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## Aspirational Industries for Workforce Development in Youngstown

Iryna Lendel

Cleveland State University, [i.lendel@csuohio.edu](mailto:i.lendel@csuohio.edu)

Iryna Demko

Scott Corsi

Madeline Frantz

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Prepared by:  
*Research Team Led by*

**Iryna V. Lendel, Ph.D.**

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**Center for  
Economic  
Development**

1717 Euclid Avenue Cleveland, Ohio 44115  
[levin.urban.csuohio.edu/ced](http://levin.urban.csuohio.edu/ced)

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## ABOUT THE RESEARCH TEAM

**Iryna V. Lendel, Ph.D.**, is the Director of the Center for Economic Development and a Research Associate Professor at the Maxine Goodman Levin College of Urban Affairs at Cleveland State University. Dr. Lendel is an economist with vast experience conducting academic and applied economic research analyzing regional and urban economic development. Her research portfolio includes projects on industry analyses, regional clusters, and multiple economic impact studies, as well as state and regional science and innovation policies. She serves in an advisory capacity in national and state economic development organizations and is an Assistant Editor of *Economic Development Quarterly*.

**Iryna Demko, Ph.D.**, was a Research Associate at the Center for Economic Development. Dr. Demko specializes in data analytics, complex statistical and econometric modeling, and economic impact studies. Dr. Demko holds her Ph.D. degree in Agricultural, Environmental, and Resource Economics from Penn State University. She has co-authored peer-reviewed publications, outreach reports, presentations, and research data briefs published by the Center for Economic Development, Urban Land Institute, Center for Cooperatives at The Ohio State University, and Organic Trade Association.

**Scott Corsi** was a Graduate Research Assistant for the Center for Economic Development and a Ph.D. student in the Department of Urban Studies in the Maxine Levin College of Urban Affairs at Cleveland State University. His research interests include workforce and economic development. In the past, Scott has worked as an Associate Economist developing labor data and maintaining industrial and occupational databases. He has also led and participated in research projects aimed at improving the workforce in the 16-counties around Detroit, Michigan. He holds a Master's Degree in Economics from the University of Toledo.

**Madeline Frantz** is a Graduate Research Assistant for the Center for Economic Development. Her role in this project was to help write, edit, format, and create visual elements for the report. Madeline is a Master of Public Administration student at the Maxine Levin College of Urban Affairs at Cleveland State University.

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## INTRODUCTION

Youngstown continues the path of defining its optimal size,<sup>1</sup> new specializations, and image. Its ongoing struggle to keep employment and population was exacerbated by the 2018 closure of the General Motors plant in Lordstown and the effects of the Covid-19 pandemic. Along these transformations, career opportunities in Youngstown's legacy manufacturing industries are changing as manufacturers invest in advanced technologies that require new and increasingly specialized skills from their workforce. Such events have contributed to a growing workforce gap, limiting Youngstown's ability to recover. These challenges, however, can be reframed as an opportunity for the Youngstown region.<sup>2</sup> Understanding the region's changing workforce needs as opportunities will set up the Youngstown region to develop its local workforce for long-term success.

This report aims to identify Youngstown industries that provide opportunities for investment in workforce development by analyzing recent changes in productivity and wages within the region. We first use shift-share analysis to identify Youngstown industries benefitting from a regional competitive advantage before the onset of the Covid-19 pandemic since this time period may indicate a baseline for economic performance. Then, to determine which industries remained strong after the pandemic, we calculated 2019-2020 changes in productivity and wage growth compared to national trends. Industries that demonstrate past regional competitive advantage as well as productivity and wage growth despite the pandemic are considered priorities for focused workforce development efforts due to their regional specialization and demonstrated resiliency. By investing in a local workforce, Youngstown will leverage its regional strengths and support economic recovery.

