivity from 2000 to 2010.[8] To put this in perspective, the productivity of the other 18 manufacturing industries grew by just 46 percent.

Figure 3: Growth of Real Value-Added Per Worker in Computer and Electronic Products, the Rest of the Manufacturing Sector, and the Rest of the Economy, 1998–2015[9]



This growth in NAICS 334 is an illusion, at least in the sense that it's not a reflection of companies producing more computers in the United States. In fact, they are producing fewer, since production has shifted offshore. And, as figure 4 shows, the United States runs a widening trade deficit in NAICS 334.[10] Rather, this massive growth in output and productivity are simply a result of quality adjustments caused by "Moore's law" and increasing computer speed, not the production of more computers. A number of studies have come to the same conclusion.[11]

Figure 4: U.S. Trade in NAICS 334: Computer and Electronic Products, 2002–2015[12]



Unfortunately, this misleading measurement has skewed the whole debate on manufacturing. As Susan Houseman, an economist at the Upjohn Institute, puts it, outsized productivity growth in NAICS 334 has prompted "many influential researchers and analysts [to] promote the narrative that employment losses in manufacturing, as in agriculture, are largely a consequence of automation, not import competition."[13]

What does manufacturing sector performance look like without the artificially inflated NAICS 334 figures? Employment in the other 18 sectors declined by 27.3 percent from 2000 to 2015, while real value-added grew by just 6.4 percent (compared with 230 percent for NAICS 334 and 31.7 percent for the U.S. economy outside of manufacturing). Moreover, real value-added in 2015 was actually 6.6 percent below 2007 levels.[14]

Misusing Manufacturing Statistics

Despite this persuasive analysis of mismeasurement by a number of economists, most defenders of the standard "tech killed jobs" narrative do not even bother to attempt to rebut it. They simply ignore it, either out of ignorance of the research or because the facts get in the way of their defense of trade narrative. Case in point is Michael Hicks and Srikant Devaraj's brief "The Myth and Reality of Manufacturing in the United State," which has gained attention in countless news articles claiming that manufacturing jobs declined primarily due to automation, and not international competition.[15] The brief, after warning readers that this method is only an illustration, reports that if productivity rates had stayed the same from 2000 to 2010, it would take 20.9 million workers to match 2010 output levels, instead of the 12.1 million employed in 2010, a difference of 8.2 million workers. The report then compares this assertion to trade deficit data and concludes that, from 2000 to 2010, only 13 percent of jobs lost were due to trade, or approximately 750,000 jobs.[16]

However, to arrive at their conclusion that only 13 percent of jobs were lost due to trade, Hicks and Devaraj assume 67.5 percent labor productivity growth over a 10-year period from 2000 to 2010. The problem—only one industry out of the 19 that make up the manufacturing sector, computer and electronic products, grew by more than 67.5 percent.[17] Indeed, Hicks and Devaraj state that of the 8.2 million jobs not filled due to productivity, 3.9 million, or 48 percent, were in NAICS 334, which employs only 370,000 people.

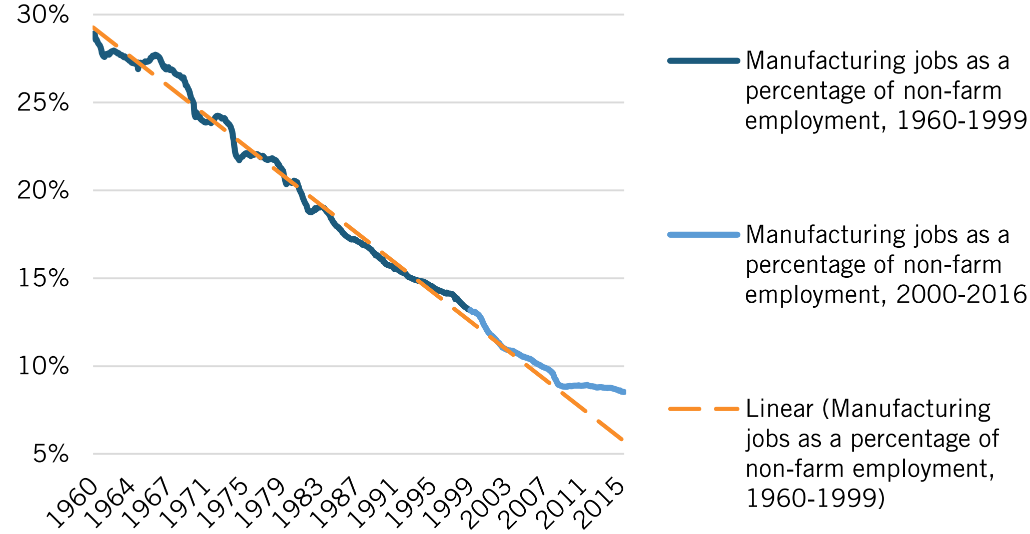
If Hicks and Devaraj applied their methods to the manufacturing sector in the 1990s, they would have seen 45 percent productivity growth over the decade, output growth of 44 percent, and employment declines of 3 percent, and conclude that increasing productivity had "cost" around 8.5 million jobs, under the logic that it would take 26 million workers (as opposed to the 17.2 million workers in 1999) to produce at 1999 levels with 1990 productivity rates.[18] In reality, if manufacturing productivity did not grow over the decade, manufacturing employment would not have increased by 8.5 million. In fact, it might have declined, as foreign companies caught up or surpassed U.S. producers, displacing U.S. production in the international marketplace.

Hicks and Devaraj's primary mistake is looking at raw productivity growth, not manufacturing productivity relative to the rest of the economy.[19] As shown in figure 2, growth in manufacturing productivity was only 23 percentage points faster than productivity growth in the rest of the economy, which would not lead to the 8.2 million jobs gap they cite. This consideration, along with addressing inflated values for NAICS 334, dramatically raises the number of jobs that can be said to have been lost to global competition.

Linear Decline in Manufacturing Labor Share?

