See highlighted portions and your blue font notes: loss of manufacturing jobs was major factor for Ohio's economic decline, and loss of jobs to right-to-work states (domestic competition) was the second-largest factor, and the largest factor (job loss from automation) was also likely exacerbated by union-inflated high labor costs.

PAPER ONE

The Decline of Ohio

By **William Shkurti** and **Fran Stewart**

KING OF THE HILL

In the quarter-century following the end of World War II, Ohio's workers stood in the front ranks of the industrial elite. If America was the "shining city on a hill" President Reagan would later invoke on the eve of his election, then Ohio's bustling factories built its sturdy foundation. Whether making auto parts and machine tools in the Cuyahoga Valley, steel tubing in the Mahoning Valley, or business machines and appliances in the Miami Valley, Ohio workers numbered among the best-paid and most productive in the world.

This industrial might benefitted the nation and state at the same time that it rewarded the individual worker. Ohio's factory workers needed no college degree or advanced education to support their families. As long as they had the skill and the inclination to do the work, these workers could look forward to making enough to own a comfortable home in a safe neighborhood, being cared for by employer-provided health insurance, sending their kids to a nearby public college, and enjoying a well-earned retirement secured by an employer-sponsored pension plan.

Then, seemingly without warning, everything changed. Starting with the 1969 recession and accelerating with the onset of the 1974 recession, factories began to close. And less than a decade later, the double-dip recession of 1980 to 1982 threw thousands of Ohio workers out of jobs they had held for years. It soon became fashionable to refer to parts of Ohio and its industrial neighbors as the "Rust Belt." Although some areas managed to shake off the moniker, for too many communities the term telegraphed the societal corrosion that accompanied economic decline.

Ohio, once the shining example of middle-class progress, suddenly became known for a much darker reality, as too many of its citizens lost hope for a better life for themselves and their loved ones. Today, too much of Ohio has become the nation's poster child of opioid addiction and crumbling communities. Many villages and towns that are beyond the reach of commuters to the state's major metropolitan centers are experiencing social problems at rates once reserved for the poorest inner city neighborhoods.[1]

This is not something that happened overnight, nor is it unique to Ohio. But having a better understanding of what happened and why is an essential first step in shaping an appropriate response. This paper is the first of a three-part exploration of Ohio's path downward and its path forward. The next section traces the magnitude of the decline over time. An examination of the multiple causes, particularly as they relate to manufacturing, follows. This paper concludes with an assessment of the impact on local communities.