## ECONOMIC BASE AND ASPIRATIONAL INDUSTRIES IN YOUNGSTOWN

This brief analyzes 47 industries, made up of Youngstown's 28 economic base industries and 19 of JobsOhio's aspirational industries (Appendix Table A1). This group of industries was compiled using Center for Economic Development research on Youngstown's economic base<sup>3</sup>, as well as input concerning the region's aspirational industries from the local Economic Recovery Coordinator team and JobsOhio. The economic base of Youngstown, determined by an industry's Location Quotient (LQ), indicates strong employment and output specialization within the region compared to national averages. The aspirational industries represent industry sectors that are considered a regional priority for future development within Ohio, including in Mahoning and Trumbull counties.<sup>4</sup>

In 2020, the Youngstown region generated nearly \$15.5 billion in output,<sup>5</sup> with almost 25% produced by the 47 industries featured in this study. Overall, the Youngstown region employed

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<sup>1</sup> A tale of two cities. (2022, March 12). *The Economist*.

<sup>2</sup> In this study, the Youngstown region in Ohio is represented by two counties on the eastern end of the state: Mahoning and Trumbull.

<sup>3</sup> Lendel, I.; Demko, I.; & Figueroa, G. G. (2021, September). [Opportunities for Youngstown in the Supply Chains of Northeast Ohio and Pittsburgh Economies](#). *Urban Publications*.

<sup>4</sup> Ibid.

<sup>5</sup> All output figures are reported in 2021 dollars.

a total of 153,850 people during the same year. About 16% of these workers contributed to the 47 base and aspirational industries. With 2,330 workers, the *Business Support Services* industry was the largest employer in Youngstown. The other top employers belong to the manufacturing sector.

**REGIONAL COMPETITIVE ADVANTAGE**

This study uses shift-share analysis for 2018 to 2019 to identify pre-pandemic regional economic strengths within Mahoning and Trumbull counties. A shift-share analysis breaks down a regional industry’s change (e.g., growth or decline) into three individual components: national share, industry mix share, and regional growth share.<sup>6</sup> The regional growth share determines the portion of change in an industry due to the regional competitive advantage (or disadvantage). Competitiveness in certain industries can be developed by factors such as industrial clustering, geography, legislation or regulation, workforce characteristics, infrastructure, or natural resource availability. Growth of the regional share component in a shift-share analysis helps to identify Youngstown’s core competitive advantage.

Six manufacturing industries, along with the related suppliers and repair, show regional competitive advantage in the manufacturing sector of Youngstown (Table 1).<sup>7</sup> Four of them are within the metal manufacturing subsector, and two industries are part of the metal manufacturing supply chain.

**TABLE 1. YOUNGSTOWN INDUSTRIES WITH REGIONAL COMPETITIVE ADVANTAGE IN BOTH EMPLOYMENT AND OUTPUT, 2018-2019**

NAICS Code	NAICS Description
3315	Foundries
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
4441	Building Material and Supplies Dealers
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers
3323	Architectural and Structural Metals Manufacturing
3312	Steel Product Manufacturing from Purchased Steel
3271	Clay Product and Refractory Manufacturing
3311	Iron and Steel Mills and Ferroalloy Manufacturing
3335	Metalworking Machinery Manufacturing

*Prepared by the Center for Economic Development using Moody’s Analytics Data*

*Note: See Appendix Table A1 for a full list of output and employment changes due to regional shift, including values*

<sup>6</sup> The national share component identifies the share of regional industry’s change attributable to the change of the national economy. The industry mix share component indicates change because a particular industry grew more (less) rapidly than that industry’s national growth (decline) level.

<sup>7</sup> The shift-share analysis on changes in employment and output in 47 Youngstown’s economic base and aspirational industries illustrates that nine of the 47 industries experiencing regional growth in employment and output between 2018 and 2019.

Youngstown *Foundries* demonstrated the largest increase in employment due to regional strength, growing 7% between 2018 and 2019, while output increased by over 2%. Youngstown's dominant competitive advantage in metal manufacturing aligns with the region's history. Iron and steel production in Youngstown dates to the 19<sup>th</sup> century, and the industry subsequently grew with demand from two World Wars and the booming American automobile industry. The overall decline in employment in the steel industry resulted from process innovation that required fewer employees to maintain or increase productivity levels.<sup>8</sup> This switch to advanced manufacturing methods is ongoing, and with the targeted workforce development programs that train highly-skilled advanced manufacturing workers, Youngstown may maintain its reputation as a center for American manufacturing.