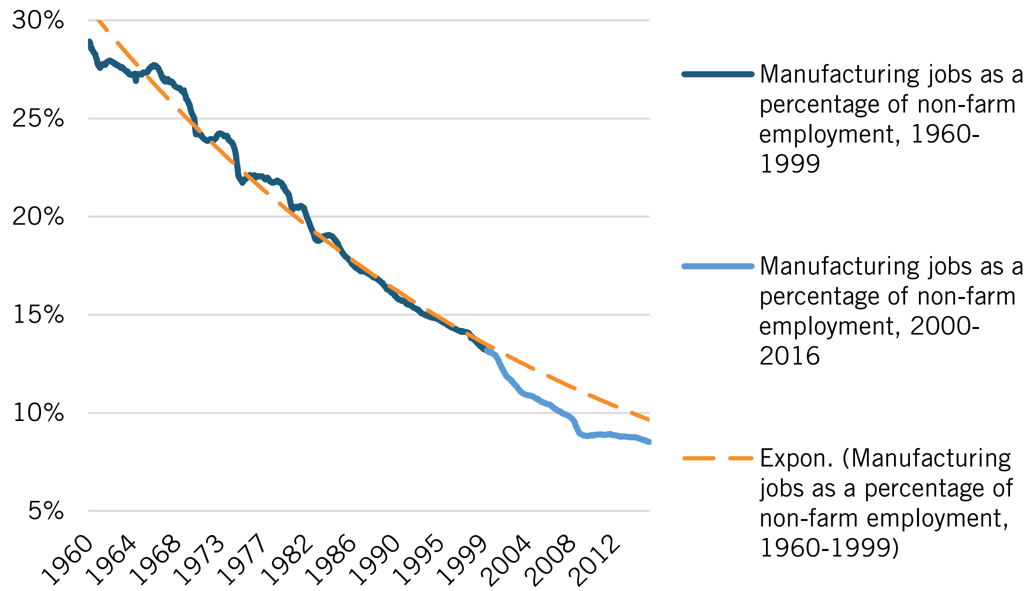
Still others argue that the loss of these jobs, in context, is not as extreme as figure 1 makes it seem, claiming that the decline of manufacturing jobs is consistent with the historical trend of percentage share of manufacturing jobs in the workforce. Harvard economist Robert Lawrence argues that from 2000 on, all that changed was that the overall number of jobs in the U.S. economy stopped growing, making manufacturing employment decline appear drastic. To illustrate this, he used a chart showing a consistent, linear decline in manufacturing jobs as a percentage of total employment, recreated below.[20]

Figure 5: Manufacturing Jobs as a Percentage of Non-Farm Jobs (Linear Trend), 1960–1999 and 2000–2016[21]



By this metric, manufacturing employment exceeds expectations since 2010, hovering around 9 percent of the workforce, while the simple linear model implies it should have declined to around 6 percent by 2015. By this illustration, manufacturing seems like it's doing quite well. However, the assumption that manufacturing's share of employment should decline linearly is flawed. Under Lawrence's linear model, manufacturing employment could be expected to drop below zero by 2030, which is clearly not possible. If manufacturing employment is declining because of steady gains in labor productivity, the downward trend line should be exponential, not linear.

Figure 6: Manufacturing Jobs as a Percentage of Non-Farm Jobs (Exponential Trend), 1960–1999 and 2000–2016[22]



Manufacturing employment would still be expected to fall under this revised model, but job losses in the 2000s are much steeper than this model would have predicted. Also, Lawrence's logic ignores that much of the cause of lagging overall employment growth from 2000 to 2009 was due to the steep drop in manufacturing employment, which, because of the high multipliers in the industry, caused very large indirect job losses among suppliers and due to diminished spending by former manufacturing workers. Indeed, that manufacturing workers did not immediately transfer into service sector industries is a strong argument against the sectoral shift argument, which argues that the success of the service sector should slowly "crowd out" manufacturing. However, Lawrence chooses not to compare to the size of the overall workforce, just the number of employed workers, which would accentuate losses in periods of high unemployment, such as during the last decade, while downplaying losses in recessions.

Global Competition and Manufacturing Employment

Our argument for why global competition has played a bigger role than the conventional view holds is not just arrived at by process of elimination. The 2000s ushered in a period of rapid growth in U.S. exports and imports.[23] Unfortunately, imports, which replace domestic production, grew faster, resulting in a reduction in real gross output in most manufacturing industries (12 out of 19).[24]

Most lay people believe that trade caused U.S. manufacturing job losses because the story of offshoring to countries like China and Mexico is quite persuasive. As reflected in the results of the 2016 elections, many people living in communities most affected by manufacturing decline held this view.

However, a range of economic research also supports this conclusion. MIT economist David Autor estimates 2.4 million jobs lost due to Chinese import competition. U.S. regions most exposed to China tended not only to lose more manufacturing jobs, but also to see overall employment decline.[25] The authors conclude that "consequences of China trade for US employment, household income, and government benefit programs may contribute to public ambivalence toward globalization and specific anxiety about increasing trade with China."[26] This says nothing about the effect of Chinese mercantilist policies limiting U.S. exports either to China or other foreign markets, or competition from other nations. Yet it comprises almost half of the jobs that were lost during the 2000s. Other work by David Autor also supports the hypothesis that Chinese trade policies have had egregious impacts on U.S. manufacturing employment.[27]

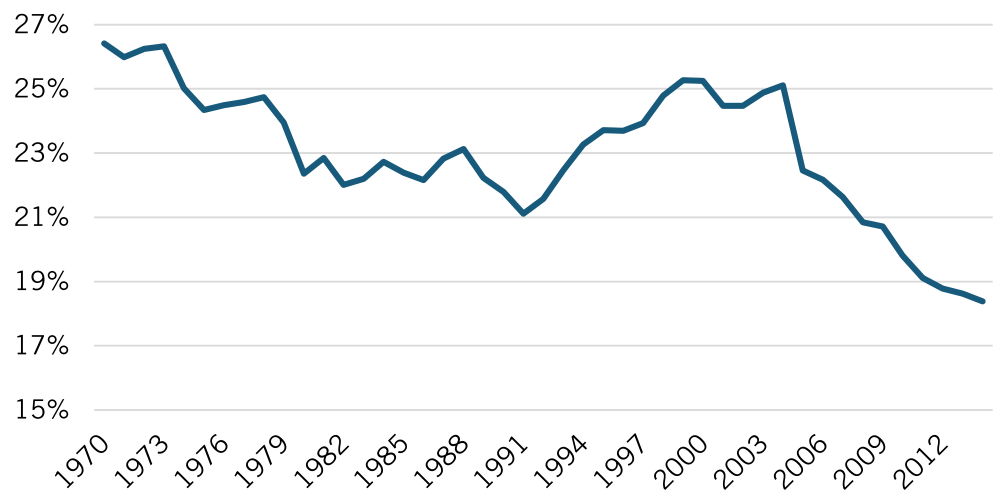
Others have also pointed to increasing global competition that affected the United States, especially China's accession to Permanent Normal Trade Relations (PNTR) status in 2001, the same year that China was included in the World Trade Organization (WTO). Yet, despite signing up for the disciplines of the WTO, China has ramped up its mercantilist policies, using tools such as currency manipulation, forced intellectual property transfers, localized production requirements to access Chinese markets, and government-sponsored forays into industries in which Chinese businesses would take masses losses in order to eventually capture market share (e.g. solar panels).[28] Justin Pierce, of the Federal Reserve Board of Governors and Peter Schott of the Yale School of Management, argued that China and the PNTR policy led to a "the sharp decline in U.S. manufacturing employment beginning in 2001."[29]