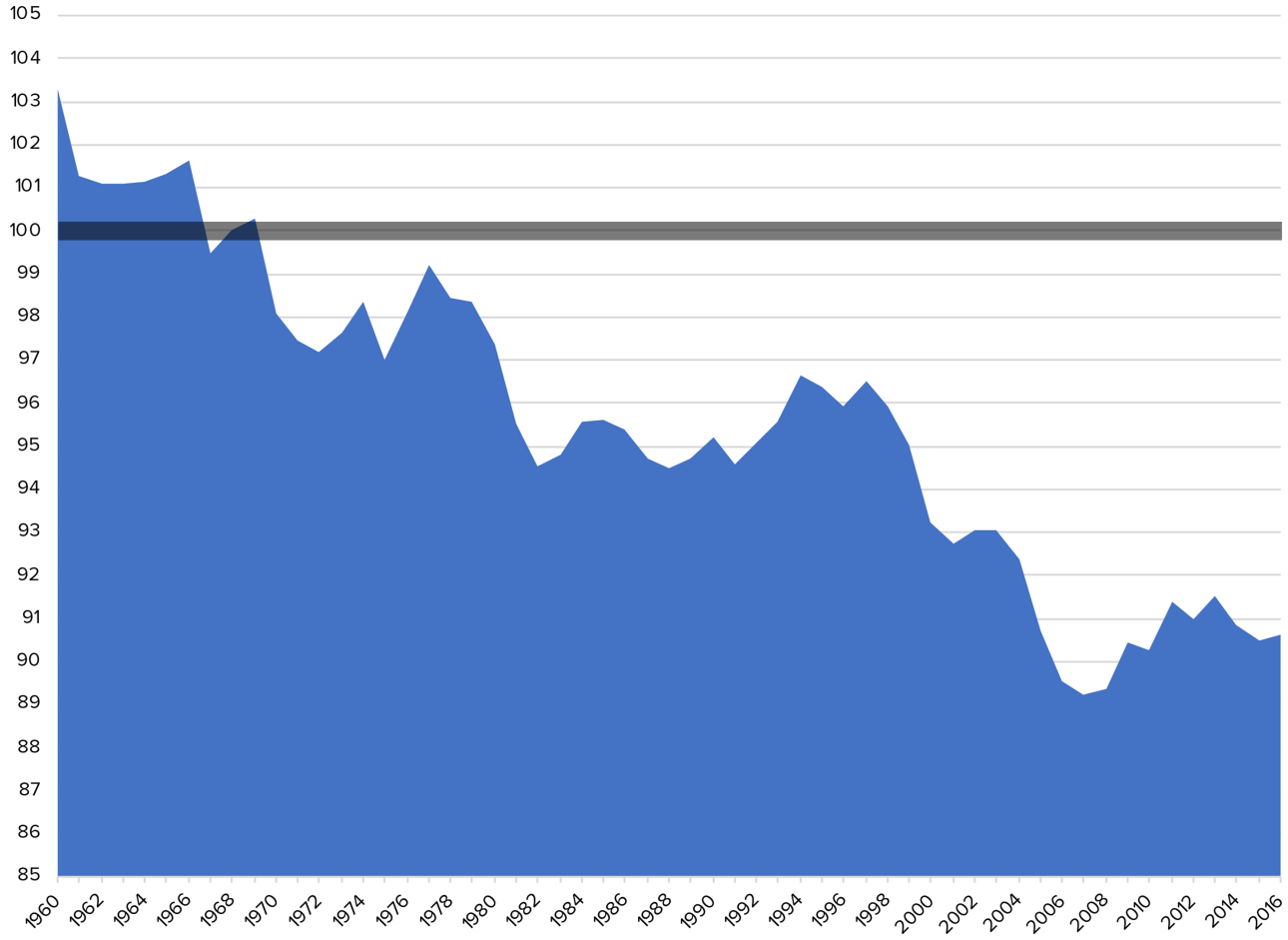
TRACING OHIO'S RELATIVE DECLINE

Ohio's economic well-being can be assessed and compared to the rest of the country in a number of ways (see Appendix A). The measure we have selected for this report is per capita personal income. Per capita personal income includes all income Ohioans collectively receive from wages, salaries, investments and government transfer payments (such as Social Security) divided by total state population. This is the most comprehensive measure of economic strength because it captures income available to families, and it also reflects the tax base to support pubic services such as schools and safety. The Bureau of Economic Analysis in the U.S. Department of Commerce reports these figures annually.

Per capita income has grown in Ohio since the late 1960s, but that growth has been slow and the state's position relative to the nation as a whole has deteriorated. Figure 1 compares the economic progress of the average Ohioan to the U. S. average since 1960. It displays the ratio of Ohio's annual per capita income to the nation's annual per capita income. If the ratio is equal to 100, then average personal incomes in Ohio and the nation are equal; if above 100, Ohio's average income is higher than the nation's; if below 100, Ohio's per capita income is lower than the nation's. A thick black line marks the 100 value in Figure 1.

The last year Ohio's per capita income was equal to the nation as a whole was 1968. After that, a pattern was established of relative decreases in per capita income in Ohio following the onset of a national recession. The nation experienced a recession in 1969 and another in 1974. The nasty double-dip recession started in 1980,

Figure 1 Ratio of Ohio Per Capita Income to U.S. Per Capita Income



Source: U.S. Bureau of Economic Analysis, Personal Income Per Capita [A792RC0A052NBEA] and Per Capita Personal Income in Ohio [OHPCPI], retrieved from FRED, Federal Reserve Bank of St. Louis; February 13, 2018.

and a recession followed in 1990. A shock that was short in duration and mild nationally took place in 2000 and proved to be the start of an economic tsunami that hit Ohio hard, and the Great Recession of 2007 is clearly visible. In 2007, the ratio bottomed out at 89.2. In other words, Ohio's average personal income was 10.8 percentage points below the national average. By 2016, Ohio had recovered a bit and was 9.4 percentage points below the national per capita income.

In 2016 national per capita income totaled $49,246, while Ohio's was $44,568, a difference of $4,678 per person. Spread over 11.7 million Ohioans, that totals $54 billion not available for Ohioans to spend on themselves, their families and their communities.