The industries demonstrating the second and third highest regional competitive advantage are part of Youngstown's metal manufacturing supply chain. *Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance* demonstrated a 3% increase in employment and output due to regional strength. This is a repair services industry that specializes in industrial machinery, employing technicians that keep the region's production facilities running smoothly. Most of the companies in this industry are small, but prominent employers include Dearing Compressor and Pump Company and National Heat Exchange Cleaning Corp. Youngstown's leadership in this industry may be attributed to the 2018 acquisition by Dearing Compressor and Pump Co. of Pittsburgh-based Kruman Equipment that has led to a larger customer base and new employment opportunities.<sup>9</sup>

The *Building Materials and Supplies Dealers* industry increased by 3% in both employment and output due to regional competitive advantage. Companies in this industry purchase supplies from regional metals manufacturers for use in construction projects. According to a TeamNEO report in collaboration with the Construction Employers Association and Cleveland Building & Construction Trade Council, construction industry employment experienced a 19% growth in the decade preceding the Covid-19 pandemic.<sup>10</sup> The Youngstown region's proximity to major construction markets and suppliers helped to foster this growth and create regional specialization for supplies dealers.

A broader group of industries, however, saw employment growth attributed to the region's comparative advantage, demonstrating the opportunity for Youngstown to explore its strength across more sectors. Standouts include tech services industries, energy production, and wholesalers in the manufacturing supply chain. A full breakdown of changes in employment and output attributed to the region's comparative strengths is illustrated in Appendix Table A2.

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<sup>8</sup> Collard-Wexler, A., & De Loecker, J. (2015, January). [Reallocation and Technology: Evidence from the US Steel Industry](#). *American Economic Review* 105(1).

<sup>9</sup> The Business Journal Youngstown, Ohio. (2019, February 1). [Acquisition Prepares Dearing Compressor for Growth](#).

<sup>10</sup> TeamNEO. (2021, March). [Construction Pre-and Post-Pandemic](#).



## PRODUCTIVITY AND WORKFORCE SHORTAGES

Between 2019 and 2020, numerous industries reported employment losses from quarantines and other measures taken to slow the spread of Covid-19. Many people exited the regional workforce and never came back even after the pandemic loosened its grip. Some Youngstown industries reported increases in productivity, measured as output per employee,<sup>11</sup> during 2020. Many of these industries experienced higher productivity growth than industries at the national level (Table 2). A closer look is required to understand whether the growth of productivity was a shortage of employment or was due to growth of actual hourly productivity. *Medical Equipment and Supplies Manufacturing* productivity grew by about 25%, *Motor Vehicle Parts Manufacturing* productivity grew by over 18%, and *Other Wood Product Manufacturing* productivity grew by over 10%.

White-collar industries within the Informational Technology, Back Offices, and Services and Financial Services aspirational industries kept and, in some cases, grew their employment; they also experienced sizeable productivity growth during the pandemic. *Data Processing, Hosting, and Related Services* reported a nearly 16% productivity increase with the decline in employment. *Office Administrative Services* grew by over 13%. Within the Financial Services sector, *Other Financial Investment Activities* and *Securities and Commodity Contracts Intermediation and Brokerage* both grew nearly 8% in productivity without a decline in employment.