Quantifying this effect, Will Kimball and Robert Scott estimate that 55 percent of manufacturing job losses between 2001 and 2013, 2.4 million, are due to the rising trade deficit with China.[30] ITIF has estimated that 67 percent of the manufacturing jobs that disappeared in the 2000s were due to trade, which includes the China effect.[31]

All Is Not Well

Defenders of the Washington Trade Consensus insist that the manufacturing sector is doing just fine in order to quell any so-called protectionist policy responses by the U.S. government, which they define as both outright protectionism as well as tough trade enforcement to fight foreign protectionism. For example, Robert Zoellick, the United States Trade Representative in the second Bush administration, claimed that the United States' share of global manufacturing had remained constant over the last 20 years. Zoellick, along with many commentators, argues that "U.S. manufacturing has never been healthier, so don't blame trade."[32] But this is false. Since the early 2000s, U.S. manufacturing output as a share of global output has declined consistently and rapidly. Controlling for the value of the dollar, manufacturing output dropped from 25 percent in the early 2000s to 18.4 percent in 2014.[33]

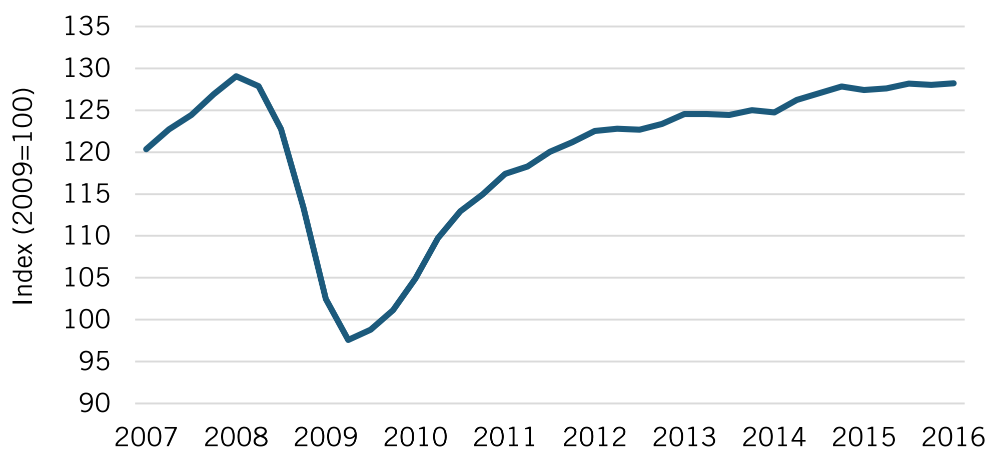
Figure 7: United States' Share of Global Manufacturing Value Added, Controlled for Value of U.S. Dollar, 1970–2015[34]



The fact that U.S. manufacturing is severely weakened, largely because of foreign competition, does not imply that global trade per se is at fault or is intrinsically bad. Trade itself has not harmed U.S. manufacturing, though a lack of American competitiveness and pernicious market-distorting trade policies created by other countries attempting to grow domestic industries by any means possible certainly have. The United States needs to improve its own competitive climate while ensuring a level global playing field for its firms.

Others take manufacturing data out of context. Ben Casselman's 538 blog states that manufacturing output is up 20 percent since the end of the recession. But this argument is flawed and misleading. He cherry-picks a reference point for growth, the end of the recession, that shows recovery after a large loss, not real growth. Indeed, in real terms, manufacturing output in 2016 is lower than its prerecession peak in 2008. Over the same period, GDP grew by 11 percent.[35]

Figure 8: Real U.S. Manufacturing Output, 2007–2016[36]



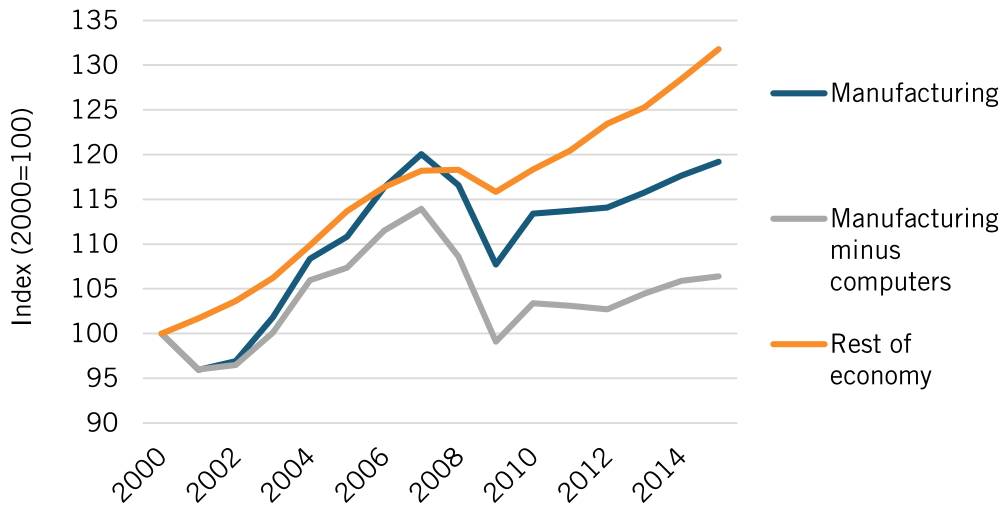
Others argue that the United States is competitive, so no need to worry. Deloitte and the Council on Competitiveness's report *2016 Global Manufacturing Competitiveness Index* ranks the United States second, behind only China.[37] The report, which uses data from a survey of manufacturing executives and thus serves as litmus test for optimism inside the industry, ranks the United States as the second most competitive manufacturing nation on the planet, and predicts that the United States will overtake China for the top spot by 2020. However, the methodology suffers from several problems, including the fallacy of composition, with less optimistic firms less likely to respond and firms that have gone out of business not able to respond. Additionally, the report lists the United States as having the world's best innovation policy, ahead of countries such as Germany and Japan, even though the United States does not even have a national manufacturing strategy. Moreover, both Germany and Japan outspend the United States on R&D per capita (Japan $1,844, Germany $1,525, and United States $1,471) and have more business- and innovation-friendly tax codes.[38]

The False Metric of Total Manufacturing Output

Supporters of the narrative that all is well commonly argue that the United States produces more manufactured goods than ever before. Ipso facto, all is well. But this is akin to saying that U.S. GDP has never been higher, which is true at most points in U.S. history, yet is irrelevant to the question of the overall health of the U.S. economy. One would hope that manufacturing output is at all-time high, and GDP is as well. The more relevant question is whether manufacturing output growth is at an all-time high as a share of GDP, which it is not.