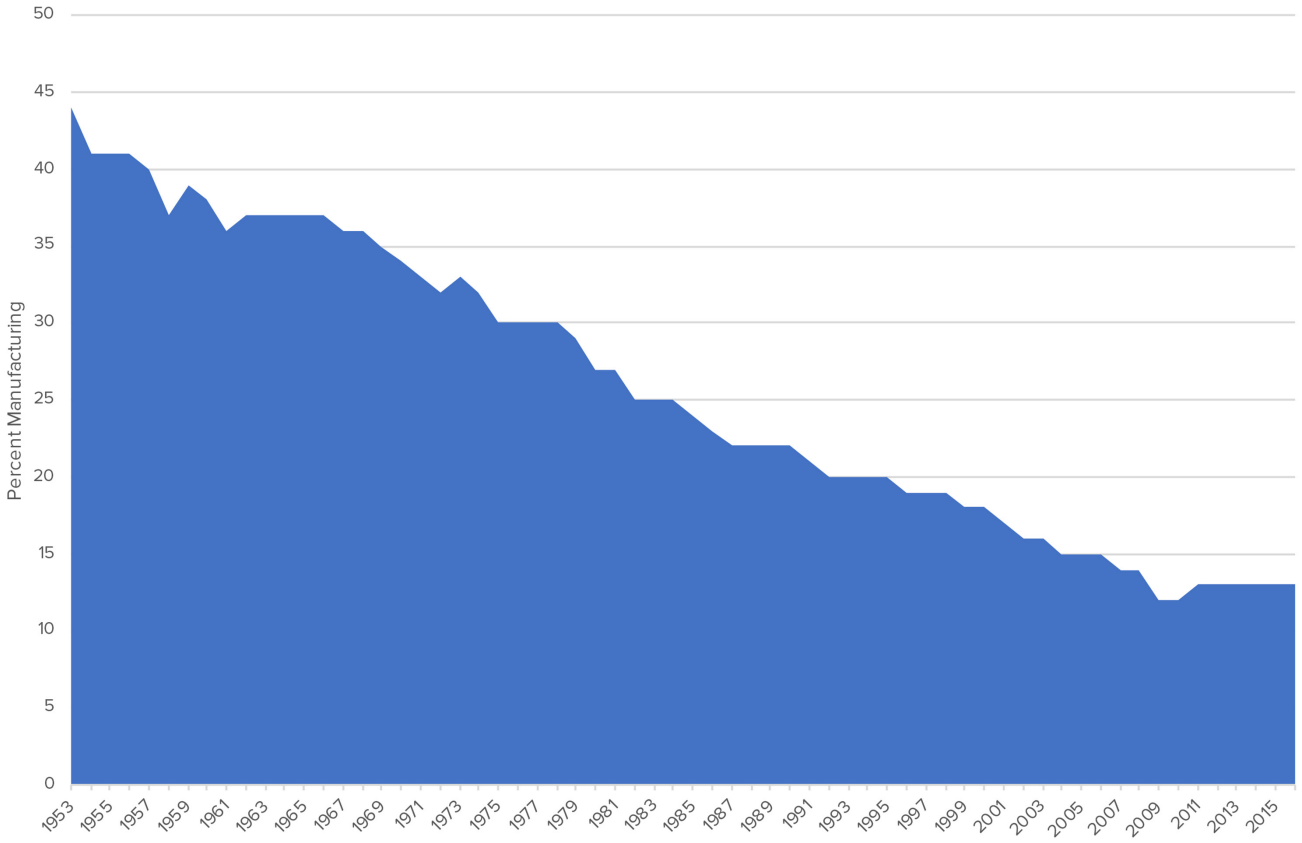
OHIO MANUFACTURING GOES LEAN

Ohio's relative decline in economic well-being reflects a number of factors, but the state's loss of high-paying manufacturing jobs has been a major contributor. Figure 2 traces the decline in manufacturing jobs in Ohio as a share of all jobs in the state since 1953. After reaching 44 percent in 1953, manufacturing as a share of state employment has declined steadily since.

The reason this is important is that it helps explain why Ohio has fallen behind in relative per capita income compared to the country as a whole. Manufacturing jobs have traditionally paid well compared to other jobs. In general, manufacturing jobs paid 5 percent to 10 percent more per hour than other jobs through the mid-1990s.

In Ohio, manufacturing wages were even higher. Figure 3 traces the average hourly wage of Ohio manufacturing workers compared to manufacturing workers in the country as a whole since 1953, where the national

Figure 2 Percent of Nonagricultural Jobs in Manufacturing in Ohio



Source: Figures prior to 1990 are from U.S. Census Bureau, *Statistical Abstract of the United States* (various years), Bureau of Labor Statistics, "Employment in Non-Agricultural Establishments by Industry by State," and post-1990, Ohio Bureau of Labor Market Information, "Current Employment Query" at ohiolmi.com.

average equals 100. In other words, in 1953, Ohio manufacturing workers made an average of 10 cents more per dollar per hour compared to their counterparts across the country. This reflected, in part, the concentration of highly paid union workers in the automotive, rubber and steel industries across the industrial Midwest. This wage "premium" reached a high of 20 percent in 1993 and remained as high as 15 percent until 2005. However, the bottom fell out on Ohio's manufacturing wage premium during the Great Recession of 2007-2009, and the differential has not returned.

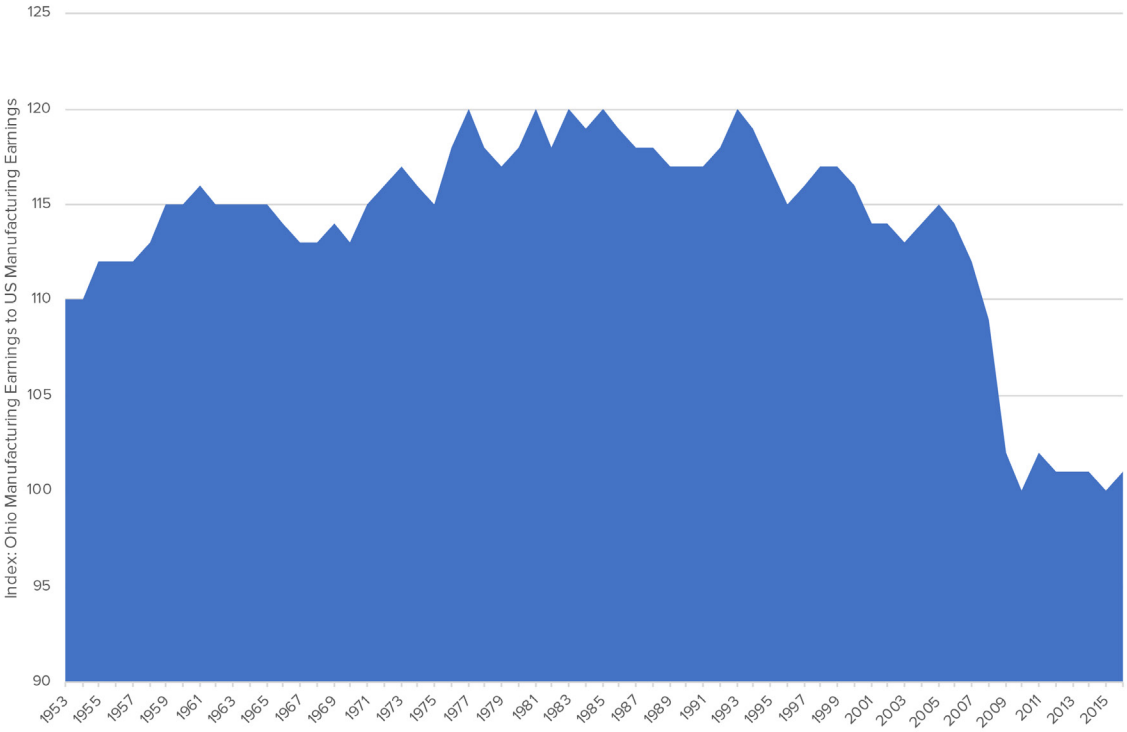
In other words, Ohio has suffered from a trifecta of bad news since the heyday of manufacturing: Well-paying manufacturing jobs have declined in total. The wage premium manufacturing workers earned compared to nonmanufacturing workers has evaporated. And the premium Ohio manufacturing workers earned compared to manufacturing workers in other states has disappeared. Why these declines have happened is explored in the next section.