Youngstown industry leaders in productivity growth in 2020 may have derived much of this change from pandemic factors, which complicates their potential for future workforce development. The *Medical Equipment and Supplies Manufacturing* industry, for example, experienced mixed changes in demand during the pandemic. The demand for personal protective equipment skyrocketed while supplies for in-person procedures decreased as elective surgeries and treatments were postponed. Youngstown has a strong manufacturing presence within *Surgical Appliance and Supplies and Ophthalmic Goods Manufacturing*.<sup>12</sup> Such subindustry specializations may contribute to the large discrepancy between Youngstown and national-level productivity in the *Medical Equipment and Supplies Manufacturing* industry overall, even not counting pandemic effects. In Mahoning and Trumbull counties, the value added of the *Surgical Appliance and Supplies and Ophthalmic Goods Manufacturing* industry was only 14% (\$7.5 million) compared to 46% (\$40.5 million) in the U.S.<sup>13</sup> While the surge in Covid-related medical supplies manufacturing may be temporary, demand for the types of equipment currently being manufactured in Youngstown can anticipate recovering demand as the rest of the health care industry in Northeast Ohio is expected to grow.<sup>14</sup>

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<sup>11</sup> This measure is the closest proxy for productivity measured with Moody's Economy.com data.

<sup>12</sup> Established Youngstown manufacturers in these industries include Anatomical Concepts, Inc., a producer of plastic orthotic devices like ankle or knee braces, and Classic Optical Laboratories, Inc., manufacturer of eyeglass lenses and contact lenses.

<sup>13</sup> According to 2019 IMPLAN data for the U.S., Mahoning and Trumbull counties in Ohio.

<sup>14</sup> TeamNEO. (2019, December). [Quarterly Economic Review: The \\$22 Billion Health Care Industry in Northeast Ohio](#).

**TABLE 2. COMPARATIVE PRODUCTIVITY CHANGES FOR YOUNGSTOWN INDUSTRIES WITH MORE THAN 5% GROWTH, 2019-2020**

NAICS Code	Description	YT Productivity 2020	YT % Change Productivity 2019-2020	National Productivity 2020	National % Change Productivity 2019-2020
3391	Medical Equipment and Supplies Manufacturing	\$136,229	25.0%	\$254,542	17.2%
3363	Motor Vehicle Parts Manufacturing	\$179,026	18.7%	\$125,640	12.8%
5182	Data Processing, Hosting, and Related Services	\$294,281	15.7%	\$512,486**	12.1%
5611	Office Administrative Services	\$101,898	13.4%	\$133,854	11.8%
3219	Other Wood Product Manufacturing	\$89,540	10.3%	\$114,050	9.9%
3271	Clay Product and Refractory Manufacturing	\$115,885	9.8%	\$153,217	6.1%
4441	Building Material and Supplies Dealers	\$84,951	9.4%	\$96,229	9.0%
3272	Glass and Glass Product Manufacturing	\$87,468	9.3%	\$169,824	4.2%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	\$262,263	9.0%	\$262,681	2.9%
5239	Other Financial Investment Activities	\$162,056	7.9%	\$359,708	1.6%
5231	Securities and Commodity Contracts Intermediation and Brokerage	\$220,541	7.8%	\$372,867	2.8%
5614	Business Support Services	\$55,824	6.8%	\$64,634	4.9%
3339	Other General Purpose Machinery Manufacturing	\$156,536	5.8%	\$156,167	1.3%

Note: Moody's Analytics Data in \$2021

\*Without California, national productivity in 2019 was \$398,384

\*\*Without California, national productivity in 2020 was \$440,516

The *Motor Vehicle Parts Manufacturing* industry in Youngstown, on the other hand, has outpaced the country in both productivity growth and total industry productivity in 2020. The region's 2020 productivity level was almost 1.5 times higher than that of the rest of the country. Much of this growth can be explained by the high demand for car parts combined with supply chain shortages

that have allowed manufacturers to increase prices on customers like automotive repair shops.<sup>15</sup> Contributing factors are Youngstown’s location within a strong Northeast Ohio market for car parts and automobiles, as well as technological investments that require fewer workers on-hand at production sites.<sup>16</sup> Employment opportunities within this industry can be expected to transition towards high-skilled positions in advanced manufacturing.