Moreover, the claim that manufacturing output is at an all-time high is not even accurate. Real value-added in manufacturing has not recovered from prerecession levels, down 0.7 percent since 2007. And as discussed above, outside of NAICS 334, manufacturing value-added has declined by 6.6 percent since 2007.[39] (See table 1.) Since 2000, real value-added in the 18 manufacturing sectors outside of NAICS 334 grew by just 6.4 percent, compared with 31.8 percent in the U.S. economy outside of manufacturing.[40]

Figure 9: Manufacturing and Rest of Economy Real Value-Added, 2000–2015[41]



Breaking down real value-added growth by sector, it becomes clear that not only has manufacturing output declined, but for most sectors value-added is significantly below prerecession levels. Besides computer and electrical products, the only other sectors to see real value-added growth since 2007 are primary metals (44.7 percent); motor vehicles, bodies and trailers, and parts (8.7 percent); petroleum and coal products (7 percent); and miscellaneous manufacturing (6.9 percent). Of these, only primary metals grew faster than the rest of the economy, which grew 11.5 percent over the period.[42]

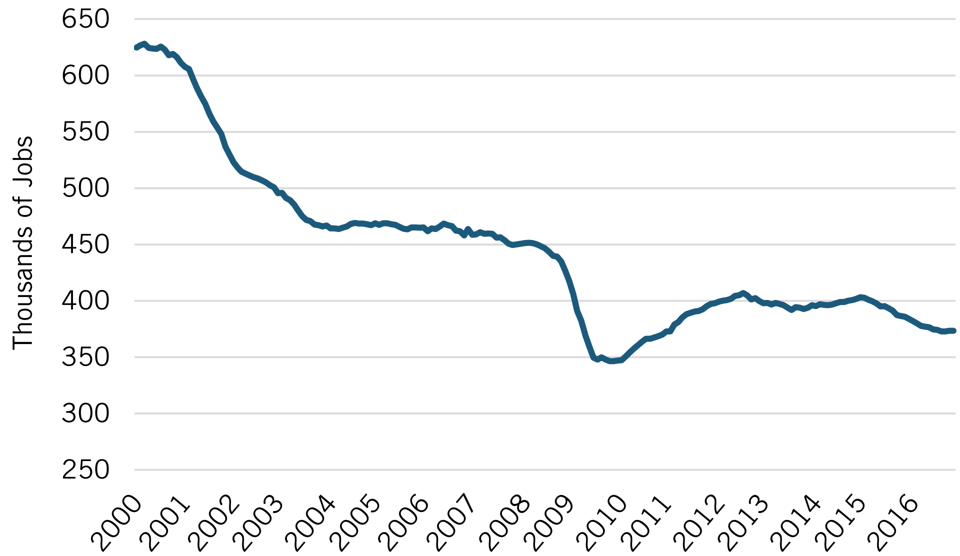
Given the significant growth in primary metals real value-added, it's worth examining the sector in more detail. While real value-added statistics show growth of 44.7 percent from 2007, this measure is suspect.[43] The nominal value-added growth for primary metals, by contrast, is -10.8 percent from 2007 to 2015 and -4.1 percent growth from 2012 to 2015.[44] Concurrently, labor productivity is down from 2012 by 1 percent and employment in the sector has declined by 6.1 percent.[45] The only way for these numbers to be reconciled is for a significant drop in price independent of gains in productivity.

Table 1: Real Value-Added Growth in Manufacturing by Industry Sector, 2007–2015[46]

Industry	Real Value-Added Growth, 2007 to 2015	Real Value-Added Growth, 2012 to 2015
GDP minus manufacturing	11.5%	6.7%
Manufacturing	-0.7%	4.5%
Manufacturing minus computer and electrical products	-6.6%	3.6%
Durable goods	6.6%	3.5%
Durable goods minus computer and electrical products	-3.8%	1.4%
Wood products	-13.2%	-0.7%
Nonmetallic mineral products	-18.5%	5.2%
Primary metals	44.7%	21.3%
Fabricated metal products	-15.9%	-2.9%
Machinery	-7.1%	-6.8%
Computer and electronic products	49.5%	9.6%
Electrical equipment, appliances, components	-11.3%	0.2%
Motor vehicles, bodies and trailers, and parts	8.7%	7.3%
Other transportation equipment	-6.2%	2.6%
Furniture and related products	-32.3%	6.5%
Miscellaneous manufacturing	6.9%	1.3%
Nondurable goods	-8.1%	5.7%
Food and beverage and tobacco products	-8.6%	-2.6%
Textile mills and textile product mills	-21.8%	7.7%
Apparel and leather and allied products	-13.5%	-1.6%
Paper products	-24.5%	-3.3%
Printing and related support activities	-14.8%	-1.8%
Petroleum and coal products	7.0%	46.0%
Chemical products	-11.9%	-0.8%
Plastics and rubber products	-4.4%	2.0%