SEARCHING FOR CULPRITS

Since Ohio's preeminent status in manufacturing peaked in the late 1960s, an intense, decades-long debate has ensued over who is at fault for the loss of 700,000 manufacturing jobs (see Figure 4). Blame is often placed on one of three culprits: cheap, foreign-made goods (particularly after China joined the World Trade Organization in 2001), domestic competition from right-to-work states, and automation. By using detailed data on manufacturing published by the Census Bureau's Census of Manufactures and other sources, we have been able to estimate the relative influence of these forces.

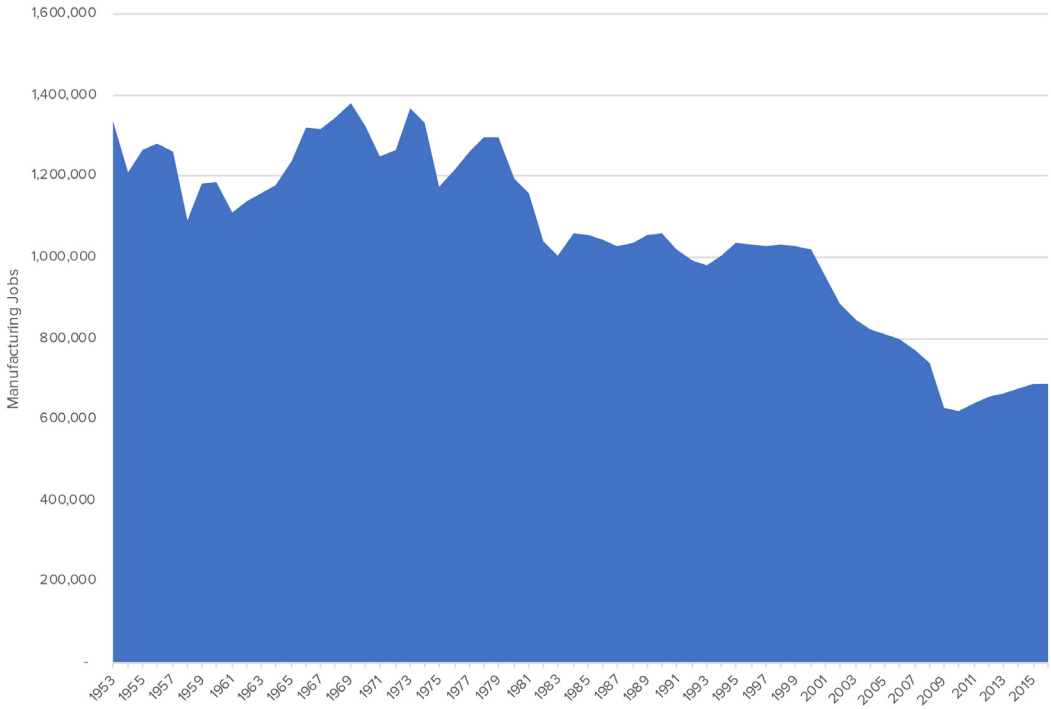
Our calculations involve a set of assumptions and interpretations that are, by nature, subjective. For example, the Census of Manufactures does not specifically measure the impact of automation or foreign trade. The impact

Figure 3 Ohio to U.S. Manufacturing Earnings Index



Source: U.S. Census Bureau, *Statistical Abstract of the United States* (various years), Bureau of Labor Statistics, "Wages of Production Workers in Manufacturing by State."

Figure 4 Number of Manufacturing Jobs in Ohio



Source: Figures prior to 1990 are from U.S. Census Bureau, *Statistical Abstract of the United States* (various years), Bureau of Labor Statistics, "Employment in Non-Agricultural Establishments by Industry by State," and post-1990, Ohio Bureau of Labor Market Information, "Current Employment Query" at ohiolmi.com. For a discussion of methodology, see Appendix B.

from these forces must be inferred from other data sources. Our calculations also try to isolate individual influences, all of which affect the manufacturing process in different ways at different times. To reflect this, we have provided estimated ranges rather than specific numbers. Finally, Census of Manufactures data are collected only every four years, so instead of 1969 and 2015 as benchmarks, we are limited to the closest corresponding years for which data are available —1967 and 2014. Nevertheless, this analysis provides some clarity as to the nature of Ohio's challenges.