The *Data Processing, Hosting, and Related Services* industry has experienced a steep national increase in demand for online services due to the unprecedented shift of employees working from home during the Covid-19 pandemic. That being said, the data management industry in Youngstown has been on a growth path for years, so positive pandemic effects should not be discounted. 2019 to 2020 productivity increases in Youngstown reflect this trend but still lag behind national productivity levels by about 50%. Youngstown is populated by small-to-mid-sized companies rather than major national players in the tech industry. CBoss Inc, for example, is a highly successful secure payment portal services provider located in Boardman, Ohio. Despite being an industry leader in online payment technology, CBoss is a small, locally owned business.<sup>17</sup> Additionally, the *Data Processing, Hosting and Related Services* industry in the Youngstown region is dominated by capital-intensive data storage and hosting infrastructure (like assets owned by Involta, discussed later in the brief) rather than data processing and analysis services that employ a greater number of highly-skilled, high-productivity employees.

### COMPETITIVE WAGES (ARE THEY COMPETITIVE?)

Total wages across all industries fell approximately 2% between 2019 and 2020 in Youngstown but grew by 0.2% nationally. However, 37 of the 47 analyzed economic base and aspirational industries saw average wages increase between those two years (Table 3). The largest difference in wage growth rates between Youngstown and the U.S. occurred in the *Other Financial Investment Activities* industry, within which Youngstown wages grew by 7% in 2020, more than double the rate wages grew across the U.S. Some of this outpaced growth may be connected to recent blockchain and cryptocurrency investment throughout Northeast Ohio, combined with the boom in the cryptocurrency market during the first year of the pandemic. Following cryptocurrency’s explosion in 2017, Northeast Ohio started the Blockland initiative, and local technology fund committed to investing millions of dollars into blockchain technology startups.<sup>18</sup> Although the Blockland initiative has since lost steam over the course of the pandemic, investments in cryptocurrency-related ventures are continuing near the Youngstown region. Akron, Ohio, is now home to two crypto-mining facilities.<sup>19</sup> In addition, LeBron James has partnered Akron’s I Promise School with Crypto.com to develop the digital skills needed in this

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<sup>15</sup> Rudder, Jon. (2021, November 22). [Supply shortages beginning to impact auto shops as prices, delivery times for parts surge](#). *News 5 Cleveland*.

<sup>16</sup> See the Center for Economic Development’s 2021 report [“The Effect of the COVID-19 Pandemic on Ohio Manufacturing.”](#)

<sup>17</sup> CBoss Inc. (n.d.). [About Us](#).

<sup>18</sup> Bamforth, Emily. (2018, December 2). [JumpStart, FlashStarts announce millions of dollars in funding for blockchain startups](#). *Cleveland.com*.

<sup>19</sup> Vanac, Mary. (2021, December 8). [Second crypto-mining facility is opening in Akron](#). *Cleveland Business Journal*.

technology sector.<sup>20</sup> Returns on these new investments have been high, and *Youngstown's Other Financial Investment Activities* industry may have seen the beginnings of those benefits in 2020.

**TABLE 3. COMPARATIVE WAGE CHANGES FOR YOUNGSTOWN INDUSTRIES WITH MORE THAN 5% GROWTH, 2019-2020**

NAICS Code	Description	YT Avg Wage 2020	YT % Change Wages 2019-2020	National Avg Wage 2020	National % Change Wages 2019-2020
5182	Data Processing, Hosting, and Related Services	\$98,932	12.9%	\$164,445	10.9%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	\$53,335	10.9%	\$56,918	7.4%
5611	Office Administrative Services	\$81,207	9.4%	\$107,999	6.8%
5614	Business Support Services	\$44,851	8.7%	\$53,322	6.8%
5622	Waste Treatment and Disposal	\$74,689	8.5%	\$84,417	7.1%
4441	Building Material and Supplies Dealers	\$34,383	7.7%	\$40,887	6.3%
5239	Other Financial Investment Activities	\$104,952	7.0%	\$255,361	2.5%
3363	Motor Vehicle Parts Manufacturing	\$133,305	6.0%	\$65,282	0.0%
3315	Foundries	\$54,685	5.6%	\$66,711	1.0%
5231	Securities and Commodity Contracts Intermediation and Brokerage	\$143,756	5.3%	\$267,686	2.1%