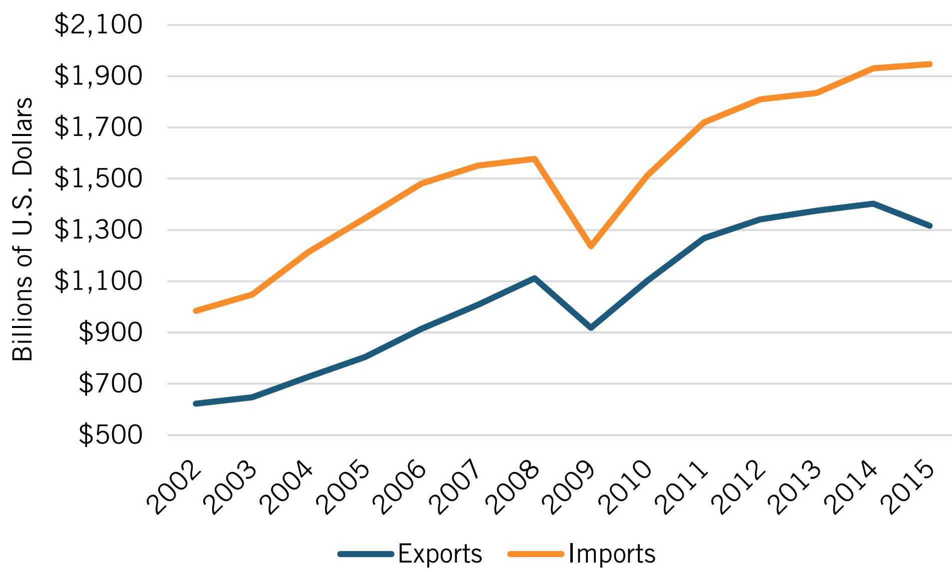
Real value-added measures rely on price indices to determine true growth in the industry. Technological improvement in an industry can have the effect of boosting productivity, resulting in price declines, hence measuring real value-added instead of just simple value-added is important. In the case of primary metals, however, most price decreases appear to have come not from productivity growth but from mercantilist behavior by the Chinese government (massive steel subsidies leading to selling below cost on global markets), so real output growth is overstated. China's global market share has increased from 31 percent to 50 percent since 2005.[47]

Figure 10: Primary Metal Employment, 2000–2016[48]



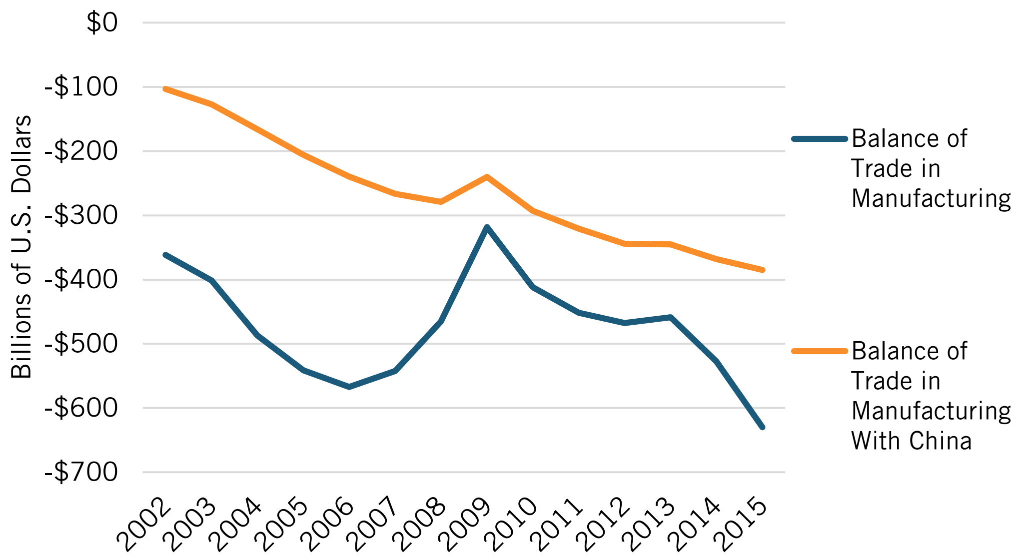
While primary metals growth appears to be overstated, many other manufacturing sectors have simply contracted, with U.S. consumers turning to imported goods as American manufacturing stagnates. Since 2012, the United States' manufacturing trade deficit has increased by more than 35 percent to a record $630 billion.[49]

Figure 11: U.S. Imports and Exports of Manufactured Goods, 2002–2015[50]



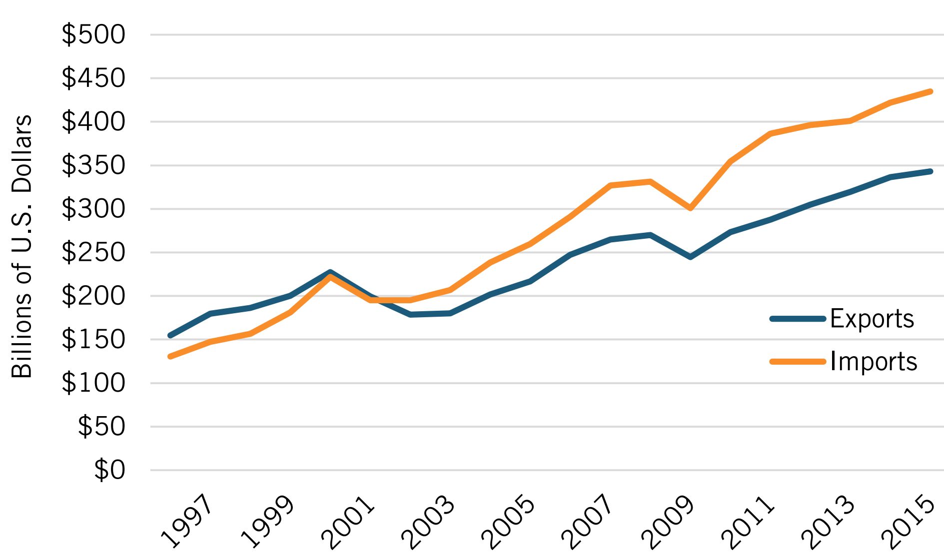
Much of this deficit is driven by the steadily widening trade barrier with China, even as China allows the renminbi to appreciate in favor of more targeted mercantilist trade distortions.[51] In 2016 China recorded a global trade surplus of $510 billion, down from $595 billion in 2015, yet still substantial.[52] It's not that the United States is moving away from manufacturing, just that manufacturing is moving away from the United States.