Domestic Competition

In order to estimate the number of Ohio manufacturing jobs lost to domestic competition, we used data from the Census of Manufactures to calculate the difference between the number of manufacturing jobs Ohio had in 2014 and what it would have had if the state had retained its 1967 share of the national total. In 1967 that share was 7.3 percent of U.S. manufacturing jobs. By 2014 that share had dropped to 5.5 percent, a loss of 1.8 percentage points. There were 11,624,500 manufacturing jobs in the United States in 2014; 1.8 percent of that equals more than 209,000 jobs lost to decreased domestic market share.[2]

As an alternative measure, we calculated the change in Ohio's share of manufacturing value added over the same period. Ohio's share of value added dropped from 7.8 percent in 1967 to 5.5 percent in 2014, a difference of 2.3 percentage points. If Ohio's share of manufacturing employment fell proportionally, that would mean Ohio lost 267,000 manufacturing jobs due to domestic competition.

Thus, we estimate manufacturing job losses due to domestic competition ranged from 209,000 to 267,000. It is important to note that the loss of these manufacturing jobs to other states occurred primarily during the 1967-1990 period. Ohio's share of total U.S. manufacturing employment bottomed out at 5.4 percent in 1990 and has since stabilized, suggesting that Ohio has more than held its own against domestic competition. Foreign competition is another matter.

Foreign Trade

Measuring the impact of the U.S. trade deficit on Ohio manufacturing jobs is both complicated and controversial. Estimates vary significantly, but here's what we do know:

- In 1967 the United States maintained a small surplus in its international trade transactions involving merchandise.
- U.S. factories continued to run a surplus through 1982, but by 1993, the year before NAFTA, the surplus had turned into a more than $100 billion deficit.
- This trade deficit grew to more than $300 billion by 2001 when China was accepted into the World Trade Organization and gained access to American markets.
- By 2014 the U.S. trade deficit in goods had exploded to $751 billion.[3]

Translating this into manufacturing jobs lost in Ohio is not straightforward. There are a number of different estimates. Public Citizen, a Ralph Nader-affiliated group that has been critical of U.S. trade policy, estimated manufacturing job losses due to foreign imports for every state from 1994 to 2017. The group arrived at its estimate by adding up the certifications for manufacturing jobs lost that were issued by the U.S. Department of Labor under the Trade Adjustment Act.[4]

Public Citizen's job loss estimate for Ohio is 151,000. The group argues that this estimate understates the real number because certification is difficult under terms of the act. Although there may be some truth to this, the estimate does not take into account jobs that have been added due to increased sales abroad. For example, between 2000 and 2014, sales of Ohio-manufactured goods abroad doubled from $26 billion to $52 billion.[5]

Another approach is to use sophisticated econometric models that take into account both jobs gained and jobs lost, as well as other factors. The Economic Policy Institute, a think tank with ties to organized labor and critical of U.S. trade policy, ran such a simulation of manufacturing jobs lost by state between 2001 and 2015 due to the U.S. trade deficit with China. The EPI estimated that trade with China had cost Ohio 121,500 jobs.[6]

Independent economists David Autor and Daron Acemoglu, of MIT's Economics Department, have written extensively on this topic. Their most recent estimate indicated that Chinese imports cost between 853,000 and 1.4 million manufacturing jobs across the United States between 1991 and 2007.[7] This compares to an estimate of 3.4 million from the Economic Policy Institute for the 2001-2015 period.

The MIT group did not provide separate estimates for each state. However, if we use the Economic Policy Institute's calculation that Ohio accounts for 3.6 percent of jobs lost due to Chinese imports, the MIT number would translate into a loss of between 31,000 and 51,000 manufacturing jobs in Ohio. If we use instead Ohio's share of total manufacturing employment (5.8 percent), the figures would be 49,000 and 81,000.

These figures apply to Chinese imports only. Imports from Canada, Mexico and other countries have grown as well. Chinese goods account for about half of the trade deficit in manufactured goods.[8] Therefore, if we double the estimate of jobs lost only to China to approximate the jobs lost to the trade deficit for all countries, the total grows to between 62,000 and 160,000 jobs.

The Ball State University Center for Business and Economic Research modeled the loss of manufacturing jobs between 2000 and 2010 and determined that only 13.4 percent of the total job loss was attributable to the foreign trade deficit. The report attributed the remainder to automation.[9] If we apply that proportion to Ohio's loss of 700,000 manufacturing jobs from 1967 to 2014, that would be the equivalent of 94,000 jobs.

Reviewing all these numbers, we can fairly conclude that Ohio lost between 62,000 and 243,000 jobs due to growth in the foreign trade deficit since the early 1980s. The lower number rests on the MIT calculation. The higher number reflects the Economic Policy Institute's calculation with an adjustment to reflect all foreign trade, not just China. Remaining open is the question of the role played by automation.

Automation

The Ball State University Center for Business and Economic Research attributed 87 percent of the manufacturing job loss from 2000 to 2010 to automation. To test this argument, we estimated the impact of automation on the Ohio manufacturing workforce from 1967 to 2014. We did this by calculating the increase in productivity of Ohio factory workers in this period using two different methods.