Note: Moody's Analytics Data in \$2021

Youngstown wages grew the most overall within the *Data Processing, Hosting, and Related Services* industry, rising by 13%, a rate two percentage points higher than wage growth at the national level. Involta, an IT service management company, is one of the region's major players in the data hosting industry as it runs Youngstown's largest data center. Nationally, average wages within this industry are about 60% higher than those in the Youngstown region. An explanation for this phenomenon centers around the location of most *Data Processing, Hosting, and Related Services* jobs across the country, with the majority centering around major metropolitan centers like San Francisco, Los Angeles, Dallas, and New York, which all have higher costs-of-living and a more developed IT industry than cities in the Youngstown region. Regardless, industry experts anticipate an increasing need for data center employees, citing a retiring workforce and an entry-level skills gap as major workforce challenges.<sup>21</sup>

<sup>20</sup> Sherter, Alain. (2022, January 28). [LeBron James teams with Crypto.com to teach kids about blockchain](#). CBS News.

<sup>21</sup> Uptime Institute. (2020, July). [Uptime Institute Global Data Center Survey 2020](#).

*Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance* also outpaced national level wage growth, growing 11% while wages grew 7.4% nationally. The related *Office Administrative Services* and *Business Support Services* industries experienced sizeable wage growth that outpaced the national rates. Out of the thirty-seven industries that experienced wage growth during the first year of the pandemic, only two increased their workforce (*Building Material and Supplies Dealers*; *Warehousing and Storage*).

Evidence suggests that demand for job retention and the need for a larger workforce motivated wage increases in the other Youngstown top wage growth industries. The *Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance* industry has faced a workforce shortage for years,<sup>22</sup> which has been exacerbated by pandemic conditions. This is an opportunity industry for workforce growth in Youngstown, as the robust manufacturing presence in the region provides a supportive environment for the hiring of equipment maintenance and repair technicians. Likewise, there is an opportunity for workforce growth in service sector industries like *Office Administrative Services* and *Business Support Services* as they face greater customer demand and simultaneous challenges to rebuilding their workforce after experiencing pandemic losses. Following these pandemic employment losses, call centers across the country are increasing job quality through higher wages and more benefits.<sup>23</sup> This is a trend that may have a significant effect on the Youngstown region, as call centers are some of the area's largest employers, providing jobs for about 3,300 workers, according to a 2021 report by the Youngstown-Warren Regional Chamber.<sup>24</sup>

## CONCLUSION

Seven of the 47 economic base and aspirational industries demonstrated strength in all three areas of analysis: pre-pandemic competitive advantage in employment and output, productivity growth, and wage growth from 2019 to 2020. Five of these seven industries - *Clay Product and Refractory Manufacturing*, *Iron and Steel Mills and Ferroalloy Manufacturing*, *Steel Product Manufacturing from Purchased Steel*, *Architectural and Structural Metals Manufacturing*, and *Metalworking Machinery Manufacturing* - are in the manufacturing sector. The remaining two are *Building Material and Supplies Dealers* and *Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance*. These two industries are also interrelated, comprised of manufacturers, retailers, and technicians that supply the strong regional construction industry and support advanced manufacturing. All seven industries are uniquely positioned, having shown regional specialization as well as adaptability in the face of new demands resulting from the Covid-19 pandemic.

Beyond these seven standouts, our analysis of Youngstown's driver industries demonstrates two important trends. For one, legacy manufacturing and related industries are demonstrating returns on decades of investment within the Youngstown region. These industries are

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<sup>22</sup> AED Foundation and the College of William & Mary. (2020). [The Equipment Industry Technician Shortage](#).

<sup>23</sup> Deighton, Katie. (2021, December). [Companies call in better pay and perks for contact center workers](#). *The Wall Street Journal*.