Figure 12: U.S. Trade Balance in Manufacturing, 2002–2015[53]



The U.S. trade deficit also extends to high-value-added advanced-technology products. This of course runs contrary to the popular stories told about manufacturing, in which jobs leaving the United States were low-wage jobs that Americans didn't want. This narrative says that it's okay that labor-intensive jobs in low-value-added sectors are leaving; the United States will instead specialize in the industries of the future, produced with cutting-edge technology. Productivity, trade, and output data do not support this. In 2015, the United States' trade deficit in advanced-technology products was $91.8 billion, just 14 years after the United States' last trade surplus. In fact, the United States exports just 78.9 percent of what it imports in this category.[54]

Figure 13: U.S. Imports and Exports of Advanced-Technology Products, 1996–2015[55]



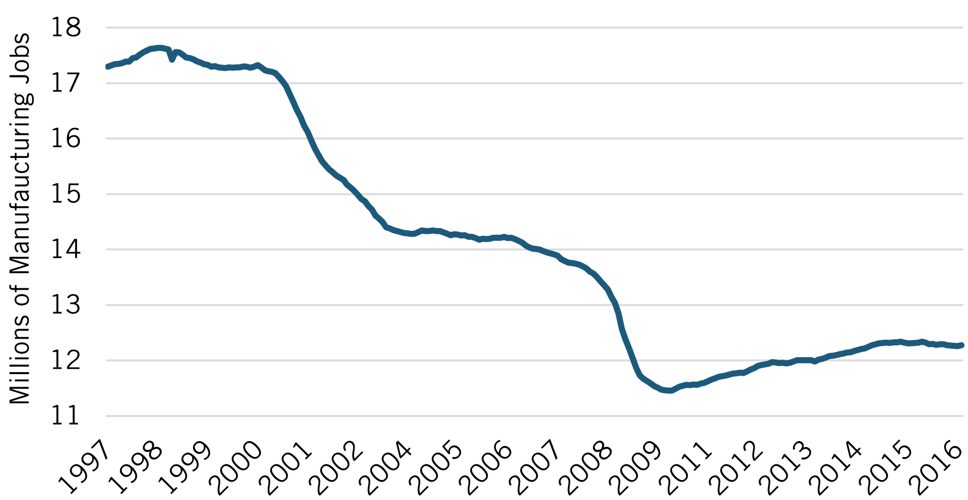
Meanwhile, net reshoring remains about even. The Reshoring Initiative estimated that in 2015 approximately 60,000 jobs were offshored, while about 67,000 jobs were "reshored" or were the result of foreign direct investment.[56] While certainly an improvement over conditions from 2000 to 2009, when millions of Americans lost jobs to offshoring, it is hard to say that the economy is making major inroads in regaining lost ground. The truth is that for every feel-good story in the media about a job being brought back from abroad, another job departs, and vice versa.

PRODUCTIVITY AND PERFORMANCE IN THE MANUFACTURING SECTOR

At first glance, U.S. manufacturing looks like it is doing just fine. At the beginning of 2015, ITIF published *The Myth of America's Manufacturing Renaissance: The Real State of U.S. Manufacturing,* a full-length paper describing the prospects of U.S. manufacturing in the aftermath of the Great Recession.[57] Then, data showed steadily growing manufacturing employment. Although growth was much slower than past recoveries, after the decade of decline between 2000 and 2009, sluggish growth was hailed as proof that U.S. manufacturing had turned a corner.

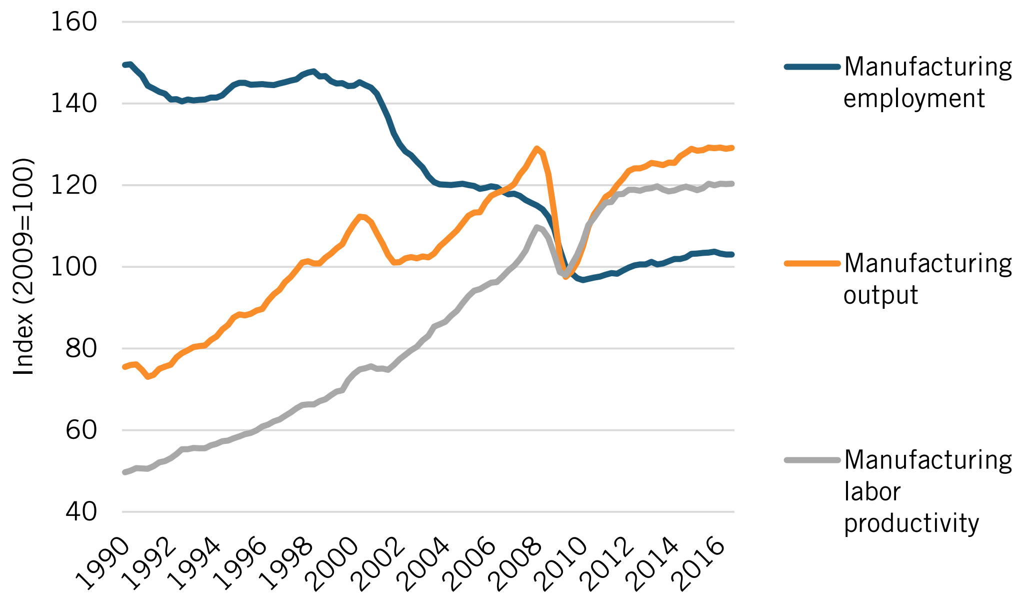
Unfortunately, this appears to have been wishful thinking. Manufacturing employment peaked in mid-2015. The manufacturing trade deficit has increased 31.5 percent since 2015.[58]

Figure 14: Manufacturing Employment in the United States, 1997–2016[59]



And after bouncing back right after the Great Recession, in the past four years (Q3 2012 through Q3 2016) manufacturing labor productivity grew by a dismal 1.5 percent. In fact, between 2014 and 2015, there was no growth in manufacturing labor productivity.[60] For comparison, between Q1 2002 and Q1 2006, manufacturing labor productivity grew by 24 percent. The result of low productivity growth is low output growth (caused both by stagnant domestic demand as prices don't fall and because of a worsening trade balance as U.S. manufacturing enterprises fail to improve their competitiveness), and indeed manufacturing output in 2016 was within a percentage point of where it was nine years previously in 2007.[61]

Figure 15: Growth of Manufacturing Output, Employment, and Labor Productivity, 1990–2016[62]



It now appears that U.S. manufacturing is suffering from a different, but related challenge—productivity stagnation. Contrary to prevalent narratives describing manufacturing as a rapidly automating sector driven by breakthrough technologies, at least for now, U.S. manufacturing appears stagnant. The United States does not appear to be moving toward factories of the future, at least presently.

Figure 16: Year-Over-Year Growth in Manufacturing Labor Productivity and Employment, 2000–2016[63]

Part of the reason for faster productivity growth in the 2000s may have been from the movement of low-productivity jobs overseas. If jobs offshored had below-average productivity, average labor productivity would increase, even if no growth occurred. The exact opposite may be happening now, if jobs that are returning to the United States are in low-wage industries, it could weigh down the average. In addition, low wages in manufacturing may discourage investment in automation, and increased difficulty identifying talented workers to fill top factory jobs could deflate productivity growth.