The first method was to use value added per job, adjusted for inflation (value added is the difference between the sale price of goods coming out of factories and the costs of raw materials and parts going in). In 1967 this was $15,616. By 2014 it had grown to $60,612 in 1967 dollars.[10] In other words, one Ohio factory worker in 2014 could produce what it took almost four (3.9) to do in 1967. This translates into the loss of more than one million jobs (only 338,000 workers would have been needed at 2014 productivity levels, compared to 1.3 million workers needed at 1967 levels). This analysis is incomplete because it does not take into account the additional sales Ohio factories were able to generate because they were more productive. Ohio factories produced almost twice as much in 2014 as they did in 1967. Meeting this increase in the value of sales required approximately another 301,000 workers. Table 1.1 provides our process in modifying the job loss figures.

Table 1.1 Net Job Loss Due to Productivity Improvements, 1967-2014, Value Added Estimate

Variation	# Workers
1967 Output at 1967 Productivity Level	1,310,000
1967 Output at 2014 Productivity Level	338,000
2014 Additional Output at 2014 Productivity	301,000
2014 Subtotal (338,000 + 301,000)	639,000
Difference (1,310,000 – 639,000)	671,000

Source: U. S. Bureau of Census, 1967 *Census of Manufactures*, "Manufactures by State" in 1970 Statistical Abstract, 699, and U. S. Bureau of Census, "Survey of Manufactures – Summary by State, 2014," in *Proquest Statistical Abstract 2017* (online edition), Table

Based on the methodology explained above, Ohio's economy lost 671,000 jobs due to improved productivity — both in terms of improved physical productivity and increased production of products with higher profit margins, or value added.

We did an alternative calculation (shown in Table 1.2) based on the national figures on the value of output per worker hour developed by the U.S. Department of Labor. The outcome was similar, but not identical. The Department of Labor calculation shows that productivity improved more than fourfold (4.2) between 1967 and 2014.[11] This compares to our estimate of 3.9 described above. In other words, if total productivity in Ohio equaled the national average, then one worker

in 2014 could do what it took 4.2 to do in 1967.

This means Ohio lost between 671,000 and 718,000 jobs between 1967 and 2014 based on automation alone. Which estimate is more likely? Ohio's manufacturing sector does not specialize in the manufacture of the highest value-added products that have appeared in the U.S. economy over the past half-century, such as electronics, integrated circuits, pharmaceuticals and chemicals. This makes us lean toward the lower estimate.

Table 1.2 Net Job Loss Due to Productivity Gains, 1967-2014, Using National Output per Worker Hour

Variation	# Workers
1967 Output at 1967 Productivity	1,310,000
1967 Output at 2014 Productivity	313,000
2014 Additional Output at 2014 Productivity	279,000
2014 Subtotal (313,000 + 279,000)	592,000
Difference (1,310,000 – 592,000)	718,000

Source: U. S. Bureau of Labor Statistics, "Labor Productivity and Costs" at data.bls.gov.

The Sum of All Culprits

So, the loss of jobs to right to work states (i.e., labor unions) is second biggest cause of loss of manufacturing jobs, and biggest cause (automation) may also have been fueled in part by high, union-inflated manual labor costs.

This table lists the estimated job losses attributed to all influences: domestic competition, foreign competition and automation. These numbers exceed the 700,000 lost manufacturing jobs referred to earlier because they include jobs not created because of lost market share as well as existing jobs that were actually lost.

These figures clearly show that all three forces contributed to the loss of Ohio manufacturing jobs, but they strongly suggest that automation was a bigger factor than the remaining two combined. This means any future set of policy initiatives needs to make sure Ohio workers are able to update their skills to keep up with changing technologies.

Table 1.3 Estimate of Jobs Lost and Not Created Due to Competition and Automation by Category, Ohio, 1967-2014

Category	Low Estimate	High Estimate
Domestic Competition	209,000	267,000
Foreign Trade Deficit	62,000	243,000
Automation	671,000	718,000
Total	942,000	1,228,000

Source: Estimates by authors. For sources see discussion in the applicable preceding section.

LOCAL COMMUNITIES SUFFER

Statewide figures are useful for examining context and statewide policies, but job markets are regional, and economic well-being can vary greatly by geography. For example, in the early 1970s, when Ohio's average per capita income was just starting to fall below the national average, high-income jobs were not spread evenly across the state. Each of Ohio's six most populous counties was above the national average, and in the cases of Cuyahoga and Montgomery counties, substantially so. Most of the state's other counties, particularly the smaller, more rural ones, had below-average per capita incomes. Sixty-eight of Ohio's 88 counties, including five of the biggest six, saw their per capita incomes decline relative to the nation as a whole from 1970 to 2015. The decline, while widespread, was anything but even. Table 1.4 shows the change in prosperity for Ohio's six largest counties, which accounted for 42 percent of the state's population in 2015.

Montgomery County, which includes the city of Dayton, fell further than any of Ohio's 88 counties. The county's bedrock in 1970 was a thriving middle class, but a brutal series of factory and related headquarters closings over the next 45 years cost it 65,000 of its 91,000 manufacturing jobs, much of

Table 1.4 Per Capita Income for Ohio's Six Largest Counties Compared to the National Average, 1970 and 2015 (National Average = 100)

County	1970	2015	Difference
Cuyahoga	115	101	-14
Franklin	102	97	-5
Hamilton	108	108	0
Summit	102	96	-6
Montgomery	112	88	-24
Lucas	104	87	-17

Source: Ohio Department of Development, Ohio Research Office, BEA Per Capita Income (May 2017)

So the loss of manufacturing jobs was major cause of Montgomery County having largest economic decline.

its middle class, and associated corporate leadership positions. Factory closings included Dayton Press in 1981 (2,000 jobs lost), GM Delphi in 2006 (3,000 jobs), GM Moraine in 2008 (2,200 jobs) and, in a final demoralizing blow, the departure of the National Cash Register headquarters in 2009 and its 1,000 jobs. NCR had called Dayton home for 125 years, employing as many as 18,000 people in the city in the mid-1960s.