<sup>24</sup> Youngstown-Warren Regional Chamber. (2021, April). [Youngstown-Warren Area Largest Employers](#).

traditionally capital-intensive and contribute to the region's economic foundation, supporting highly-paid jobs, but at a lower quantity than some labor-intensive industries. Alongside traditional manufacturing, Youngstown's service economy is growing, contributing to healthy industry diversification in the region. The productivity growth, wage growth, and higher quantity of employment opportunities in the business services, finance, and data management industries signal an opportunity for greater investment by the region.

It is also important to note that by focusing on 47 industries, this report addresses only a portion of Youngstown's economy and ensuing dynamics. These 47 industries are economic drivers within the region, and their growth has an impact on the rest of the economy, creating positive trickle-down effects on other industries. Driver industries generate more disposable income that triggers the growth of population services industries and their suppliers. For example, Youngstown's healthcare industry is growing, boasting large employment and new investment in infrastructure and service expansion. It is unclear whether this growth in the medical cluster is due to its research component, which produces a larger economic multiplier effect, or its local population service function, which plays a more supportive role in the economy. There is evidence for the latter, as Mercy Health, the region's largest employer, recently announced plans to build a 60-bed rehabilitation hospital in partnership with Kindred Rehabilitation Services.<sup>25</sup> This specialty hospital will add a roster of new, living-wage and high-wage jobs to the regional economy, contributing to its overall health. From a demographic perspective, demand for these services may signal the Youngstown region's population stabilization and potential for future growth.

Existing workforce development programs may be supplemented with skills training that more directly targets these high-opportunity industries. In recent years, Youngstown has initiated workforce development programs to close the gap for in-demand skills within industries such as advanced manufacturing, information technology, and more. For example, Youngstown State University's Division of Workforce Education and Innovation provides on-site and online training in advanced manufacturing, robotics, automation, information technology, and professional business skills. Providing increased access to affordable jobs training programs in the region's community colleges and technical schools ensures that job seekers of all ages and experiences have opportunities to participate in Youngstown's changing economy. The region can also reduce the workforce gap by tapping into overlooked labor pools through recruitment initiatives geared towards a more diverse workforce that includes more women and minority populations in advanced manufacturing, IT, and construction industry roles. By investing in a workforce according to its strengths and opportunities, Youngstown can ensure continued recovery from the Covid-19 pandemic and economic resiliency in the face of future challenges.

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<sup>25</sup> Nelson, George. (2022, May 10). [Mercy Health, Tennessee Firm to Build Rehab Hospital](#). *The Business Journal*.

## APPENDIX

**TABLE A1. YOUNGSTOWN ECONOMIC BASE AND ASPIRATIONAL INDUSTRIES**

NAICS Code	NAICS Description	NAICS Code	NAICS Description
2111	Oil and Gas Extraction	3361	Motor Vehicle Manufacturing
2211	Electric Power Generation, Transmission and Distribution	3362	Motor Vehicle Body and Trailer Manufacturing
3116	Animal Slaughtering and Processing	3363	Motor Vehicle Parts Manufacturing
3118	Bakeries and Tortilla Manufacturing	3365	Railroad Rolling Stock Manufacturing
3121	Beverage Manufacturing	3391	Medical Equipment and Supplies Manufacturing
3219	Other Wood Product Manufacturing	4235	Metal and Mineral (except Petroleum) Merchant Wholesalers
3241	Petroleum and Coal Products Manufacturing	4238	Machinery, Equipment, and Supplies Merchant Wholesalers
3261	Plastics Product Manufacturing	4441	Building Material and Supplies Dealers
3271	Clay Product and Refractory Manufacturing	4841	General Freight Trucking
3272	Glass and Glass Product Manufacturing	4881	Support Activities for Air Transportation
3311	Iron and Steel Mills and Ferroalloy Manufacturing	4931	Warehousing and Storage
3312	Steel Product Manufacturing from Purchased Steel	5112	Software Publishers
3313	Alumina and Aluminum Production and Processing	5182	Data Processing, Hosting, and Related Services
3314	Nonferrous Metal (except Aluminum) Production and Processing	5222	Nondepository Credit Intermediation
3315	Foundries	5231	Securities and Commodity Contracts Intermediation and Brokerage
3321	Forging and Stamping	5239	Other Financial Investment Activities
3323	Architectural and Structural Metals Manufacturing	5241	Insurance Carriers
3324	Boiler, Tank, and Shipping Container Manufacturing	5415	Computer Systems Design and Related Services
3328	Coating, Engraving, Heat Treating, and Allied Activities	5417	Scientific Research and Development Services
3329	Other Fabricated Metal Product Manufacturing	5611	Office Administrative Services
3332	Industrial Machinery Manufacturing	5614	Business Support Services
3335	Metalworking Machinery Manufacturing	5622	Waste Treatment and Disposal
3339	Other General Purpose Machinery Manufacturing	8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance
3353	Electrical Equipment Manufacturing		