There are likely a number of reasons for low productivity growth, including low investment in machinery and equipment and workforce training and perhaps a shift in the industry toward lower value-added industries and firms.[64]

Why U.S. Manufacturing Has Not Rebounded

During the most recent bout of U.S. manufacturing confidence, observers predicted that productivity growth, high shipping costs, a weak dollar, reduced U.S. energy costs, and rising labor costs in China were creating positive conditions for manufacturing jobs to return to the United States en masse. As noted above, U.S. productivity growth has disappointed, particularly given that Chinese manufacturing productivity has grown at a fairly robust rate.[65] Likewise, the other factors either have not occurred or have not had a significant impact: 1) shipping costs are low (indeed they have been low since about 2010); 2) the dollar is strong; 3) energy cost savings from the shale gas revolution have been made obsolete by lowered fuel costs worldwide; and 4) China is moving into higher value-added industries, threatening an increasing number of manufacturing industries.

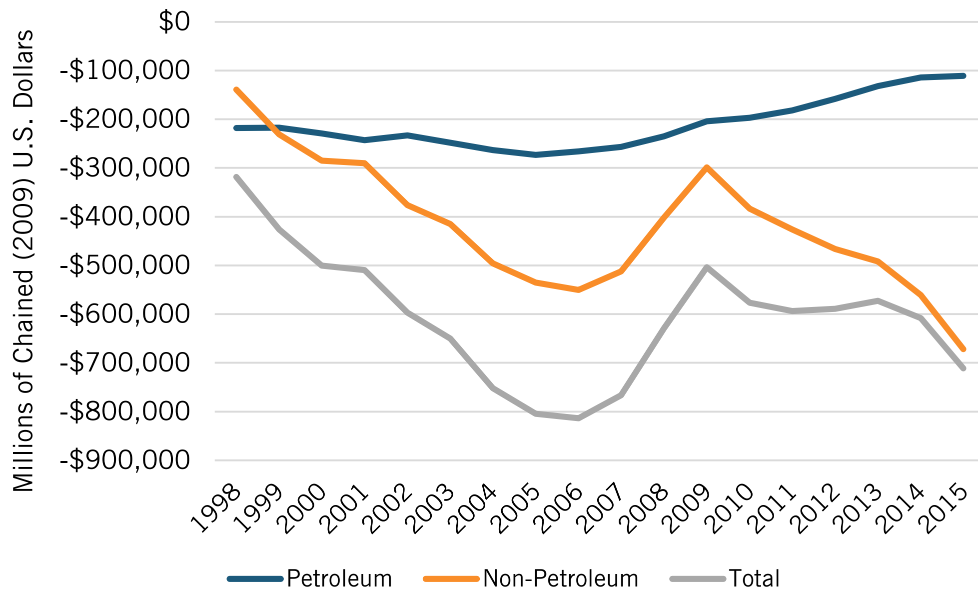
Global Shipping Costs

From 2000 to 2008, as global shipping capacity lagged behind the accelerated pace of globalization, shipping costs rose dramatically. During this time period, the Baltic Dry Index, which aggregates and measures the cost to ship dry goods worldwide, rose by 635 percent. However, shipping costs are highly elastic, as the quantity of ships in the market cannot easily be adjusted. It takes years to build large freighters, and ships cannot easily be left unused without accruing large losses. However, once the 2008 recession depressed demand for global shipping while new ships commissioned during boom times hit the seas, costs plummeted. In fact, 2015 saw a record low for global shipping costs worldwide, meaning that it was relatively cheaper to import to the United States.[66]

Value of the Dollar and Energy Costs

Increases in petroleum and natural gas output are largely the influence of fracking technology, which has allowed Midwestern shale to become competitive even when prices are low. The industry grew rapidly from 2012 to 2015, following contraction from 2005 to 2012.[67] Indeed, the United States now produces around 275 million barrels of oil annually, about 100 million more than a decade ago, and rivals Saudi Arabia and Russia for the mantle of world's largest oil producer.[68] Meanwhile, deficits in energy products have decreased significantly, down almost 60 percent from a decade ago.[69]

Figure 17: U.S. Petroleum and Non-Petroleum Trade Deficit, 1998–2015[70]



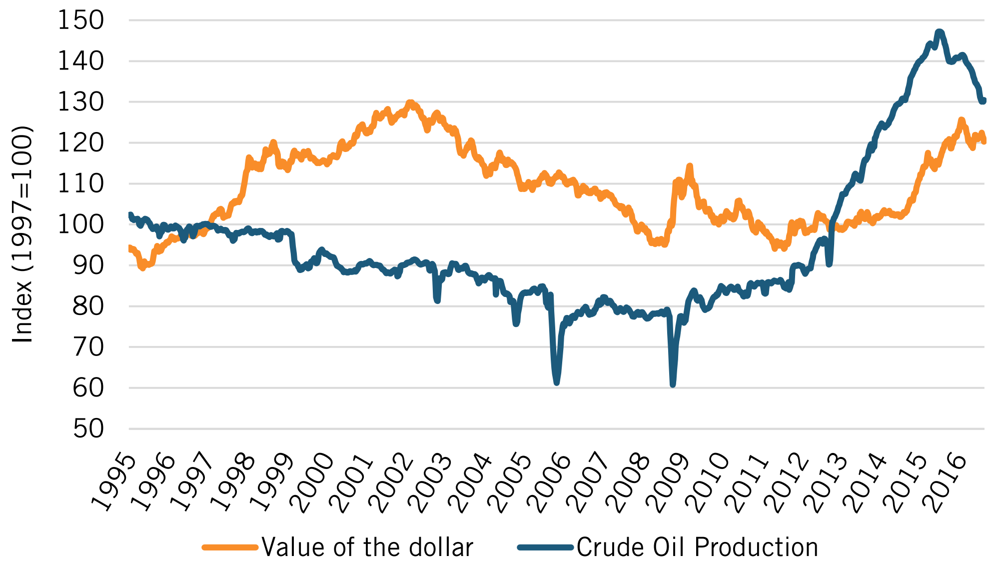
Low oil prices have not done much to help lower costs for U.S. manufacturers. In part this is due to the relatively low share of energy costs for most manufacturing industries. While energy bills for factories can be substantial, they are generally not large enough to sway a company to choose one location over another. For 90 percent of manufacturing industries, energy costs are lower than 5 percent of shipment value.[71]

Moreover, low oil and natural gas prices were supposed to lead to a resurrection of the U.S. chemical, plastics, and other industries that relied heavily on petroleum inputs. In fact, real value-added output in the chemical industry actually fell by almost 1 percent between 2012 and 2015, while plastics grew by a mere 2 percent.[72] Maybe output will grow if new plants come online, but to date we have not seen this growth.