In 1970 pollsters Richard Scammon and Ben Wattenberg identified the wife of a machinist in a suburb of Dayton as the example of the typical middle-class swing voter who would determine elections over the next decade. In 2017 MSNBC featured Montgomery County as a classic example of the challenges facing local communities in dealing with opioid addiction.[12]

The next three biggest losers in relative income are listed below. All three suffered big losses in manufacturing jobs.

Marion Power Shovel once employed 3,200 workers and produced the steam shovels that built the Panama Canal. It closed its doors in 1978. Closure of Armco steel in 1981, Quaker Oats pet food in 1989, and Con Agra popcorn in 2014 followed. Marion did manage to hold onto its giant Whirlpool plant (2,000 employees) but suffered losses amounting to 3,600 jobs (38 percent of the total) between 1970 and 2015.

Richland County, in the center of the state, suffered the loss of 10,000 jobs over this period from a string of plant closings that included Mansfield Tire and Rubber in 1978, Westinghouse Appliances in 1990, Tappan appliances in 1992 and its GM stamping plant in 2010.

Table 1.5 Ohio Counties With Largest Decline in Per Capita Income, Compared to National Average, 1970 and 2015 (National Average = 100)

County (Largest City)	1970	2015	Difference
Montgomery (Dayton)	112	88	-24
Marion (Marion)	90	68	-22
Richland (Mansfield)	95	74	-21
Trumbull (Warren)	97	76	-21

Source: Ohio Department of Development, Ohio Research Office, BEA Per Capita Income (May 2017).

In 1970 Trumbull County boasted the highest proportion of manufacturing workers (49.1 percent) of any Ohio county. It lost nearly 70 percent of its manufacturing jobs (30,000 out of 43,000) between 1970 and 2015. Employment at the giant Lordstown GM plant fell from a peak of 12,000 in 1985 to just over 4,500 in 2015. The Delphi parts plant (formerly Packard Electric) in Warren, which once employed 11,000, closed altogether in 2014.

Eighteen of Ohio's counties showed gains in relative income over this 45-year period, but there is no dominant pattern as to which ones or why. Some were wealthy suburban counties. Some were not. Some added manufacturing jobs; others lost manufacturing jobs but grew anyway. This shift is discussed in more detail in Paper Two, but the devastating impact of lost manufacturing jobs is clear across the state.

Numbers alone fail to capture the devastation many Ohio communities have endured. The cycle of economic despair includes job loss, population loss, disrupted families and demoralization. Narratives from natives who grew up in these communities have become a growth industry of sorts. The most well-known is J.D. Vance's 2016 book, *Hillbilly Elegy: A Memoir of a Family and Culture in Crisis*, about his hometown of Middletown, Ohio. But other books and articles with similar observations and recollections have been written as well. Former Ohio State University-Mansfield professor Christopher Phelps, who taught at the regional campus for 10 years, wrote about the devastating effects of the closing of the GM stamping plant and other factories on the Mansfield area in *Nation* magazine in 2010. Harvard public policy scholar Robert Putnam wrote about his troubled hometown of Port Clinton in "Crumbling American Dreams," an article that appeared in the *New York Times* in August 2013 and was at the core of his 2015 book *Our Kids*. Author Brian Alexander described how the loss of manufacturing jobs shattered the social fabric in his once-thriving hometown of Lancaster in *Glass House: The 1% Economy and the Shattering of the All-American Town* (2017). And Sam Quinones' prescient 2015 book, *Dreamland*, told the tale of the devastation of communities and individuals caused by the toxic combination of no work and opiate addiction. The book focuses on a southern Ohio river town that lost its steel mill in the 1980s. That town is Portsmouth.

CONCLUSIONS

The subject of this paper is Ohio's economic trajectory since the late 1960s. The relatively high incomes that Ohioans enjoyed compared to the rest of the nation declined steadily after 1969. The loss of approximately 700,000 well-paying manufacturing jobs between 1970 and 2015 has negatively affected the lives of Ohioans and communities across the state. It is not that Ohio is no longer a manufacturing state; it very much is one. What is produced in the state has higher value, production is highly automated, and what we make is different today than it was in the late 1960s. Labor-intensive manufacturing is gone from Ohio and will never return. Factories that employ more than a thousand workers have nearly disappeared, with auto and truck assembly, aircraft engines and appliance factories being among the few exceptions.

These losses reflect multiple causes, including increased domestic and foreign competition. However, the most powerful force has been the automation of factory jobs, followed by a drop in demand for products of historic importance to the state — especially steel. Automation has allowed many of Ohio's factories to remain competitive and has opened up opportunities for some Ohioans but at the expense of opportunities for other Ohioans, especially those lacking a college degree.

The state's changing economy has varied greatly by community. Large metropolitan areas, such as Cleveland, Columbus and Cincinnati, have not been immune but have been able to offset some manufacturing job losses through diversification. Many less-populous counties have found it more difficult to grow other forms of business after major plant closings. Yet some other Ohio counties have managed to thrive for various reasons.