**TABLE A2. YOUNGSTOWN EMPLOYMENT AND OUTPUT CHANGES FROM REGIONAL SHIFT, 2018-2019**

NAICS Code	NAICS Description	Total Employment 2019	YT Emp Change from Shift	YT GDP Change from Shift	% Emp Change from Shift	% GDP Change from Shift
3315	Foundries	380	25	\$937	7.2%	2.3%
8113	Commercial and Industrial Machinery and Equipment (except Automotive and Electronic) Repair and Maintenance	390	12	\$1,327	3.3%	3.2%
4441	Building Material and Supplies Dealers	1680	50	\$3,788	3.0%	3.0%
4235	Metal and Mineral (except Petroleum) Merchant Wholesalers	1180	25	\$1,700	2.2%	1.3%
3323	Architectural and Structural Metals Manufacturing	640	12	\$1,155	2.0%	1.5%
3312	Steel Product Manufacturing from Purchased Steel	1150	21	\$5,211	1.9%	2.2%
3271	Clay Product and Refractory Manufacturing	370	6	\$100	1.8%	0.3%
3311	Iron and Steel Mills and Ferroalloy Manufacturing	710	10	\$3,379	1.5%	2.0%
3335	Metalworking Machinery Manufacturing	790	7	\$1,804	0.9%	1.6%
5415	Computer Systems Design and Related Services	600	64	-\$252	12.3%	-0.4%
3241	Petroleum and Coal Products Manufacturing	250	19	-\$3,055	8.2%	-0.6%
5622	Waste Treatment and Disposal	380	20	-\$2,361	5.8%	-3.8%
4238	Machinery, Equipment, and Supplies Merchant Wholesalers	1250	57	-\$116	4.9%	-0.1%
3313	Alumina and Aluminum Production and Processing	1580	56	-\$6,325	3.8%	-2.6%
5239	Other Financial Investment Activities	200	5	-\$876	2.7%	-2.8%
5182	Data Processing, Hosting, and Related Services	220	2	-\$1,725	1.1%	-3.3%
3219	Other Wood Product Manufacturing	550	5	-\$1,905	1.0%	-4.1%
3118	Bakeries and Tortilla Manufacturing	550	5	-\$710	0.9%	-1.5%
2111	Oil and Gas Extraction	130	1	-\$3,206	0.7%	-1.7%
3332	Industrial Machinery Manufacturing	240	0	\$833	-0.1%	2.0%
3272	Glass and Glass Product Manufacturing	80	0	\$22	-0.5%	0.3%
3321	Forging and Stamping	470	-3	\$2,977	-0.6%	5.1%
3339	Other General Purpose Machinery Manufacturing	540	-7	\$4,679	-1.3%	6.2%
5614	Business Support Services	2530	-73	\$518	-2.8%	0.4%
3329	Other Fabricated Metal Product Manufacturing	520	-26	\$713	-4.9%	1.3%
3116	Animal Slaughtering and Processing	90	-22	\$366	-19.7%	5.4%

*Note: Moody's Analytics Data in \$2021*