Moreover, while the oil boom helped lower energy costs, it also helped inflate the value of the U.S. dollar through a dynamic known as Dutch Disease. A weaker currency is the safety valve that is supposed to allow a country to correct its trade deficit. After falling gradually as the United States lost manufacturing jobs in the 2000s, the value of the dollar jumped sharply in 2015 as oil production increased. Americans seem to have taken the oil boom income and applied it dollar-for-dollar to consumption of foreign manufactures.

By inflating the value of the dollar, oil production lowers the global price competitiveness for most manufacturing sectors. It is safe to say that for the vast majority of industries, the appreciation of the dollar as a direct result of oil exports has a much larger impact than the marginal savings proffered by less-expensive energy.

Figure 18: Value of the U.S. Dollar and U.S. Crude Oil Production, 1995–2016[73]



Chinese Wage Increases

Many commenters have reflected that rising Chinese wages signal a decline in China's competitive edge over the United States. But the real issue is not relative wage growth; it's relative wage growth relative to productivity. In other words, if Chinese wages are rising 4 percent faster than U.S. manufacturing wages, they do not become less price competitive if labor productivity is also rising 4 percent faster. Chinese manufacturing wages can be hard to measure, but by best estimates they grew by an average of 16.4 percent per year between 2002 and 2009 and 12.5 percent between 2010 and 2015.[74] In 2015, the average Chinese manufacturing worker earned about $8,000 U.S.[75] But at the same time, labor productivity grew by 15 percent a year from 1999 and 2007.[76] By another estimate, Chinese productivity growth averaged 11.5 percent from 2000 to 2011, compared with 1.9 percent average growth in the United States.[77]

Also, the Chinese economy is less dependent on low-wage industries as the Chinese government moves into its second decade of pushing its indigenous innovation strategy to try to move into higher-value industries. While we like to imagine that China only out-competes us in low-cost industries, with the United States holding onto the industries that really matter, the truth is that China is challenging the United States in an increasing breadth of industries. They have poured investments into industries such as semiconductors, solar panels, and others, often with the explicit goal of displacing the United States as world leader.[78]

Can Manufacturing Return?

Many of the defenders of the Washington consensus are loathe to admit that manufacturing can come back, for to admit this is to admit that there may have been steps the United States could have taken to limit offshoring in the first place. National Public Radio reports that "the plain truth is that, legally speaking, there's not a lot that Trump or any other president could do to bring those jobs back."[79] Andrew McGill writes in *The Atlantic* that "A presidential candidate who promises to claw back the careers of 1979 is probably making a promise they can't keep. They would do better to find jobs that fit this decade's economy instead."[80] *FiveThirtyEight* economist Ben Casselman is even blunter: "A plea to presidential candidates: Stop talking about bringing manufacturing jobs back from China. In fact, talk a lot less about manufacturing, period. … Whether or not those manufacturing jobs could have been saved, they aren't coming back."[81]

But there is a difference between saying that all offshored work can come back and saying that some can. Clearly some of it can't come back, nor should we want it to. Low-wage, low-skill, commodity production is not the kind of work where the United States has a comparative advantage. But as Harry Moser of the Reshoring Initiative has argued, with the right management decisions, particularly to take into account what he terms total cost of ownership, and with the right policies (e.g., a lower effective tax rate on firms in traded-sector industries; support for pre-competitive, cooperative research and development; support for export financing from entities like the Ex-Im Bank), at least 1 to 2 million manufacturing jobs could be reshored.[82] Likewise, the Boston Consulting Group has shown that a weaker dollar and other factors could reduce or even close the cost gap with China, allowing U.S. production of many products now sold in America but produced in China.[83]

Second, even if it costs more to produce in the United States, the real question about whether it boosts economic welfare is why it costs less overseas. If the reason is because of natural competitive advantages (for example, if electronics assembly went overseas because Chinese wage costs are much lower and that work cannot be done in the United States in a way that is productive enough to offset the cost differential), then that's one thing. But if the cause is foreign mercantilism, such as export subsidies or currency manipulation, then eliminating those policies could bring back work or at the very least prevent more jobs from going overseas than necessary.

In the short run, this would lead to higher prices. But in the long run it would lead to lower relative prices, as the dollar would not have to fall as far for the United States to finally run a trade surplus. (The United States cannot run a trade deficit forever, since by definition that would mean it is taking goods and services from trading partners in exchange for a perpetual IOU.) Finally, looking at the issue solely from a consumer-welfare perspective misses the fact that most consumers are also workers, and the higher wages that come from bringing back some work would offset at least some of the increase in prices.

If the United States enacts policies to more effectively counter foreign policies and jumpstarts its productivity growth to compete with other advanced economies, then it can increase its manufacturing output by around $630 billion annually, level its trade deficit, and create around 1.3 million U.S. jobs across the country.[84] Though far from replacing all of the more than 5 million jobs lost since 2000, this certainly would be a major boost to Americans' prosperity, returning high-paying jobs to many communities that have been negatively affected by globalization and creating powerful multiplier effects that will reverberate across the nation.

CONCLUSION

Instead of blithely assuming that all or most of the U.S. manufacturing jobs were lost due to automation, more analysts, pundits, and journalists need to take a more nuanced and careful look at the evidence. Clearly, both automation and trade impacted manufacturing employment. Maintaining black and white views on trade and technology's impact on manufacturing prevents the kind of informed debate needed to effectively address how best to support U.S. manufacturing. Likewise, instead of a Pollyannaish attitude that U.S. manufacturing is invincible, or that no jobs can be reshored and we should move on to become a service economy, we need a more sober assessment that recognizes that the United States still has strengths (we haven't deindustrialized to the extent of the United Kingdom), but that it faces real challenges, particularly foreign mercantilism, a short-term investment focus, and lack of a robust national traded-sector strategy and the policies to accompany it, including increased investment in technology and skills. As ITIF stated in 2015, "it is unwise to assume that U.S. manufacturing will continue to rebound without significant changes in national policy."[85] Hopefully the new Congress and the new Trump administration will act swiftly and smartly to enact much-needed reforms that provide manufacturing with a stable foundation for growth.

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ERRATA

This report has been updated on page 20 and in endnote 84 to clarify the methodology used to estimate the number of manufacturing jobs that would be created if the United States were to boost manufacturing productivity enough to close its manufacturing trade deficit.

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