While these issues of economic decline have festered for years, the soaring rates of opioid addiction and the discontent voiced by white working-class voters in the 2016 presidential campaign have pushed these concerns more firmly onto the national agenda and have raised fears of the nation polarizing into haves and have-nots.

The next paper in this three-article series examines the impact of these changes on Ohio's workforce.

APPENDIX A — MEASURING THE STANDARD OF LIVING

There are alternate ways to measure the relative performance of Ohio's economy. We have chosen personal per capita income because it is the most comprehensive measure of the relative standard of living for Ohio residents. It includes wages and salaries as well as investment earnings and transfer payments, such as Social Security. Another useful measure is per capita disposable income because it measures how much money people have left to spend after taxes. However, this calculation does not reflect the ability of the state's taxpayers to support public services, such as schools and local law enforcement. Another potential indicator is median household income, which is a better measure in some ways because it is less subject to distortion by a relatively small number of extremely wealthy people. However, median household income is also subject to other extraneous influences, such as average household size.

Table 1.6 Ohio versus U.S. Average, Selected Income Measures (1969-2015)

Measure (U.S.=100)	1969	1969	2015
Per Capita Personal Income	101	96	91
Per Capita Disposable Personal Income	101	95	92
Median Household Income	108	100	92

Sources: "Personal Income *and Employment by Region, State and Area," in Hannah M. Anderson (ed.), Patterns of Economic Change by State and Area, Fourth Edition* (Lanham, MD: Bernan Press, 2016), p. 51; and U.S. Bureau of Census, "Median Money Income of Families by State," in *Current Population Reports*, selected years.

Two other possible measures are gross state product (GSP) and employment growth. GSP measures the value of goods and services produced but does not reveal how much of that trickles down to workers. In addition, that data series only dates to 1987. Employment growth is important, but that number alone does not tell whether the jobs that are being added are high-paying or low-paying ones.

The table below provides all three income-related indicators over a 46-year period at three critical points: 1969, while Ohio income still equaled the national average or better; 1993, the year before NAFTA took effect; and 2015. The results for per capita personal income and per capita disposable income are similar. The results for median household income are similar for 2015 but show a greater decline than the other two measures both from 1969 to 1993 and from 1993 to 2015.

APPENDIX B — MEASURING MANUFACTURING JOB LOSSES

Comparisons over time are useful in identifying long-term trends, but they are subject to data distortions when the definitions change. This proved to be true with the shift from the Standard Industrial Classification (SIC) system to the North American Industry Classification System (NAICS), which occurred in 2003 as part of the North American Free Trade Act (NAFTA). Changes made in 2003 reduced the number of jobs classified as manufacturing positions by about 6 percent.[13] Many manufacturing establishments were reclassified as part of the headquarters industry, administration and back office, or wholesale and distribution sector. The number of temporary employees working in manufacturing has grown rapidly in recent years as domestic manufacturing companies reacted to competitive cost pressures, but such workers are classified in the business services industry, not in manufacturing. The U.S. Department of Commerce estimates that temporary workers now account for 5 percent to 10 percent of manufacturing employment. This means that manufacturing employment has been undercounted compared to previous years.[14]

If these adjustments are appropriate, it means the loss of manufacturing jobs between 1969 and 2014 may have been overstated by as much as 11 to 16 percent, or between 161,000 and 235,000 jobs. Nevertheless, adjusting for this potential overstatement still means Ohio lost at least a half-million manufacturing jobs.

For the purposes of this paper, we have adjusted the pre-2003 manufacturing employment numbers down by 6 percent (88,000 jobs) to conservatively reflect current definitions. We did not attempt to adjust for contract workers because there is no reliable historical base to work from. It is possible these jobs don't pay as well as the permanent jobs they replaced, but it is also possible Ohio would have lost even more jobs had employers not taken these steps to remain competitive.

ENDNOTES

[1] See, for example, John Begala, *Big City Problems in Ohio's Small Towns.* Cleveland: Center for Community Solutions, November, 2016.

[2] U.S. Census Bureau, *U.S. Census of Manufactures, 1967* and *Annual Survey of Manufactures, 2014.*

[3] U.S. Census Bureau, "U.S. Trade in Goods and Services-Balance of Payments (BOP) Basis, 1960-2016," at census.gov/foreign-trade/statistics/historical/GANDS.

[4] The Trade Adjustment Act provides retraining for affected workers. See: Public Citizen, "Ohio Job Loss During the NAFTA-WTO Period" at citizen.org/our-work/globalization-and-trade.

[5] U.S. Census Bureau, "U.S. Exports of Goods by State of Origin: 2000 to 2015," *Proquest Statistical Abstract 2017* online, Table 1314.

[6] Economic Policy Institute, "Net U.S. Jobs Displaced Due to Trade Deficit with China by State 2001-2015" from epi.org/114752.

[7] Daron Acemoglu et al., "Import Competition and the Great U.S. Employment Sag of the 2000s," *Journal of Labor Economics*, 2016, vol. 34, no. 1, pt. 2, Table 8, electronically published December 16, 2015.

[8] U.S. Bureau of Economic Analysis, "U.S. Balances on International Transactions by Area and Selected Country: 2015 and 2016," Table 1300, *Proquest Statistical Abstract 2017.*

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The findings, conclusions, and recommendations expressed in this report are the product of research conducted by the authors and do not represent the views of either the John Glenn College of Public Affairs or The Ohio State University.